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(A quarterly journal devoted to research on ageing)

Contents

Declaration

OBITUARY

PROFESSOR P.K.DEV
(1st May 1942- 21st December 2020)

The members of the Executive Committee of Indian Gerontological Association and the members of the Editorial Board of Indian Journal of Gerontology extend heartfelt condolences on the sad demise of Professor P.K. Dev (former professor of Zoology, University of Rajasthan, Jaipur).

Professor P.K.Dev was associated with Indian Gerontological Association and the Journal- Indian Journal of Gerontology, since its inception in the year 1969. He was Vice-President of Indian Gerontological Association and was also Associate Editor (Biological Sciences Section) of Indian Journal of Gerontology since 1990. He always took a keen interest in all the activities of IGA and helped in improving in the quality of the Journal.

We pay our deepest respects to the departed soul and pray for the Almighty to grant him everlasting peace.

NEWS & VIEW

ATTENTION PLEASE

Those who are interested in becoming a member of *Indian Gerontological Association* (IGA) are requested to send their Life Membership fee, Rs. 2000/- (Rupees Two thousand) or Annual Membership Rs. 500/- (Rupees Five hundred only). Membership fee is accepted only by D.D. in favour of Secretary, Indian Gerontological Association or Editor, Indian Journal of Gerontology. Only Life members have the right to vote for Association's executive committee. Members will get the journal free of cost. Life Membership is only for 10 years.

REQUEST

Readers are invited to express their views about the content of the journal and other problems of senior citizens. Their views will be published in the Readers' Column. Senior citizens can send their problems to us through our web site: www.gerontologyindia.com Their identity will not be disclosed. We have well-qualified counsellors on our panel. Take the services of our counselling centre - **RAHAT.**

Dr. Bhaweshwar Singh, Professor, Department of Biotechnology,
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Properties of Lipase and Lipolytic Activity During Ageing of Female Moth, Helicoverpa Armigera (Hubner)

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ABSTRACT

Properties of lipase in female moth H. armigera showed optimum pH 8.1, incubation time 20 minutes, temperature 37E C, enzyme concentration 1 per cent, substrate 6 per cent as optimum substrate concentration and Michaelis-Menten constant (Km) value 0.246×10–2 mM. The lipase hydrolysed the triglycerides to diglycerides and fatty acids. The gradual increase in lipolytic activity was noted from 1-day to 5-day and decrease from 5 to 9-day female moth. The maximum lipolytic activity in 5-day old female adults of H. armigera. Arithmetic mean and standard deviation were noted to be 0.3672 and 0.04135 respectively. One way analysis of variance (ANOVA) of lipolytic activity from male and female adults of H. armigera noted to be $p < 0.003$. The role of lipase in female moth of H. armigera has been discussed in present work.

Keywords: Lipase activity, female moth, insect, ageing, *H. armigera*.

Insects make ideal organisms for fundamental biological research. They are in general easily collected easy to rear in large numbers and are small in size. *Drosophila melanogaster* has been widely utilized as a research species in genetics. A considerable amount of experimental development endocrine work has been carried out on the reduviid bug, *Rhodnius prolixus*, other genera that appear often in biological literature include *Tribolium, Ephestia, Calliphora, Musca, Periplaneta* and *Apis* (Romosar, 1973). Insects are the earth's most varied organisms. Almost exactly half (50.8%) of the species of living things and 72 per cent of all animals are insects. Of all the animal phyla, only the arthropods and the chordates have succeeded extensively in adapting to life in dry air. Insects now inhabit virtually all land surfaces of the globe. Insects have been found living in deep caves, hot springs, salt lakes, and pools of petroleum. About 3 per cent of all species of insects live in freshwater, and perhaps 0.1 per cent are found in the marine intertidal zone (Daly *et al.,* 1978). *H. armigera* is a cosmopolitan, multivoltine and highly polyphagus pest and serious pest of gram, *Cicer arietinum* (L.) in India. Lipase is an enzyme which is responsible for hydrolysis of triglyceride. The information on lipase in female moth of *H. armigera* is rather scanty. *H. armigera* is one of the most destructive pests of several field and vegetable crops, with indiscriminate use of insecticides contributing to multiple instances of resistance *H. armigera* had developed resistance to Bt cotton (Alvi *et al.,* 2012). Wang *et al.* (2016) have attempted characterization of a lipase in the malpighian tubules of the silkworm, *Antheraea pernyi*. Nguyen *et al.* (2018) have noted black soldier fly larvae can assimilate organic waste for fat accumulation. The use of lipase in the enzymatic esterification of black soldier fly larvae fat with methyl acetate is a promising and ecofriendly method for green fuel production. In the present study, an attempt has been made to evaluate properties of lipase and lipolytic activity during ageing of female moth, *H. armigera* which will help understand the physiology of the pest which can be used for pest control. Hence, present work was under taken.

Materials and Methods

The rearing of *H. armigera* was carried out in the laboratory on the natural food of chick pea, *C. arietinum*. The female moths from

1-day to 9-day were taken for study of lipolytic activity. For the enzyme preparation moths were isolated under ice cold distilled water, after removing the wings weighed and homogenized in the cold distilled water using a ground glass mortar and pestle. The homogenate were diluted with cold distilled water so as to get 1 per cent (wt/vol) concentration. Such homogenate were used for the assay of lipase activity (Hayase and Tapple, 1970). The assay system contained 0.25 ml of 6 per cent olive oil dispersed in gum acacia; 1.0 ml of 0.2 M tris-maleate buffer pH 8.1 and 0.25 ml of 1 per cent (wt/vol) enzyme solution in a total volume of 1.5 ml. The incubations were carried out in a shaker with a continuous shaking for 20 minutes in glass stoppered vessels at 37EC. The reaction was stopped with 2 ml of Cu-TEA reagent. The colour was developed by the addition of 1 ml of 0.5 per cent solution of mixture of diphenyl carbazone and diphenylcarbazid (5:95 w/w) in methanol. At the end of the incubation the liberated fatty acids were measured colorimetrically (Itaya, 1977).

Results and Discussion

Female adult developmental period of *H. armigera* is of 9-days. Properties of lipase in adult female moth *H. armigera* showed optimum pH 8.1, incubation time 20 minutes, temperature 37E C, enzyme concentration 1 per cent, substrate 6 per cent as optimum substrate concentration and Michaelis-Menten constant (K_m) value 0.246×10^{-2} mM. The lipase hydrolysed the triglycerides to diglycerides and fatty acids. The gradual increase in lipolytic activity was noted from 1-day to 5-day and decrease from 5 to 9-day female moth. The maximum lipolytic activity in 5-day female moth of *H. armigera*. Arithmetic mean and standard deviation were noted to 0.3672 and 0.04135 respectively. One way analysis of variance (ANOVA) of lipolytic activity from male and female moths of *H. armigera* noted $p < 0.003$. Effect of tris-maleate pH on 4th day female moth lipolytic activity of *H. armigera* is shown in Figure 1 and lipolytic activity in female moth of *H. armigera* in Figure 2.

Figure 1
Effect of pH on 4th day female moth lipolytic activity of H. armigera.
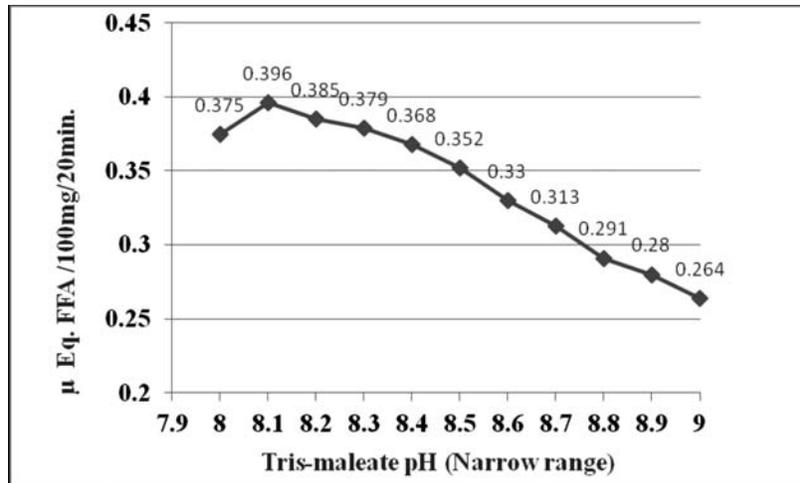
Figure 2
Lipolytic activity during ageing female moth, H. armigera.
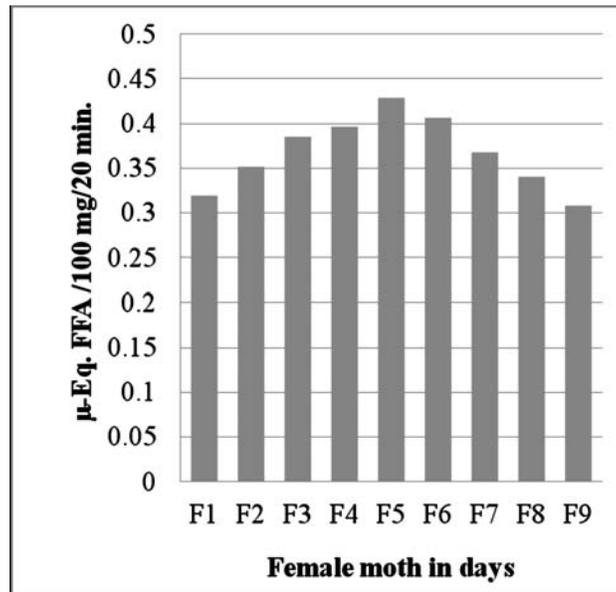
During adult development, the female apparently utilizes far more lipid than the male (Domroese and Gilbert, 1964). Fast (1964) studied lipid contents (wet weight) 5.5 per cent, 23 per cent, 33.8 per cent and 7.8 per cent in the female adults of *Eacles imperialis, Danaus plexippus, Plusia gamma* and *Papilio turnus* respectively. In most insects the female contains more lipid than the male, as lipid is a most efficient substrate for egg development (Gilbert, 1967). Lipase activity in adult *Drosophila melanogaster* was maximum at pH 7 (Smith *et al.,* 1994). In adult females, lipophorin delivers lipids to growing oocytes (Entringer *et al.,* 2013). The lipid of some adult insect species belong to order coleopteran have been noted by Bozdogan *et al*. (2016). In the present study, female moth lipase of *H. armigera* pH 8.1, incubation time 20 minutes, temperature 37EC, 1 per cent enzyme concentration, substrate concentration 6 per cent and apparent K_m 0.246×10^{-2} mM indicates enzyme maximally active at an alkaline pH and high affinity with the substrate. The gradual increase in female adult lipolytic activity from 1-day female moth to 5-day female moth suggests utilization of lipids for the oogenesis. The female moth flies little after emergence therefore needs only limited lipids for flight. In the present work, decrease from 5 to 9-day female moth suggests lipid depletion stage requiring low energy. The maximum lipolytic activity in 5-day female moth of *H. armigera* indicates active role of lipase in oogenesis and ovi position. The analysis of variance (ANOVA) extends the problem of testing of equality of two means to that of testing of equality of several means of several independent populations. In the present study, P-value 0.003 indicates true hypothesis with significant differences ($p < 0.005$) in lipase activity during male and female moths of *H. armigera*.

Conclusion

The experiment attempted herein suggests the role of lipase in the female moth and fatty acid oxidation system in the muscles of female adult moth. The rate of release of free fatty acids in male moth is 1.15 fold as compared to female moth of *H. armigera*. The rate of release of free fatty acids is in the order of male moth > female moth. Increased lipase activity may lead to decrease in lipid level in different developmental stages. The increased levels of lipase enzyme activity in different developmental stages could be due to higher rate of lipolysis

to cope up with the high energy demand of active stages of growth and development.

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Otological Disorders in Geriatric Population: A Study

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ABSTRACT

The present study was conducted with the aim to highlight the pattern of otological diseases in the elderly for careful cost-effective health care plans and to make the ageing period more fulfilling and tolerable to the elderly. A total of 543 patients visiting the ENT OPD ESIC hospital having ear complaints were included in this study to find out the different otological disorders present amongst the geriatric patients. It was found that the disease was more prevalent in the 60–64 years age group and in males compared to females. Presbycusis was the most common otological disorder (48.8%) followed by impacted wax (25.59%), tinnitus (12.89%), otomycosis (6.99%), CSOM (4.60%), vertigo (0.92%) and foreign body (0.18%). Based on the findings of this study it may be suggested that Prebycausis is the most common geriatric otological problem. Geriatric health problems are likely to gain public health importance because of the rising population in this age group.

Keywords: Elderly population, Hearing problems, Otology, Presbycusis.

The problems of the elderly are many. As life expectancy increases the problems increase proportionately. For a developing country like India, there will be mounting pressures on various medical care providers. As the numbers of elderly patients with

Oto-rhino-laryngological problems seeking medical care will increase significantly, over the next several decades, knowledge of the prevalence of the diseases and basic principles of geriatric medicine will become essential for otolaryngologists. The ageing process in humans affects all the organs of the body, including the ear (the external, the middle, and the inner ear) (Kayode, *et al.,* 2010). For this reason, the various parts are usually diseased should the individual lives long enough. As most of these diseases are usually not life-threatening, little or no attention is paid to them and hence, there is a scarcity of information about the pattern of otological diseases in elderly Indians.

Oto-rhino-laryngological problems, especially hearing loss and balance disorders interfere with the social interaction of geriatric patients and can worsen co-existent health problems. Every otolaryngologist should understand the unique health care needs of the elderly. The Maintenance and Welfare of Parents and Senior Citizens Act, 2007 (India) was enacted to ensure need-based maintenance for parents and senior citizens and their welfare, ensuring that they may not merely live longer, but lead a secure, dignified and productive life and these are major challenges (Jeyalakshmi S, *et al.,* 2011).

A proper understanding of the magnitude of ear diseases and the factors associated with their occurrence in the community would help in planning for geriatric otorhinolaryngology care services (Giri, P.A. *et al.,* 2010).

A geriatric population is a group in which ear problems are significantly found yet few studies are available which gives an idea about different types of ear problems. This study gives us a rough idea about the different types of otological problems faced by the patients of the geriatric age group visiting the ENT OPD in our hospital.

In this study, the researchers have tried to figure out the various otological problems faced by the geriatric patients attending the ENT OPD.

Materials and Methods

It is a prospective observational study of elderly patients attending ENT OPD between December 2018 and December 2019 after taking into account inclusion and exclusion criteria.

Inclusion criteria: The patients of the age of 60 yrs. & above who attended the ENT outpatient department with ear complaints and peripheral vertigo were studied.

Exclusion criteria: Patients below 60 yrs. age and patients with vertigo of systemic and neurological origin.

The study was conducted by the ethical standards of ESIC hospital and with the Helsinki declaration. With due attention to the patients, complaints were noted and the detailed history of Otological problems was taken from each individual. The information regarding age, sex, were noted. The physical examinations of ear, nose, throat, and neck were done along with systemic examination. They were thoroughly examined using ENT headlight, Otoscopic examination was done and tuning fork tests of 256 Hz,512 Hz,1024 Hz frequencies were done. The vestibular function tests were done in patients complaining of vertigo or unsteadiness. We conducted Pure Tone Audiometry which was necessary to evaluate impaired hearing. The investigations like fasting blood sugar, kidney function tests, serum electrolytes, liver function tests, etc. were done whenever required. Other radiological investigations were done as per indications. The final diagnosis of disease was done by clinical examination and required investigations.

Results

A total of 543 patients were included in our study. It was found that the disease was more prevalent in the 60–64 years age group (39.59%) followed by 65–69 years age group (36.68%) and >70 years age group (23.75%) as shown in Table 1.

Table 1
Age Distribution

Age	Frequency	Percentage
60–64	215	39.59
65–69	199	36.64
>70	129	23.75
Total	543	100

Otological disorders were prevalent more in males (72.007%) as compared to females (27.992%) as shown in Table 2.

Table 2
Gender Distribution

Sex	Frequency	Percentage
Male	391	72.007
Female	152	27.992
Total	543	100

Presbycausis was the most common otological disorder (48.8%) followed by impacted wax (25.59%), tinnitus (12.89%), otomycosis (6.99%), CSOM (4.60%), vertigo (0.92%) and foreign body (0.18%) as shown in Table 3.

Table 3
Pattern of Otological Problems

Isorders of Ear	Frequency	Percentage
Presbycausis	265	48.80
Aural Wax Impaction	139	25.59
Tinnitus	70	12.89
Otomycosis	38	6.99
Csom	25	4.60
Vertigo	5	0.92
Foreign Body	1	0.18
Total	543	100

Discussion

In the current study, we found a maximum of geriatric patients in the 60–64 age group (39.59%). This is similar to a study done by Mohanta, *et al.,* (2018) where maximum geriatric patients were in the age group of 60–64 years (46.02%) followed by 65–69 yr (27.70%) and 70 yrs. & above (26.77%).

In this study, it was found out that diseases were more prevalent in males. The findings of this study are similar to the study done by

Mohanta, *et al.,* (2018) where the Otorhinolaryngol problems were more prevalent in males (63.65%) than females (36.35%). In a study conducted by Giri P. A. *et al.,* (2010) from Maharastra (India) during the year 2009 it was observed that there were 784 (61.7%) males and 486 (38.3%) female patients out of a total number of study patients (1270). This may be due to typical social trends in India relating to gender bias, ignorance, and negligence towards female patients.

Presbycusis is the most common form of otological disorder encountered in our study among elderly patients (48.80%). The high prevalence of presbycusis in this study corresponds to the results obtained elsewhere in similar study populations (Perez, 1995; Bora, 2004; and Giri, 2010). World Health Organization (WHO), reports that 30–35 per cent patients above 60 years suffer from presbycusis, and this increases to 40–45 per cent in patients above 70 years of age (WHO 1989 and 1999). Jonsson and Rosenhall (1998) confirmed the results of population-based studies that had shown a higher prevalence of hearing loss in this age group. Cruickshanks, *et al.,* (1998) found a still higher prevalence of hearing loss (45.9%) in an epidemiological study of geriatrics in Wisconsin, USA. In a study done by Mohanta, *et al.,* (2018) otological problems, especially presbycusis scores, were high (17.71% of total and 34.21% of otological problems). The present study also corresponds to the studies of Nepali, *et al.,* 2004 and Okhakhu, *et al.,* 2013). Ageing factors include hair cell loss, atrophy of stria vascularis, loss of cochlear neurons, and central loss due to degradation of executive function (Joseph 2010).

Hearing loss severely affects the quality of life especially in the background of low socioeconomic status where the accesses to health care facilities are restricted due to various reasons. It increases the disability burden on society and could be a cause of depression, isolation, and suicidal tendencies.

Impacted wax was the second otological disease in our group and constituted 25.5 per cent of all subjects studied. With ageing, the coarsening and lengthening of the hairs within the external auditory canal act as a physical impediment to self-cleaning of the ear, and declined activity of the cerumen gland with age makes the ear drier & difficult

to clean (Torcinsky *et al.,)* . So a wax formation in old age leads to problems. In a study conducted in Nigeria impacted wax was the most common ontological problem (Kayode, *et al.,* 2010).

Tinnitus increases in incidence with age. In our study tinnitus was observed in 12.89 per cent of the patients which is almost similar (12.64% of otological disorders) and comparable to the findings of Nepali, *et al.,* 2014) and Mohanta, *et al.,* 2018). In the present study, otomycosis constituted 6.99 per cent of all subjects. In a study conducted in Nigeria, otomycosis, represented, 63 (8.5%) of all subjects studied (Kayode *et al.,* 2010).

The overall incidence of chronic suppurative otitis media (CSOM) in our study was 4.60 per cent. In a study by Mohanta, *et al.,* (2018) CSOM accounted for 17.34 per cent of total aural problems. In a study conducted by Nepali, *et al.,* (2014), 19.4 per cent of total aural problems accounted for by CSOM suggesting that the incidence and etiological factors are identical in the Indian subcontinent. But another study conducted by Okhakhu A.L. *et al.* (2013) in Benin city of Nigeria showed that CSOM was prevalent in only 10.6 per cent between 2008 and 2012.

Vertigo in old age occurs due to degenerative vestibulopathy (atrophy and collapse of semicircular duct, undifferentiated cellular proliferation, and deposits in saccule), BPPV, Meniere's disease, multiple sclerosis, diabetic vestibulopathy (Kim, *et al.,* 2008). In this study, the researchers have observed vertigo in 0.92 per cent of elderly patients. The incidence of vertigo in a different study like that of Okhakhu A.L., *et al.,* (2013) was 5 per cent. These patients may attend the otolaryngology clinic either on regular OPD periods or may present in an emergency. The incidence of benign paroxysmal positional vertigo (BPPV) in adults causing vertigo in old age is 13.8 per cent of all otological disorders as observed by Nepali R., *et al.,* (2014). There are not many works of literature about the incidence of BPPV in adults. Dagan, E., *et al.,* (2012) observed that the incidence of BPPV was 8.88 per cent in an emergency outpatient department, who also observed the aggregate percentage of vertiginous or balance disorders was 23.45 per cent, which seems appreciably high. In a study

by Mohanta, *et al.,* (2018) the incidence of vertigo of various etiologies was only 2.96 per cent. It might be because the management of vertigo is undertaken by physicians of other disciplines as the vertigo is a symptom of multifactorial origin. Francis Jr. *et al.,* (2013) observed that most of the vertiginous syndromes and vestibular disorders were in the range of age groups of 66–100 yrs. They also concluded that most common geriatric diagnoses were otogenic between these ranges.

In the present study 1 case of a foreign body (Insect) in the ear was noticed. In a study (Kayode *et al.,* 2010) conducted in Nigeria, foreign body impaction accounted for 32(4.3%).

Conclusion

The findings of this study suggest that Presbycusis is the most common geriatric otological disorder. Proper counselling and treatment of geriatric age group patients having otological disorders should be done by an otorhinolaryngologist.

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Haematocrit-SBP Nexus: Possible Age and Obesity Intervention

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ABSTRACT

In view of marked senescence-perpetrated decrements and deficiencies in late age, the present cross-sectional study was carried out in senile human subjects to assess the possible effect of advancing age and increasing obesity on Haematocrit and Systolic Blood Pressure, haematologic parameters with marked pathophysiologic manifestations. Statistically significant and more pronounced variations in the late age segment under overweight and obese subcategories with significant intra-correlations could be thought suggestive of lowered plasma volume-induced raised blood viscosity as one of the probable determinants of raised Systolic Hypertension with wide cardiovascular implications.

Keywords: Age, Ageing, Gerontological, Haematocrit, Systolic Hypertension, Haematologic, Obesity.

Recent gerontological advances affirm an accelerated pace of degenerative ageing in senility. Increasing age in the later part of life believably declines physiological reserves and culminates in devastating age onslaughts by way of inescapable pathophysiologic perturbations. A linear rise in the frequency of cardiovascular diseases with age (Karavidas, *et al.,* 2010) and their higher prevalence in

developing countries (Cesare *et al.,* 2013) prioritises epidemiological studies to assess deteriorative variations in haematologic and wide-ranging physiological parameters of cardiac concern. The high prevalence of cardiovascular disabilities including initially asymptomatic essential hypertension known as a silent killer (Oparil *et al., ,*2003 and Prabhakaran *et al.,* 2013) is thought to induce glycemic and dyslipidemic imbalances in connivance with obesity and thereby raise cardiovascular morbidity and mortality in late age.

It is in this perspective that the present piece of work was contemplated to estimate Haematocrit and Systolic Blood Pressure in older human subjects in relation to increasing age and BMI-linked obesity.

The paper summarily attempts to throw some light on the relationship between chosen blood parameters in the given backdrop of age and obesity intervention. Suggestive measures to reduce risk of Systolic Hypertension through lifestyle changes are also discussed.

Materials and Method

Randomised older adults from both the sexes inhabiting Darbhanga, a commissionary town of North Bihar, India (n=322), and ranging in age from 50 to 98 yrs. were categorized into four age groups, viz. 50–59 yrs., 60–69 yrs., 70–79 yrs. and 80+ yrs. and three obesity subcategories based on Body Mass Index (BMI), viz. Normal

weight: NW (18–22.9), Overweight: OW (23–24.9), and Obese: Ob (>25) as per the standards prescribed for the Indian population (Patil *et al.,* 2012). BMI was computed using measured values of height and weight of consented subjects with the application of the formula BMI=Weight (kg)/Height (m)2 as suggested by Romerocorral *et al.,* 2008. Quantitative estimation of Haematocrit (Ht) was performed using Semi-Automated Analyzer (Model: Xp 100, Company: Sysmex) and Systolic Blood Pressure (SBP) was measured in sitting position during early hours only by the auscultatory method using a sphygmomanometer (Gyton *et al.,* 1988) to rule out postural and diurnal variations. ANOVA and Correlation analyses were done for statistical interpretations at 5 per cent and 1 per cent probability levels.

Results and Discussion

Table 1 illustrates the mean observed values of chosen blood parameters concerning respective age and obesity groups. Findings appear suggestive of a general trend of diminished Ht ($37.072 \pm 6.469\%$ for Men and $36.448 \pm 4.372\%$ for Women) in contrast to raised SBP (138.6 ± 17.70 mmHg for Men and 143.5 ± 18.15 mmHg for Women) in all age ranges taken together. More pronounced variabilities in overweight and obese groups and in 60–69 and 70–79 yrs. age brackets were found statistically significant (Table 2). Significant correlations between Ht and SBP were conspicuous in all age ranges in overweight and obese groups (Table 3). In all probabilities, results appear indicative of the close relationship of Systolic hypertension with Haematocrit (Jae *et al.*, 2014), cardiovascular diseases (O'Donell and Kennel, 1998; Mendis *et al.*, 2007) and cardiovascular risk factors and BMI (Vilgman *et al.*, 2018 and Wormser *et al.*, 2011). Accelerated hematopoiesis induced elevated Ht could be thought to be one of the variable determinants of raised BP perceived as an independent risk predictor or risk factor for cardiovascular diseases and diabetes (Paul *et al.*, 2012, Jae *et al.*, 2014 and Liu *et al.*, 2015). Lowered plasma volume-induced raised blood viscosity might be considered as one of the probable ingredients of raised Systolic Blood Pressure, a serious pathophysiologic manifestation with serious cardiovascular implications. Besides altered viscosity properties of blood, progressive decline in vascular elasticity, arteriosclerotic deposition of fatty plaques on the inner surface, unintentional high salt intake as a sequel of olfactory impairment and free cytosolic calcium accumulation and magnesium depletion could be thought to lead to vasoconstriction and subsequent systolic hypertension (Barbagallo *et al.*, 1997; Brown and Whitworth, 1992 and Dilman,1989). Post-adulthood age increment in association with devastating obesity resulting in overweight and obese conditions could be thought to be the main culprit behind all observed functional disabilities and systemic lapses in older adults. Deep-rooted ramifications of Ageing-Disease nexus in late life might have contributed to elevated Haematocrit-linked systolic Blood Pressure, in turn, enhancing the risk of hemorrhagic and ischemic stroke besides cardiac dysfunctions (Munsi, 2006).

Table 1

Showing Mean values of SBP and Ht concentrations among older adults (n=322) under chosen age intervals in relation to various obesity group.

Obesity group	Age range	Sex (% population)	Mean Values ± S.D.	
			SBP (mmHg)	Ht (%)
Normal weight	50–59	M (12.73)	132.6 ± 21.52	32.17 ± 7.801
		W (4.97)	125.1 ± 17.66	31.156 ± 4.886
	60–69	M (13.35)	132.3±14.76	34.176±7.42
		W (5.69)	128.8±15.59	34.35±7.102
	70–79	M (5.28)	137.06±23.20	32.764±6.725
		W (2.79)	138.8±26.43	32.71±3.752
	80+	M (2.48)	114.6±11.47	32.25±3.989
		W (0)	–	–
	All age range	M (33.85)	131.9±19.50	33.06±7.327
		W (13.35)	129.5±19.74	32.818±5.913
Overweight	50–59	M (5.9)	136.8±14.16	35.584±5.767
		W (2.79)	127.7±12.27	35.98±4.89
	60–69	M (4.66)	136.1±14.28	37.326±6.818
		W (3.11)	136±21.54	33.72±4.95
	70–79	M (2.48)	149.5±29.52	29.7±6.418
		W (1.55)	154±12	35.86±7.473
	80+	M (1.24)	142.5±4.330	33.05±3.697
		W (0.31)	120	29.3
	All age range	M (14.3)	139.3±18.09	34.908±6.66
		W (7.76)	136±19.18	34.788±5.656
Obese	50–59	M (8.07)	138.1±18.62	38.092±3.33
		W (8.69)	141.7±20.01	37.66±4.09
	60–69	M (6.21)	137.7±15.51	36.17±7.66
		W (3.73)	143.3±11.05	34.816±3.889
	70–79	M (1.86)	151.6±12.13	39.33±8.285
		W (1.55)	154±17.43	33.56±4.35
	80+	M (0.62)	115±5	26.05±5.85
		W (0)	–	–
	All age range	M (16.77)	138.6±17.70	37.072±6.469
		W (13.97)	143.5±18.15	36.448±4.372

N.B: S.D=Standard Deviation, M=Men, W=Women, SBP=Systolic Blood Pressure, Ht= Haematocrit.

Table 2

ANOVA Value and Significance level in Chosen Obesity Groups of Older Adults

Parameters	Age Range	Sex	ANOVA OW & Ob		ANOVA NW & Ob		ANOVA NW & OW	
			F	P	F	p	F	P
BMI	50–59	M	134.09	< .00001**	266.34	< .00001**	39.824	< .00001**
		W	37.869	< .00001**	213.98	< .00001**	57.486	< .00001**
	60–69	M	110.379	< .00001**	323.80	< .00001**	54.127	< .00001**
		W	42.292	< .00001**	86.95	< .00001**	20.365	0.00021**
	70–79	M	46.515	< .00001**	120.27	< .00001**	31.182	0.00011**
		W	21.235	0.0006**	68.733	< .00001**	30.82	0.00054**
	80+	M	57.524	< .00001**	58.564	< .00001**	9.597	0.0362*
		W	-	-	-	-	-	-
	All age range	M	341.05	< .00001**	764.2	< .00001**	130.23	< .00001**
		W	105.92	< .00001**	375.13	< .00001**	101.138	< .00001**
SBP	50–59	M	1.104	0.2971	1.104	0.2971	0.063	0.8025
		W	0.153	0.6984	7.381	0.0095**	3.722	0.061
	60–69	M	0.726	0.3976	1.696	0.197	0.088	0.768
		W	0.937	0.3419	7.196	0.012*	0.96	0.338
	70–79	M	1.200	0.2844	1.98	0.174	0.024	0.878
		W	1.256	0.28422	1.127	0.309	0	0.999
	80+	M	18.354	0.0016**	0.001	0.968	32.26	0.0047**
		W	-	-	-	-	-	-
	All age range	M	4.802	0.0299*	4.511	0.0351*	0.034	0.852
		W	1.413	0.2387	10.98	0.0013**	2.596	0.111
Ht	50–59	M	2.805	0.0993	13.026	0.00059**	3.226	0.079
		W	5.179	0.0324*	21.28	0.00003**	0.977	0.329
	60–69	M	2.015	0.1612	0.933	0.337	0.202	0.655
		W	0.057	0.8123	0.040	0.842	0.307	0.585
	70–79	M	1.069	0.3117	3.403	0.079	5.149	0.0424*
		W	0.942	0.3509	0.125	0.729	0.282	0.609
	80+	M	0.093	0.7657	2.513	0.151	2.122	0.218
		W	-	-	-	-	-	-
	All age range	M	2.141	0.1453	11.533	.00086**	2.649	0.106
		W	1.756	0.1895	10.543	0.0016**	1.815	0.182

* Significant at 0.05 and **Significant at 0.01 level of P, NW-Normal Weight, OW-Overweight, Ob-Obese.

Table 3
*Correlation Value and Significance level in Chosen Obesity
Groups of Older Adults*

Obesity group	Age range	Sex	BMI & SBP (r)	p-value	BMI &Ht (r)	p-value	SBP& Ht (r)	p-value
Normal weight	50–59	M	0.1302	0.417	–0.132	0.4089	0.196	0.2192
		W	0.0906	0.7386	–0.078	0.772	–0.117	0.6638
	60–69	M	0.245	0.112	0.1341	0.3911	–0.095	0.5419
		W	0.101	0.689	–0.3733	0.127	–0.105	0.6774
	70–79	M	0.376	0.136	–0.4378	0.0787	–0.468	0.0581
		W	–0.036	0.886	0.2056	0.413	0.1648	0.7874
	80+	M	0.842	0.008**	–0.309	0.456	–0.285	0.4932
		W	-	-	-	-	-	-
	All age range	M	0.25009	0.0087**	–0.075	0.435	–0.0237	0.8069
		W	0.0349	0.8238	–0.2104	0.175	–0.0341	0.828
Over weight	50–59	M	0.068	0.781	0.306	0.202	0.3699	0.1190
		W	–0.250	0.515	0.108	0.782	0.74006	0.0226*
	60–69	M	0.420	0.118	–0.1903	0.4969	0.0419	0.6727
		W	0.287	0.419	0.3729	0.288	0.3748	0.2859
	70–79	M	–0.152	0.718	–0.4797	0.228	–0.1185	0.7799
		W	–0.881	0.047*	–0.668	0.217	0.6195	0.265
	80+	M	0.483	0.516	–0.17013	0.829	0.1951	0.8048
		W	-	-	-	-	-	-
	All age range	M	0.0589	0.696	–0.0609	0.687	–0.0229	0.8797
		W	0.047	0.8218	–0.033	0.875	0.4323	0.0309*
Obese	50–59	M	0.104	0.612	0.027	0.893	0.2429	0.2317
		W	0.344	0.072	0.027	0.889	–0.2369	0.2248
	60–69	M	0.2337	0.3211	0.386	0.092	0.392	0.0867
		W	–0.265	0.405	0.2115	0.509	0.1479	0.646
	70–79	M	0.717	0.108	–0.3201	0.536	–0.2061	0.6952
		W	–0.245	0.690	0.256	0.676	0.3076	0.614
	80+	M	-	-	-	-	-	-
		W	-	-	-	-	-	-
	All age range	M	0.236	0.0852	0.1326	0.3391	0.29827	0.0284*
		W	0.089	0.5588	0.1307	0.3918	–0.15587	0.3066

* Significant at 0.05 and **Significant at 0.01 level of P.

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In consideration of notable findings, a general preference for a low-calorie vegan diet and accompanying moderate to high physical activity from pre-senile age and onwards in tune with changing metabolic needs is suggested in order to minimise the risk of cardiovascular insult.

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A Survey of Nutritional and Health Status of Elderly Farmers in North 24 Parganas, (WB)

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ABSTRACT

This cross-sectional study was conducted on 396 elderly (192 males and 204 females) farmers, of North 24 Parganas (W.B.), age varying from 60 years to 80 years to find out the morbidity and nutritional status. Each respondent in the study was interviewed and clinically examined individually. The information was collected on a pretested Pro-forma. Based on the present findings it may be concluded that aged farmers are mostly affected by low back pain, osteoarthritis, and upper back pain. While comparing the elderly males aged between 60–70 years and above 70 years, there is a significant deficiency of most of the micronutrients except protein. The same is also true with the elderly women of 60–70 years and above 70 years. With the advancement in the age in both males and females above 70 years of age, calcium deficiency is evident. Moreover, they also have micronutrient deficiency-related disorders especially Vitamin A deficiency which was significant among men and women.

Keywords: Elderly farmers, Health status, Nutritional status, Micro-nutrients, Diseases

Advancement in medicine has improved the living standard and life expectancy of human beings worldwide. However, older persons are characterized by great diversity and extended longevity which may not necessarily be accompanied by better health. Although many enjoy healthy ageing and live in good physical and mental condition even into and beyond their 80s, a number of older persons face declining health and age-based disabilities caused or exacerbated by external factors such as limited access to appropriate and affordable health care and unhealthy lifestyles throughout the life. Meanwhile, the continued prevalence of communicable diseases and an increase in non-communicable diseases also contribute to the decline of an older person's health and well-being. Since a growing number of people will live to older ages, it is increasingly challenging but no less necessary to ensure that older persons live in better health and with low rates of age-related disabilities (United Nations General Assembly, 2015)

India is the world's second-most populous country. It has experienced a dramatic demographic transition in the past 50 years, entailing almost a tripling of the population over the age of 60 years (i.e., the elderly) (Government of India, 2011). This pattern is poised to continue. It is projected that the proportion of Indians aged 60 and older will rise from 7.5 per cent in 2010 to 11.1 per cent in 2025 and of which two-thirds live in villages and nearly half of them in poor conditions (United Nations Department of Economic and Social Affairs, Population Division, 2008; Jamuna, 2003; Lena *et al.*, 2009).

According to Population Census 2011, there are nearly 104 million elderly persons (aged 60 years or above) in India; 53 million females and 51 million males (Census, 2011). A report released by the United Nations Population Fund and Help Age India suggests that the number of elderly persons is expected to grow to 173 million by 2026.

In rural areas, 66 per cent of elderly men and 28 per cent of elderly women were working, while in urban areas only 46 per cent of elderly men and about 11 per cent of elderly women were working. The per cent of literates among elderly persons increased from 27 per cent in 1991 to 44 per cent in 2011. The literacy rates among elderly females (28%) is less than half of the literacy rate among elderly males (59%), as per Census 2011. However, information gathered from numerous surveys and regional and local studies point to the high prevalence of several risky behaviors, such as tobacco and alcohol use (Goswami, *et al.,* 2005; Gupta, *et al.,* 2005; Mutharayappa and Bhat, 2008) and physical inactivity (Rastogi, *et al.,* 2004; Vaz and Bharathi, 2004).

Agriculture as a profession can be a threat to the aging population due to age-related physical and cognitive changes. The dangers of working on a farm are only aggravated when the effects of aging are considered. Older farmers are at high risk because they tend to suffer injuries more frequently than do younger farmers and the injuries they suffer are more likely to be fatal (Gelberg, *et al.,* 1999).

Objectives

The main objectives of the study were to assess the nutritional and health status of the elderly farmers and to see age and sex differences in the respondents of this study.

Materials and Methods

A cross-sectional study was conducted among elderly persons in the age group of 60 years and above (60 to 80 years) to find out the morbidity status of the geriatric population working as farmers in the urban areas of North 24 Parganas. The total sample size was 396 among which 192 males and 204 females were taken. These two groups comprising of 192 males and 204 females were subdivided according to their age group taking 60 to 70 years old farmers in one group (group I) and the farmers aged above 70 years in another group (group II). This classification was done keeping WHO criteria in view. Each individual in the study was subjected to a personal interview and clinical examination. The information was collected on a pretested proforma. Nutritional status was assessed by using the ABCD method, where height, weight, and BMI (body mass index), blood pressure, pulse pressure, random blood glucose, and diet survey was done using 24 hours dietary recall method. Each individual was well informed and their consent was taken before the study. The purpose of the study was explained and confidentiality of the information was assured. The data thus collected were tabulated and statistically analyzed using mean, SD, t-test, and chi-square.

Inclusion Criteria

Subjects over 60 years of age were included in this study as the geriatric age group, defined by the World Health Organization.

Exclusion Criteria

Subjects with cancer, end-stage of renal disease or terminal illness, receiving artificial enteral or parental nutrition.

Results

Old age farmers are prone to diseases more than people from any other age group. The results represent the health, disease history, and nutritional status of the old age farmers.

Table 1

Physiological and anthropometric parameters of Geriatric Male Farmers

Parameters	Group-I 60 to 70 years (n=101) (Mean + S D)	Group-II 70 years and above (n=91) (Mean + S D)	t value	P value	Signif icance (p<0. 05)
Age (years)	64.90+3.72	74.81+2.55	–9.36	<0.0001	S
Height (cm)	165.37+6.02	161.06+7.65	2.08	0.02	S
Weight (kg)	55.18+9.30	49.31+7.71	2.26	0.01	S
Body Mass Index (kg/m2)	20.17+3.46	19.03+2.94	1.11	0.13	NS
Systolic Blood Pressure (mmHg)	141.71+24.89	132.85+26.20	1.12	0.13	NS
Diastolic Blood Pressure (mmHg)	86.25+14.73	81.75+13.72	1	0.16	NS
Pulse Rate (per min)	80.68+5.77	78+6.53	1.95	0.02	S
Random Blood Glucose (mg/dl)	147.12+38.75	140.12+37.97	1.49	0.03	S

Significant (S); Not Significant (NS).

This table represents the physiological and health parameters of the male farmers. 192 males were sub-categorized into two groups; Group I (n=101, aged between 60 to 70 years) and Group II (n=91, aged between 70 years and above) were Group I had the mean age of 64.90 years and Group II had the mean age of 74.81 years and it was significant at 0.0001 level ($p<0.05$).

The mean height and weight of Group I is 165.37 cm and 55.18 kg and that of Group II is 161.06 cm and 49.31 kg respectively. Height and weight both are significant at 0.02 and 0.01 level ($p<0.05$) between these two groups.

The result shows that both categories were having normal BMI (body mass index), male 20.17+3.46 kg/m^2 in female 19.03+2.94 46 kg/m^2 when compared to the WHO standard for the Asian population and there is no significant difference between the BMI of these two groups (WHO, 2019). The mean systolic pressure and a diastolic pressure of the two groups were within the normal range according to the American Medical Association (140/90 mmHg is the normal value

of blood pressure for people with more than 60 years). There was no significant difference between systolic pressure and a diastolic pressure of these two groups.

The mean pulse rate was 80.68/minute for Group I and 78/minute for Group II and was found significant at 0.02 level ($p < 0.05$)

The mean random blood glucose (mg/dl) was 147.12 for Group I and 140.12 for Group II and was found significant at 0.03 level ($p < 0.05$).

In a related study, it was found that the average age of the participants was 60.6 ± 6.7 years, with a mean (±SD) BMI (kg/m²) of 30.3 ± 3.9, and a mean percentage body fat (%) of 47.1 ± 4.7, which was measured by dual-energy X-ray absorptiometry (Basiotis, *et al.,* 2002). In another study, there was a negative relation with this present study where the prevalence of underweight in terms of chronic energy deficiency (CED), i.e. BMI < 18.5 kg/m² was reported to be higher among the elderly men (44.8%) as compared to their women counterparts (40.9%), the prevalence of overweight/obesity (BMI > 25.0 kg/m²) was three folds higher among elderly women (21.8%) as compared to the elderly men (6.9%) (Arlappa, *et al.,* 2003; Arlappa, *et al.,* 2016).

Table 2

Physiological and anthropometric parameters of Geriatric Female Farmers

Parameters	Group-I 60 to 70 years (n = 104) (Mean + S D)	Group-II 70 years and above (n = 100) (Mean + S D)	t-value	P-value	Remarks (p < 0.05)
Age (Years)	65.23 + 4.53	77.91 + 4.71	−8.22	< 0.0 001	S
Height (cm)	155.74 + 5.86	153.66 + 6.56	1.02	0.05	S
Weight (kg)	48.28 + 9.22	48.25 + 7.27	0.01	0.49	NS
Body Mass Index (kg/m2)	19.92 + 3.59	20.52 + 3.41	−0.5	0.33	NS
Systolic Blood Pressure (mmHg)	140.41 + 27.49	133 + 22.56	1.83	0.02	S
Diastolic Blood Pressure (mmHg)	85.12 + 13.56	80.16 + 10.81	1.14	0.12	NS
Pulse Rate (per min)	79.89 + 6.37	79.66 + 16.10	0.82	< 0.0 01	S
Random Blood Glucose (mg/dl)	159.48 + 50.96	155 + 47.67	1.27	0.05	S

Significant (S); Not Significant (NS)

The above table represents the anthropometric, biochemical, and clinical results of the female farmers who were categorized into two groups according to their age, Group I are belongs to 60 to 70 years age and Group II is above 70 age. The mean age of Group I females was approximately 65 years and Group II are approximately 78 years and also there was a significant difference (< 0.0001) between the age of the two groups. Mean height and weight of Gr. I is 155.74 cm and 48.28 kg and the value of that two parameters is near about the same for the Gr. II, whose heights are 153.66 cm, and weight is 48.25 kg. The heights of the two female groups have a significant difference among them at 0.05 level but the weight of that group has no significant difference between them, as a result, BMI also has no significant difference between those two female agricultural workers. The mean systolic pressure and a diastolic pressure of the two female groups were 140.41 mmHg and 133 mmHg within the normal range according to the American Medical Association (140/90 mmHg is the normal value of blood pressure for people with more than 60 years). The systolic pressure of those two groups has a significant difference at 0.02 level (< 0.05) but diastolic pressure has no significant difference between them. Pulse rate has also the significant difference at < 0.001 level and is at approximately 80 per minute and also there is a significant difference between the random blood glucose levels at 0.05 level of the following two groups.

In a related study done by Arlappa, the weights, heights and BMIs of older adults were significantly ($p < 0.01$) different between the age groups and decreased with increasing age among both genders. The mean values of weights and heights were higher among the elderly men; while the mean BMI is higher among the elderly women (Arlappa, *et al.,* 2016). There was a related study which was done by Geleijnse and Sacks (Geleijnse, *et al.,* 2003), where they compare systolic blood pressure of both rural and urban female and they observed that rural females had higher systolic blood pressures than urban participants, and may, therefore, be at greater cardiovascular risk than urban older people.

Table 3

Disease history of the male and female geriatric farmers

Affected Diseases	Group I: Male geriatric farmers (N=192) (%)	Group II:Female geriatric farmers (N=204) (%)	Chi-square (x^2) Value	P value	Remarks (p < 0.05)
Diabetes Mellitus	72 (37.5)	76 (37.25)	0.03	0.86	NS
Low Back Pain	156 (81.25)	128 (62.74)	0.45	0.50	NS
Hypertension	88 (45.83)	100 (49.01)	0	1	NS
Osteoarthritis	124 (64.58)	132 (64.70)	0.02	0.88	NS
Upper Back Pain	112(58.33)	92 (45.09)	0.33	0.88	NS

Significant (S); Not Significant (NS)

The table represents the disease history of both male and female geriatric farmers. The major diseases of co-morbidities present in order of prevalence in Group-I were: low back pain (81.25%), osteoarthritis (64.58%), upper back pain (58.33%), hypertension (45.83%), followed by diabetes (37.5%) respectively. The result is also nearly the same for the Group-II here approximately 65 per cent had osteoarthritis, 63 per cent had lower back pain, 45 per cent had upper back pain. The disease level of the two groups has no significant difference between them that is both groups have more or less the same problems but have no significant change.

Farmers in this study reported a variety of symptoms that may need further investigation (e.g. shortness of breath, chest heaviness, frequent urination, dry mouth, and symptoms of hearing loss, expected in this older population). Studies in developing countries show that multiple chronic illness, nutritional deficiency, and functional disability are common features of old age which can cause malnutrition also (Rolland, *et al.,* 2012). There are many conditions frequently associated with age (i.e., arthritis, limited vision and hearing, and depression) that potentially make the demands of daily farming extremely dangerous for the older farmer, Nonetheless, older farmers have been described as unwilling to recognize or accept their physical limitations (Singh and Shrestha, 2016). The weakness of the eye is an eminent problem for the elderly. Arthritis and diabetes are also found to be a highly prevalent disease at an older age. It can also be inferred from the chi-square test there is a significant

difference among males and females concerning arthritis problems (p-value < 0.05) (Raj, *et al.,* 2014). The greatest causes of disability in old age worldwide are estimated to be sensory impairments, such as hearing and vision loss, back and neck pain, chronic obstructive pulmonary disease, depressive disorders, falls, diabetes, dementia, and osteoarthritis. Yet sensory impairments and chronic obstructive pulmonary diseases have a higher burden in low- and lower-middle-income countries, whereas basic interventions such as eyeglasses and medication in wealthier countries improve one's functioning (WHO, 2015). The major diseases or comorbidities reported by the elderly individuals studied were, in order of prevalence: hypertension (46.2%), followed by diabetes (18.0%), osteoporosis (12.4%), anxiety (11.8%), and cardiovascular disease (10.2%). It should be noted that elderly persons could report suffering from more than one condition. At the same time, 25.0 per cent of elderly individuals said they did not have any diseases and 15.8 per cent suffered from a condition of lower prevalence, such as arthritis, gastritis, spinal pain and labyrinthitis, rheumatism, asthma, prostrate complications, glaucoma, urinary incontinence, leprosy, spinal disc herniation, gallstones, Parkinson's disease and ulcers (Pereira *et al.,* 2015). According to the National Health and Nutritional Survey, National Health Interview, and the Compressed Mortality File, hypertension is the most prevalent condition among older adults, affecting 71 per cent of the population. Women are more likely to have hypertension than men (77% vs. 58%) arthritis is the third most prevalent condition among older adults. Affecting 60 per cent of older women and 42 per cent of older men. The Indian elderly are more likely to suffer from chronic than acute illness. There is a rise in NCDs, particularly cardiovascular, metabolic, and degenerative disorders, as well as communicable diseases (Ingle and Nath, 2008; Alam, 2006; Kosuke and Samir, 2004; Shrestha, 2000; Waite, 2004; Kumari, 2001; Raju, 2000). Inadequate diet and malnutrition are associated with a decline in functional status, impaired muscle function, decreased bone mass, immune dysfunction, anemia, reduced cognitive function, poor wound healing, and delay in recovering from surgery, and higher hospital and readmission rates and mortality (Khalesi and Bokaie, 2015).

Table 4

Nutritional Requirements of the Male vegetable cultivators age between 60 to 70 years

Parameters	Nutrient Consumed (n = 101) (Mean + S D)	ICMR Recommendation (2010)	t-value	P value	Remarks (p < 0.05)
Energy (K cal)	2292.06 + 119.50	1940	5.89	0.0001	S
Protein (gm)	54.23 + 9.03	60	−1.27	0.11	NS
Calcium (mg)	415.32 + 60.60	400	0.51	0.31	NS
Iron (mg)	24.68 + 2.32	28	−2.84	0.01	S
Vitamin A (Fg)	196.53 + 25.27	600	−31.93	< 0.0001	S
Vitamin B1(mg)	5.18 + 0.78	0.9	10.89	< 0.0001	S
Vitamin B2 (mg)	3.88 + 1.11	1.1	4.98	0.0005	S
Vitamin C (mg)	69.86 + 3.46	40	17.25	< 0.0001	S

Significant (S); Not Significant (NS)

The above table represents the nutritional consumption of the male farmers aged between 60 to 70 years and also correlates with the ICMR recommendation (2010) level (Indian Council of Medical Research, 2010). From the result it was noticed that the subjects are consuming 2292.06 kcal energy daily for their daily requirements and body functioning which is greater than their daily requirements (1940 kcal) as a result there is a significant difference between the intake level and the requirement level at 0.0001 but at the same time the subjects also suffer from protein deficiency they intake 54.23 gm of protein daily which is 9.61 per cent less than the requirements; the farmers intake sufficient amount of calcium 415.32mg daily which is greater than the daily requirements; among the subjects there is an Iron deficiency they intake 24.68mg of iron daily which is approximately 12 per cent less than the daily requirements (28mg per day) and also there is a significant difference between the intake level and requirement level at 0.01(< 0.05); vitamin A deficiency is also a leading problems among the farmers, they intake 196.53 Fg of vitamin A daily which is 67.24 per cent deficient than the daily requirements (600 Fg) and also the difference have the significant value at < 0.0001; and at the same time there is a significant deference between the ICMR recommendation level and the subjects' consumption level for the other vitamins like vitamin B1, B2, C, here the subjects consuming excess

amount of those vitamins compared to their daily requirements and the difference have their significant value also, viz. at <0.0001 level, 0.0005 level, <0.0001 level.

Arlappa, *et al.,* (2016) observed that the all nutrients which were taken by older adults were below the suggested RDAs, except for thiamine among elderly women. Similarly, the median intakes of the majority of nutrients tend to decrease with increasing age among both genders. The median intake of micronutrients such as vitamin A, iron, riboflavin, and free folic acid was grossly deficient as compared to their RDAs among both genders. The intake majority of nutrients except for total fats, calcium, vitamin A and vitamin C were significantly ($p<0.01$) different between age groups in both genders.

Table 5
Nutritional Requirements of the Male vegetable cultivators above 70 years aged

Parameters	Nutrient Consumed (n=91) (Mean + S D)	ICMR Recommend ation (2010)	t-value	P value	Remarks (p<0.05)
Energy (K cal)	1848.50+157.51	1697	1.92	0.04	S
Protein (gm)	49.17+1.61	60	–13.41	<0.0001	S
Calcium (mg)	387.78+88.07	400	–2.8	0.39	NS
Iron (mg)	23.47+3.50	28	–2.58	0.01	S
Vitamin A (Fg)	170.89+38.84	600	–22.1	<0.0001	S
Vitamin B1(mg)	3.34+0.96	0.8	5.46	0.0003	S
Vitamin B2 (mg)	2.42+0.64	0.9	4.73	0.0007	S
Vitamin C (mg)	57.72+4.85	40	7.3	<0.0001	S

Table 5 represents the nutritional requirement of the male farmers whose age is above 70 years. According to the table, the intake of energy is 1848.50 kcal/day, which is 8.92 per cent excess than the daily requirement as per ICMR recommendation and there is a significant difference between the intake level and the recommendation levels, $p<0.05$ (0.04).

The geriatric farmers were suffering from protein deficiency, the average intake of protein is 49 gm/day which is 18.3 per cent less than the daily requirements as per ICMR recommendation, 2010 and this protein deficiency level has the significant value also <0.0001.

Subjects also suffer from calcium deficiency. They take approximately 388 mg of calcium daily which is 3 per cent less than the recommended value and there is no significant difference between the intake level and requirement level.

Iron deficiency, anemia is a leading health problem among the older individuals with an intake of 23.47 mg iron daily which is 16.17 per cent deficient than the recommended value and also this iron deficiency have a significant value, $p < 0.05$ (0.01).

Vitamin A consumption was 170.89 Fg/day which is approximately 72 per cent less than the recommended level and there is a significant difference between the intake level and recommendation level that is < 0.0001 and at the same time the subjects were having an excessive intake of Vitamin B_1 (318%), Vitamin B_2 (168%) and Vitamin C, (44.3%) when compared with ICMR recommendation and the results are significant at 0.0003 level, 0.0007 level and < 0.0001 level respectively.

Table 6
Nutritional Requirements of the Female vegetable cultivators age between 60 to 70 years

Parameters	Nutrient Consumed (n = 104) (Mean ± S D)	ICMR Recommendation	t-value	P value	Remarks (p < 0.05)
Energy (K cal)	1917.93±29.92	1500	27.93	<0.0001	S
Protein (gm)	53.13±5.81	50	1.08	0.15	NS
Calcium (mg)	390.4±30.79	400	–0.62	0.27	NS
Iron (mg)	21.82±2.94	30	–5.53	0.0002	S
Vitamin A (Fg)	256.84±109.91	600	–6.24	0.0001	S
Vitamin B1 (mg)	3.61±0.84	0.7	6.85	<0.0001	S
Vitamin B2 (mg)	5.89±1.43	0.8	7.08	<0.0001	S
Vitamin C (mg)	56.53±25.68	40	1.29	0.13	NS

Significant (S); Not Significant (NS)

Table 6 denotes the nutritional consumption level of the female farmers of North 24 Parganas Districts aged between 60 to 70 years and also this consumption level is co-relate with their nutritional requirement level. According to the table, the female subjects are consuming 1917.93 kcal daily which is 27.86per cent excess of the

recommended level, and also there is a significant difference < 0.0001. The subjects also take excess amounts of protein and Vitamin C compared with the recommendation level but there is no significant difference. At the same time the subjects are suffering from Calcium, Iron deficiency they intake 390.4 mg calcium which is slightly deficient than the recommended level and that's why there is no significant difference between these values, in case of Iron, they take 21.82 mg iron daily which is 27.26 per cent less than the recommended level and as a result, there is a significant difference between the intake level and with recommendation level 0.0002. Vitamin A deficiency is a major problem for females also they take only 256.84 Fg of Vitamin A daily where the recommendation is 600 Fg which is 57.19 per cent less than the recommended level as per the ICMR recommendation (2010) and it is significant at 0.0001. At the same time, the scenario is reversed for other two vitamins like Vitamin B1 and B2, here subjects take 415.7 per cent and 636.25 per cent excess vitamins than the recommended level and as a result, there is a significant difference between the intake level and recommendation level at 0.0001 for both vitamins.

The RDA for adults (elderly) in India constitutes about 55–60 per cent, 15–20 per cent, and 20–25 per cent of carbohydrate, protein, and fat respectively and their results also showed that the percentage of the macronutrient intake is not within the prescribed RDA. The carbohydrate and fat intake in the case of both males and females is a little higher than the reference value and the protein intake is very low than the recommended value (Khole and Scoletti, 2018).

Table 7
Nutritional Requirements of the Female vegetable cultivators
above 70 years aged

Parameters	Nutrient Consumed (n = 101) (Mean ± S D)	ICMR Recommen-dation	t-value	P value	Remarks (p < 0.05)
Energy (K cal)	1703.96±62.49	1312	12.54	< 0.0001	S
Protein (gm)	49.65±3.37	50	0.2	0.42	NS
Calcium (mg)	335.65±39.77	400	–3.24	0.005	S
Iron (mg)	22.08±2.19	30	–7.21	< 0.0001	S
Vitamin A (Fg)	264.16±72.16	600	–9.31	< 0.0001	S

Cont'd...

Cont'd...

Vitamin B1(mg)	2.78±0.66	0.6	6.61	<0.0001	S
Vitamin B2 (mg)	5.65±1.65	0.7	7.46	<0.0001	S
Vitamin C (mg)	44.80±21.12	40	0.45	0.33	NS

Table 7 denotes the nutritional consumption level of female farmers aged above 70 years. Here subjects intake approximately 30 per cent excess calorie daily compare with the recommended level of 1312 kcal and as a result, there is a significant difference between the intake levels and requirement levels <0.0001. Here the subjects nearly fulfill the daily requirements of protein 49.65 gm daily where the requirement is 50 gm daily, as a result, there is no significant difference for that nutrient. According to the result, the subjects are suffering from calcium deficiency as per the recommendation level, they consume 16.08per cent less than the daily requirement level of 400 mg per day and it is significant at 0.005 level. The subjects were also suffering from iron and vitamin A deficiency, which is 26.4 per cent and 55.97 per cent deficient than the recommendation level respectively and both are significant at <0.0001 level.

There is 363.3 per cent and 707.14 per cent excess consumption of Vitamin B1 and B2. The subjects also consumed an excessive amount of Vitamin C than the recommendation level but there is no significant difference among the intake and recommended values.

Table 8
Inadequate (< 70% of RDI) intake of various nutrients by old aged farmers

Particulars	Protein (gm)	Energy (K cal)	Calcium (mg)	Iron (mg)	Vit A (Fg)	Vit B1 (mg)	Vit B2 (mg)	Vit C (mg)	Fiber (gm)
Men (%)	20.31	18.22	50.52	49.47	51.56	8.85	9.89	29.68	34.76
Women (%)	20.09	23.03	62.25	63.23	72.05	19.80	18.33	29.90	37.74
$\square^2$	0.01	0.7	1.23	1.89	3.83	0.02	0.1	0	16.07
P-value (p<o.005)	>0.05	>0.05	>0.05	>0.05	<0.05	>0.05	>0.05	>0.05	<0.001
Significant (S); Not Significant (NS)	NS	NS	NS	NS	S	NS	NS	NS	S

Table 8 represents the subjects who have consumed less than 70 per cent nutrients compared to their daily requirement (according to the ICMR 2010 recommendation). 72 per cent of the female have an inadequacy of vitamin A, 63 female have inadequate intake of iron, and 62 female have inadequate intake of calcium regularly. Among the male, the scenario is almost the same, 52 per cent, 51 per cent, and 50 per cent have the inadequacy of vitamin A, calcium, and iron respectively. There is a significant difference between the inadequate levels of those two groups regarding fiber consumption. The result matched with a study which found that the inadequacy of intake of micro-nutrients such as vitamin A, iron, riboflavin, and free folic acid was high among both genders. Similarly, the inadequacy of consumption of all the nutrients was significantly different between genders and the extent of in-adequacy of protein, calcium, iron, vitamin A, vitamin C, and folic acid was higher among elderly women compared to elderly men (Arlappa, *et al., 2016*).

Conclusion

It can be concluded that aged farmers are mostly affected by pain-related problems like low back pain, osteoarthritis, upper back pain, other common age-related diseases like eye problems, hearing loss, headache, acidity, gastritis, constipation, etc. While comparing the elderly males aged between 60–70 years and above 70 years, there is a significant deficiency of most of the micronutrients except protein. The same is also true with the elderly women of 60–70 years and above 70 years. With the advancement in the age in both males and females above 70 years of age, calcium deficiency is evident. Micronutrients were deficient and moreover, imbalance among the nutrients is very prominent which aggravates the disease conditions. Proper dietary regimen and modification in the diet might bring desirable changes.

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Nutritional Status and Risk of Metabolic Complicacies among Elderly Tiwas (Assam)

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ABSTRACT

The present study examines the nutritional status of elderly belonging to Tiwas (a scheduled tribe of Assam which is spread over in various districts) on the basis of anthropometric variables and assesses the prevalence of under-nutrition along with risk for metabolic complications among them. 501 Tiwas elderly in the age group of 60 years and above were measured for height, weight, waist circumference, and hip circumference using a standard protocol. Body Mass Index, Waist Hip Ratio, and Waist to Height Ratio were computed for assessment of nutritional status. Prevalence of under-nutrition on the basis of Body Mass Index is 27 per cent and 10 per cent of the elderly are at risk for metabolic complicacy according to Body Mass Index with significant gender difference. On the basis of Waist circumference, only 3.41 per cent showed a risk whereas on the basis of Waist Hip Ratio the risk is found to increase substantially. There is a significant gender difference in the prevalence of risk for metabolic complicacy with more female elderly showing risk. Under-nutrition is higher among the male elderly. Age, sex, no longer having a spouse, and not being able to work anymore are found to have a significant influence on the body mass index, waist to hip ratio, and waist to height ratio.

Keywords: Tiwas Elderly, Nutritional Status, Gender differences, Undernutrition, Metabolic Complicacies.

An increase in average life expectancy may not always have positive outcomes among all sections of society. It is associated with an increased concentration of health problems in old age for many. Ageing as generally known is accompanied by deteriorating health conditions, the decline in functional ability as well as other forms of impairment. Ignorance of the ways of maintaining good health may bring about adverse effects in later part of life. One of the ways by which good health and functional ability may be maintained in later life is by having a good nutritional status. Nutrition and health can be said to be inextricably related with ageing. A good nutritional status can aid in maintaining both a disease-free life as well as the necessary biological support to resist in case of a disease affliction. Older persons become vulnerable to malnutrition. Lean body mass and basal metabolic rate decline with age and as a result, an older person's requirement per kilogram of weight is also reduced. Elderly people reduce their food intake due to a number of reasons and do not prefer variety in the food they eat which may lead to micronutrient deficiency. The loss in muscle mass with ageing can be managed to some extent with proper and right kind of nutrition.

Maintaining a good nutritional status is important in older ages. Undernourished individuals are at greater risk of illness, have poorer recovery from illness, and a poorer quality of life (Elia, *et al.,* 2000). Proper nutrition as a part of an active and healthy lifestyle is the key to successful ageing (Krishnaswamy and Shanthi, 2010). Increased falls, vulnerability to infection, loss of energy and mobility, poor wound healing, and confusion are reported consequences of under nutrition (Kenkmann, *et al.,* 2010). Nutritional status in the elderly is especially significant as there may be a double burden of under-nutrition as well as risk for metabolic complications from overweight among the elderly population. Overweight and obesity increase the risk of morbidity and mortality from diabetes, hypertension, and cardiovascular diseases.

The ageing process involves physiological and nutritional changes that are manifested by height and weight loss, muscle mass loss, and fat mass increase. It also involves adipose tissue redistribution, with fat accumulating in the trunk and viscera (Sanchez-Garcia *et al.,* 2007). Malnutrition as a health problem remains unrecognized and

under-treated. Interventions at various levels may be one of the ways of combating it. Mother and child nutritional needs are being taken care of through various programmes but the nutritional needs of elderly people especially the socio-economically deprived still remain elusive. Assessment of nutritional status in community-living elderly has limitations of various kinds. Among the various tools like the Mini Nutritional Assessment tool (MNA), Malnutrition Universal Screening Tool (MUST), hydrodensitometry test, dilution technique, electric impedance, anthropometric measures may be one of the most pragmatic ways of assessing nutritional status (Kyle *et al.,* 2002). It is also highly reliable. Anthropometric measures can be used to evaluate the prognosis of chronic and acute diseases and to guide medical inter-vention in the elderly (Sanchez-Garcia *et al.,* 2007). The present study tries to assess the nutritional status of elderly Tiwas through anthropometric variables and evaluate the prevalence of undernutrition as well as the risk of metabolic complicacy among them.

Literature Review

Anthropometry has been one of the widely used tools for assessment of nutritional status in community studies. It is mainly because of its practicality and convenience of collecting data on objective measurable variables without subjective bias or limitation. Mohan *et al*. (2007) tried to determine the anthropometric cut-off point for the risk of cardio-metabolic risk factors in an urban Asian Indian population. This was done as a part of the Chennai Urban Rural Epidemiology study conducted among a sample of 26001 twenty years and above age group individuals. Sensitivity, specificity, and distance on the receiver operating characteristic curve were used to determine the optimal cut-points for Body Mass Index and Waist circumference with cardiometric risk factors. The optimal cut-off for BMI was found at 23 kg/m^2 in both sexes. Waist circumference was calculated at 87 cm for males and 82 cm for females. Snehlatha *et al*. (2003) determined the cut-off values for normal anthropometric variables in Asian Indian adults for BMI and upper body adiposity. Asian Indians have a high risk of developing glucose intolerance with small increments in their BMI. They generally have high upper-body adiposity, despite having a lean BMI. They calculated the values as a

normal cut-off for BMI as 23 kg/m² for both sexes, waist circumference measure as 85 cm for males and 80 cm for females, while for waist-hip ratio the cut-off values are 0.88 in males and 0.81 in females.

The prevalence of risk of undernutrition is associated with poor health status in older people in the United Kingdom as revealed in a study among older persons (Margetts *et al.,* 2003). 14 per cent of the elderly were found to be at risk ranging from medium to high based on the composite measure of low BMI and reports of recent loss. In a community-based cross-sectional study among older persons (60 years and above) in rural Ballabgarh, Haryana, Jamir *et al.* (2013) tried to estimate the prevalence of under nutrition with the help of anthropometric variables. They used the variables of weight, arm span, MUAC, tricep skinfold, and calf circumference. The prevalence of malnutrition was 53.7 per cent with 95 per cent confidence interval. In a cross-sectional study among 60+ community-dwelling elderly (Vedantam *et al.,* 2010) prevalence of malnutrition was found to be 14 per cent and 49 per cent were found to be at risk. No significant difference was found between male and female elderly. The study was conducted in Kaniyambadi rural development block in Tamil Nadu. Mini Nutritional Assessment tool was used to assess nutritional status. Moreover, 60 per cent of the elderly had low MNA Scores (<23.5) indicating deficient protein-energy intake. In an assessment of nutritional status among rural community living elderly of Kongpal in Imphal East of Manipur, 20.8 per cent were found to be malnourished and 49.2 per cent were found at risk of malnourishment (Joymati *et al.,* 2018). A significant association was found between being malnourished with the older age group, female gender, among the elderly without spouses, lower education, unemployed or homemaker, and financially dependent elderly. Agarwalla *et al*. (2015) assessed the nutritional status of elderly living in Boko-Bongaon Block of Kamrup district, Assam through the Mini Nutritional Assessment tool, and 24-hour dietary recall method. The sample size consisted of 360 individuals in the 60 years and above age group. The block was divided into 30 clusters and 12 individuals were selected from each cluster. 15 per cent of the elderly were found to be malnourished and 55 per cent were at risk of malnutrition. Association between nutritional status,

older age group, female gender, dependent functional status, and inadequate calorie intake was found to be significant.

Scope of the Study

For countries like India, the diversity in culture and socio-economic condition in general and more specifically for the elderly people the understanding of community-level conditions are important from the point of view of the understanding prevalence of both undernutrition and risk factors for metabolic complicacies. This can also help in estimating requirements for the provision of services among marginalised communities. The state of Assam, situated in the Northeastern part of the country is also undergoing the ageing of the population. Studies on ageing have begun in this part of the country quite recently. The region presents a mosaic of different tribes, castes, and communities each having their unique culture. The community-level conditions are determined by the culture of the people. Culture plays an important role among the members of a group in defining behaviour due to shared beliefs, values, and practices. The present paper is among a scheduled tribe of Assam, namely the Tiwas. Scheduled tribes of Assam have a poor socio-economic condition with little or no access to the health care facilities. They are predominantly agriculturists. Studies on conditions of the elderly among scheduled tribes are very few in Assam. Under the circumstances, understanding of their nutritional status can give insight into the health condition of the elderly from a community perspective and the need for probable intervention for public health service.

Material and Methodology

It is a cross-sectional study among the elderly Tiwas of Morigaon district in Assam. Morigaon is one of the 32 districts of Assam and has its headquarters in Marigaon town. The district has five revenue circles, viz. – Laharighat, Mayong, Morigaon, Mikirbheta, and Bhurgaon. The sample of the study consist of 504 elderly Tiwa persons of which 249 are males and 255 are females. To obtain the sample size data have been collected from thirteen villages from the five revenue circles. Of the four villages namely, Ghagua, Ghuligaon, Udahinbori, and Manipur are homogenous Tiwa villages. The other remaining nine villages namely Borigaon, Khorotibori, Bishnupur, Noagaon,

Kothalguri, Bherbheri, Tikhabori, Gormari, Saruboriare are heterogenous villages. These villages have Tiwa people living along with other communities Karbi, Boro, Assamese, Koch Rajbangshi, Ahom, etc. Only the Tiwas were considered for the study.

The age of sixty years and above was the inclusive criteria. Assessment of age in a semi-literate society with no supporting documents presents some difficulties. Cross referring to events and major happenings in the state and correlating with the age of children and peers are some of the techniques used for assessment of age. Informed verbal consent had been obtained from the respondents before undertaking the study. Data on socio-demographic characteristics have been collected with a household survey schedule. For the assessment of nutritional status anthropometric measures of height, weight, waist circumference, and hip circumference have been used. From the height and weight, the Body Mass Index is calculated for assessing nutritional status. Waist to Hip Ratio is calculated for the assessment of abdominal obesity. Body Mass Index, waist circumference, waist to hip ratio, and waist to height ratio have been used to assess risk for metabolic complicacy in the community.

Body Mass Index is calculated from stature and weight. These two measurements are taken using the standardised tools of anthropometric rod and weighing scale following the necessary protocol. The elderly persons have been classified according to the WHO classification of nutritional grading for the adult Asian population. Waist and hip circumference have been measured with non-elastic measuring tape using a standard protocol. Waist circumference, Waist to hip ratio, waist to height ratio, and Body Mass Index are used to assess the risk for metabolic complications. Higher measures of these variables are indicators of increased risk. Waist circumference ≥ 85 cm for male and ≥ 80 cm for female adults are considered at risk. In the case of the waist to hip ratio measure, ≥ 0.90 cm for males and ≥ 0.80 cm for a female is at risk. A measure higher than .50 cm for the waist to height ratio puts both male and female adults at risk for metabolic complicacies.

For the purpose of presenting the findings, the elderly persons have been classified into three more age categories of young-old (60–69

years of age), middle old (70–79 years of age), and very old (80 years and above). ANOVA and chi-square tests were done for under-standing statistical significance.

Results

The findings have been presented in three parts. The first part consists of a brief description of the socio-demographic characteristics of the elderly Tiwas. The second part deals with the nutritional status assessed from the Body Mass Index and the influence of the socio-demographic characteristics with the BMI. The third part deals with the assessment of risk for metabolic complicacies.

Socio-demographic Characteristics

The sample consists of 249 male and 255 female elderly persons. The mean age for the male elderly is 67.39 $\pm$5.26 years and the mean age in females is slightly lower at 65.13$\pm$ 5.45 years. Most of the elderly belong to the young-old age group and with an increase in age the proportion of elderly declines. The decline is sharp for female elderly in the middle old age group but equalises in the old-old age group (Table 1).

Table 1

Distribution of the elderly Tiwas by their socio-demographic characteristics

	Age -sex distribution			
	60-69 years	*70-79 years*	*80+ years*	*Total*
Male	173 (69.48)	65 (26.10)	11 (4.42)	249 (100)
Female	210 (82.35)	34 (13.33)	11 (4.31)	255 (100)
	Educational level			
	Illiterate	*Primary and middle school*	*High school and beyond*	*Total*
Male	157 (63.05)	62 (24.90)	30 (12.05)	249
Female	222 (87.06)	26 (10.20)	7 (2.75)	255

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	Current occupation			
	Cultivation	*Wage earning/ petty trade*	*No longer working*	*Total*
Male	177 (71.1)	14 (5.6)	58 (23.30)	249
Female	151 (59.22)	10 (3.92)	94 (36.86)	255

	Marital status			
	Currently Married	*Widow/ widower*	*Never married*	*Total*
Male	198 (79.52)	49 (19.68)	2 (0.80)	249
Female	132 (51.76)	115 (45.10)	8 (3.14)	255

	Living Arrangement			
	Living alone/ With only spouse	*Nuclear family*	*Extended family*	*Total*
Male	22 (8.8)	30 (12.0)	197 (79.1)	249
Female	14 (5.5)	12 (4.7)	229 (89.8)	255

Figures in parentheses indicate the percentage.

Source: A field study

The elderly Tiwas of Morigaon district are predominantly illiterate. Illiteracy is higher among the female elderly. Very few elderly persons have studied to the level of high school or above. Cultivation of wet paddy is their primary occupation. Both males and females take part in the cultivation process within the culturally defined sexual division of labour. Elderly people continue to be part of the agricultural process as long as their physical conditions allow them. 23.60 per cent of the male elderly and 36.86 per cent of the female elderly are no longer involved in any occupation due to their physical inability. The remaining elderly are either involved in the cultivation or in an alternate source of income like wage-earning or some petty trade. Examination of their current marital status indicates that most male elderly still have a surviving spouse. But relatively higher proportions

of the female elderly no longer have a surviving spouse. A small proportion of both male and female elderly have remained unmarried (Table 1). Joint or extended family is the norm among the Tiwas. Though newlyweds set up independent homes after marriage, at least one adult child continues to live with the ageing parents out of filial piety. Very few elderly individuals are found to be living alone or with only their spouse.

Anthropometric Variables and Indices:

Table 2

Mean and standard deviation of the anthropometric variables and indices

Anthropometric variable	Total mean±SD	Male mean±SD	Female mean±SD
Height (cm)	155.5 ± 8.76	162.13 ± 6.38	149 ± 5.18
Weight (kg)	48.25 ± 7.22	51.46 ± 6.30	45.11 ± 6.67
Waist circumference (cm)	71.48 ± 7.72	73.98 ± 6.45	69.24 ± 7.08
Hip circumference (cm)	81.83 ± 6.41	83.76 ± 5.67	79.94 ± 6.53
Indices	*Total mean±SD*	*Male mean±SD*	*Female mean±SD*
BMI	19.94±2.48	19.36±3.18	20.04±3.32
WHR	0.87±0.06	0.87±0.10	0.85±0.11
WHtR	0.46±0.05	0.45±0.06	0.46±0.07

Figures in parentheses indicate the percentage

Source: A field study

The mean height of the elderly Tiwas is 155.5 cms. with the male elderly showing a higher mean height (162.13cms.) in comparison to the female elderly (149 cm). The elderly Tiwas are not very heavy individuals as can be deduced from the mean weight (48.25 kg). The male elderly have a higher mean weight (51.46 kg) than elderly females (45.11kg). The mean waist circumference for the elderly Tiwas is 71.48 cm with a gender difference of 4.74 cm. The mean waist circumference among the elderly males is 73.98 cm and among the female elderly it is 69.24 cm. The mean hip circumference is higher than the mean waist circumference. The mean hip circumference is 81.83 cm, with the mean in male elderly being 83.76 cm and that of female elderly being 79.94 cm. The mean Body Mass Index is within the normal range for the elderly Tiwas. The female elderly show a higher mean Body Mass Index (20.04) in comparison to male elderly (19.36). The mean

waist-hip ratio and mean waist to height ratio is also within normal limits for both male and female elderly. The mean waist-hip ratio is higher among male elderly while the mean waist to height ratio is higher among female elderly.

Nutritional Status Assessed from Body Mass Index

Table 3

Distribution of the elderly Tiwas by their nutritional status as per BMI according to socio-demographic characteristic

Socio-demographic characteristic	Sex	Undernourished (BMI < 18.5)	Normal (BMI 18.5–22.9)	Overweight (BMI ≥23.0)	Total
Age					
60–69 years	Male	43 (24.9)	115 (66.5)	15 (8.7)	173
	Female	27 (12.9)	153 (72.9)	30 (14.3)	210
70–79 years	Male	33 (51.6)	26 (40.6)	5 (7.8)	64
	Female	22 (64.7)	12 (35.3)	-	34
80+ years	Male	6 (66.7)	3 (33.3)	-	9
	Female	8 (100)	-	-	8
Total	Male	82 (33.3)	144 (58.5)	20 (8.1)	246
	Female	57 (22.6)	165 (65.5)	30 (11.9)	255
Educational level					
Illiterate	Male	61 (39.4)	85 (54.8)	9 (5.8)	155
	Female	45 (20.5)	153 (69.9)	21 (9.6)	219
Primary and middle school	Male	15 (24.6)	42 (68.9)	4 (6.6)	61
	Female	10 (38.5)	10 (38.5)	6 (23.1)	26
High school and beyond	Male	6 (20.0)	17 (56.7)	7 (23.3)	30
	Female	2 (28.6)	2 (28.6)	3 (42.9)	7
Current occupation					
Cultivation	Male	48 (27.1)	115 (65.0)	14 (7.9)	177
	Female	8 (5.3)	119 (78.8)	24 (15.9)	151
Wage earning					
/petty trade	Male	5 (35.7)	9 (64.5)	-	14
	Female	3 (27.3)	6 (54.5)	2 (18.2)	11
No longer working	Male	29 (52.7)	20 (36.4)	6 (10.9)	55
	Female	46 (51.1)	40 (44.4)	4 (4.4)	90

Cont'd...

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		Marital status			
Married	Male	63 (32.1)	114 (58.2)	19 (9.7)	196
	Female	16 (12.1)	98 (74.2)	18 (13.6)	132
Spouse no longer alive	Male	19 (39.6)	28 (58.3)	1 (2.1)	48
	Female	38 (33.9)	63 (56.2)	11 (9.8)	112
Never married	Male	-	2 (100)	-	2
	Female	3 (37.5)	4 (50.0)	1 (12.5)	8
		Living arrangement			
Alone/with the only spouse	Male	5 (22.7)	15 (68.2)	2 (9.1)	22
	Female	3 (21.4)	70 (71.4)	1 (7.1)	14
		Nuclear			
family	Male	2 (6.7)	23 (76.7)	5 (16.7)	30
	Female	1 (8.3)	10 (83.3)	1 (8.3)	12
		Extended			
Family	Male	75 (38.7)	106 (54.6)	13 (6.7)	194
	Female	53 (23.5)	145 (64.2)	28 (12.4)	226

Figures in parentheses indicate the percentage.

Source: A field study.

Measurements could be taken on 501 elderly individuals. Elderly persons who were unable to stand independently or stand straight were not measured. Three elderly females could not be measured. On the basis of the calculation of Body Mass Index, most of the elderly Tiwas show normal nutritional conditions. The prevalence of under nutrition is higher among male elderly (33.3%) as compared to female elderly (22.6%). Overweight condition is prevalent more among elderly females (11.9%) relative to elderly males (8.1%). Undernutrition prevalence shows an association with age. The prevalence of undernutrition conditions increases with an increase in age for both male and female elderly. The overweight individuals are found mostly in the young-old age group and among males of the middle old age group. In the old old age group, no overweight individuals are found. The gender difference in the prevalence of different grades of nutrition is statistically significant (chi-square –7.8524, p – .019818, $p \leq .05$).

Nutritional status examined according to the educational level of the elderly shows that with the increase of education from being illiterate to studying up to high school level or beyond, the prevalence of under nutrition shows a decline in frequencies in elderly males. But no such trend is observed in elderly females. The prevalence of overweight, on the other hand, shows an increasing trend with the increase in educational level for both male and female elderly. The difference in the prevalence of nutritional grades between illiterate and literate male elderly (chi-square 8.3193, p – .015613) and female elderly (chi-square 15.62, p – .000406) is statistically significant at probability ≤ .05.

Among the elderly ability to carry on activities for economic sustenance or continuing with economic activities may be associated with the nutritional status which is also an indicator of their health condition. As there is no specific age of retirement in cultures that follow the traditional economy, the health condition may be a determinant for giving up such activities. Therefore, an attempt is made to understand their nutritional condition based on their current occupation or their ability to be involved in the economy. The prevalence of undernutrition is high among both male and female elderly who are no longer able to work in comparison to the other two occupations categories. Among female elderly overweight prevalence is lowest among those who are no longer working. But in the case of elderly males, the prevalence of overweight increases from the cultivation category to the no longer working category. This may be related to their decline in physical activity level with giving up active participation. The number of such individuals, however, is small to derive a conclusive statement and requires further investigation. The difference in the prevalence of different grades of nutrition among elderly who are working and who are no longer able to work is statistically significant at a probability of less than .05. The chi-square value and p-value for the male elderly are 14.6156, .00067 and that for female elderly is 37.1902, 0.00001.

Having a spouse plays a significant role in the psycho-social life satisfaction level among elderly people. An attempt is made to understand the prevalence of the nutritional condition in relation to having or not having a spouse. Among the elderly who are undernourished,

the prevalence of undernutrition is higher among those who do not have a spouse. The percentage of undernourished females is relatively higher among females who no longer have a spouse. The prevalence of overweight is higher among the elderly having a surviving spouse. The difference in the prevalence of different categories of nutritional status between elderly males having a surviving spouse and not having a surviving spouse is statistically not significant (chi-square 3.3336, p – .188855). but in the case of female elderly, the difference in nutritional categories between females having and not having a surviving spouse is statistically significant (chi-square 17.4573, p – .000162) at probability less than .05.

Nutritional status examined against their living arrangement shows that 22.7 per cent of the elderly males living alone or with only their spouse are undernourished. Similarly, 21.4 per cent of the female elderly living alone or with only spouse are undernourished. The prevalence of undernutrition is relatively less among the elderly living in nuclear families. As for elderly living in extended or joint families, the prevalence of undernutrition is higher among male elderly in comparison to female elderly. In the case of the male elderly, the difference in nutritional categories between elders living in joint/extended families and other types of living arrangements is statistically significant (chi-square 12.4983, p – .001932). But among female elderly, the difference in nutritional categories by living arrangement is statistically not significant (chi-square 1.6831, p – .431039).

To understand the influence of the socio-demographic variables on the dependent variable Body Mass Index, the regression analysis was done. Taking the young-old age group as the reference category, the increase in age to middle old and very old age category has a significant negative influence on the Body Mass Index (Table 4). In other words, with an increase in age, the Body Mass Index scores come down. Similarly sex also has a significant influence on Body Mass Index. In the case of educational level, taking illiteracy as the reference category, an increase of educational level to primary or middle school did not have a significant effect but moving to high school and above category had a significant influence. Similarly, among the elderly no longer working, the influence is found to be significant. Not having a spouse appears to affect the Body Mass Index. The effect is found to be

significantly negative for widows and widowers, but not significant for never married elderly. The living arrangement does not appear to have a significant influence on the Body Mass Index.

Table 4

ANOVA table for BMI and socio-demographic variables

Age	R square – .248 B-value	Adjusted R square – .245 P-value	Significant at p ≤.05 With a 95 per cent confidence interval
60–69 years	20.491	.000	Significant
70–79 years	–2.470	.000	Significant
80+ years	–6.894	.000	Significant
Sex	R square – .011	Adjusted R square – .009	
	B-value	P-value	
Male	19.362	.000	Significant
Female	.678	.020	Significant
Educational level	R square – .008	Adjusted R square – .004	
	B value	P-value	
Illiterate	19.613	.000	Significant
Primary and middle school	.046	.905	Not Significant
High school and above	1.141	.043	Significant
Current occupation	R square – .135	Adjusted R square – .132	
	B value	P-value	
Cultivation	20.528	.000	Significant
Wage earning/petty trade	-.570	.368	Not Significant
No longer working	–2.653	.000	Significant
Marital status	R square –.018	Adjusted R square – .015	
	B value	P-value	
Currently married	20.020	.000	Significant
Widow/widower	-.953	.002	Significant
Never married	-.240	.818	Not Significant
Living arrangement	R square – .010	Adjusted R square – .006	
	B value	P-value	
Alone/with the only spouse	20.539	.000	Significant
Nuclear family	-.184	.804	Not Significant
Extended family	-.971	.066	Not Significant

Risk of Metabolic Complications

Risk of Metabolic Complicacies have been assessed from Body Mass Index, waist circumference, waist to hip ratio, and waist to height ratio. According to their Body Mass Index, 28.86 per cent of the elderly Tiwas are underweight, 61.72 per cent show normal Body Mass Index, and 9.41 per cent are overweight. The risk of metabolic complications arises in overweight or obese individuals. The risk factor as per the gender of the elderly reveals that there is a risk for metabolic complications among 7.69 per cent male and 11.11 per cent female elderly. The proportion of female elderly who are overweight is higher than the male elderly. The gender difference in the nutritional status among the elderly Tiwas is statistically significant (Table 5).

Table 5

Risk of Metabolic complications assessed from anthropometric variables

Sex	Underweight (BMI < 18.5)	Normal (18.5–22.9)	Overweight (≥23.0)	Total	P-value
			Risk by Body Mass Index		
Male	85(34.41%)	143(57.89%)	19 (7.69%)	247	0.045*
Female	59(23.41%)	165(65.48%)	28 (11.11%)	252	
Total	144(28.86%)	308(61.72%)	47 (9.41%)	499	

	Risk by Waist Circumference				
	Normal	Increased (≥85 cm in male and ≥80 cm in female)			
Male	243(98.78%)	3 (1.22%)		246	.029*
Female	238(94.44%)	14 (5.56%)		252	
Total	481(96.59%)	17 (3.41%)		498	

	Risk by Waist to Hip Ratio				
	Normal	Increased (≥ 0.90 cm in male and ≥0.80 cm in female)			
Male	137(55.69%)	109(44.31%)		246	< .001**
Female	86(34.13%)	166(65.87%)		252	
Total	223(44.78%)	275(55.22%)		498	

	Risk by Waist to Height Ratio				
	Normal	Increased			
Male	222 (89.88%)	25 (10.12%)		247	.012*
Female	207 (82.14%)	45 (17.86%)		252	
Total	429 (85.97%)	70(14.03%)		499	

*Significant at *p*(p ≤.050); **Significant at *p*(p ≤.010)

The underweight individuals are at low risk for metabolic complicacies but are at risk of other clinical problems. The individuals who show normal Body Mass Index are at average risk and the overweight individuals are at an increased risk.

The measure of waist circumference indicates predominantly a normal level among the elderly Tiwas. Only 3.41 per cent of the elderly show increased risk for metabolic complications on the basis of their waist circumference. As per this measurement also the proportion of elderly females (5.56%) showing risk is higher than the male elderly (1.22%) and the difference is statistically significant at $p < .05$. When the risk is assessed from waist to hip ratio the proportion of elderly showing risk increases substantially. 44.31 per cent of males and 65.87 per cent of the female elderly show increased risk from the waist-hip ratio. The gender difference in individuals showing normal waist-hip ratio and increased waist to hip ratio is statistically significant at $p < .05$. The risk for metabolic complicacy assessed from waist to height ratio shows 14.03 per cent of the elderly at risk. According to the waist to height ratio too higher proportion of female elderly show risk compared to male elderly. The gender difference in the occurrence of the normal and increased waist to height ratio is statistically significant.

From the findings, it can be said that the risk for metabolic complications is low among the Tiwas. This may be because of their traditional way of life with remaining active as long as physically possible. From among the four measures used for the assessment of risk for metabolic complications, the highest proportion of elderly are found at risk according to the waist to hip ratio and the least number of elderly persons show risk for metabolic complicacies by waist circumference.

Table 6
ANOVA for Waist to Hip Ratio by socio-demographic variables

Age	R square .138	Adjusted R square .134	Significant at p p
	B value	P-value	≤.05 With a 95 per cent confidence interval
60–69 years	.876	.000	Significant
70–79 years	-.021	.083	Not Significant

Cont'd...

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80+ years	-.207	.000	Significant
Sex	R square .007 *B value*	Adjusted R square .005 *P-value*	
Male	.872	.000	Significant
Female	-.019	.067	Not Significant
Educational level	R square .008 *B value*	Adjusted R square .004 *P-value*	
Illiterate	.858	.000	Significant
Primary and middle school	.012	.387	Not Significant
High school and above	.037	.060	Not Significant
Current occupation	R square .045 *B value*	Adjusted R square .041 *P-value*	
Cultivation	.879	.000	Significant
Wage earning/ petty trade	.001	.979	Not Significant
No longer working	-.052	.000	Significant
Marital status	R square .010 *B value*	Adjusted R square .006 *P-value*	
Currently married	.870	.000	Significant
Widow/widower	-.023	.034	Significant
Never married	.014	.693	Not Significant
Living arrangement	R square .005 *B value*	Adjusted R square .001 *P-value*	
Alone/with the only spouse	.888	.000	Significant
Nuclear family	-.036	.167	Not Significant
Extended family	-.027	.140	Not Significant

Table 7

ANOVA for Waist to Height Ratio and socio-demographic variables

Age	R square .123 *B value*	Adjusted R square .120 *P-value*	Significant at p ≤ 05 With 95 per cent confidence interval
60–69 years	.465	.000	Significant
70–79 years	-.024	.001	Significant

Cont'd...

Cont'd...

	B value	P-value	
80+ years	-.114	.00	Significant
Sex	*R square .002*	*Adjusted R square .000*	
	B value	*P-value*	
Male	.451	.000	Significant
Female	.007	.267	Not Significant
Educational level	*R square .008*	*Adjusted R square .004*	
	B value	*P-value*	
Illiterate	.452	.000	Significant
Primary and middle school	.006	.433	Not Significant
High school and above	.023	.050	Significant
Current occupation	*R square .048*	*Adjusted R square .044*	
	B value	*P-value*	
Cultivation	.465	.000	Significant
Wage earning/petty trade	-.004	.753	Not Significant
No longer working	-.033	.000	Significant
Marital status	*R square .005*	*Adjusted R square .001*	
	B value	*P-value*	
Currently married	.458	.000	Significant
Widow/widower	-.010	.140	Not Significant
Never married	.010	.657	Not Significant
Living arrangement	*R square .005*	*Adjusted R square .001*	
	B value	*P-value*	
Alone/with the only spouse	.465	.000	Significant
Nuclear family	-.004	.753	Not Significant
Extended family	-.033	.000	Significant

Anova test has been done to assess the influence of the socio-demographic variables on the waist-hip ratio and waist to height ratio. Being in the oldest age group, not having a surviving spouse and no longer working status has a significant negative influence on the waist-hip ratio among the elderly Tiwas. For waist to height ratio being in the middle old age group and the oldest-old age group has a significant negative influence. The living arrangement and no longer

working status also has a significant negative influence on the waist to height ratio.

Conclusion

The prevalence of undernutrition on the basis of Body Mass index is among 27 per cent of the elderly and risk for metabolic complicacy is among 10 per cent of the elderly Tiwas. Age, sex, no longer having a surviving spouse, and being no longer able to work has a significant negative influence on the prevalence of higher Body Mass Index scores. The proportion of elderly showing risk for metabolic complications as per waist to hip ratio is relatively higher than the elderly waist to height ratio.

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Late Life Suicides: An Indian Scenario

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ABSTRACT

The twentieth century is witnessing a large and rapid increase in the elderly population worldwide. It is mainly a result of demographic change in the decline of fertility and mortality and increased life expectancy due to medical advancement. Increasing longevity surrounds concern as it presents several challenges to individuals, families, and larger communities. Besides social, economic, and cultural challenges, an emerging issue among the older population is a growing trend of suicides. According to official data (2018), suicides by those above sixty years of age comprise 08 per cent of total suicidal deaths with a higher presence of older men than women. In terms of causes, family problems and illness are the main reasons behind their suicides. If family problems showed more suicides by men then women largely committed suicide because of illness. Moreover, suicidal incidences among the elderly show that mental health care for older people needs serious attention, which is not the case especially in India.

Keywords: Ageing, Suicide, Elderly, Mental illness, Family problems, Prolonged illness

The population aged sixty years or over in almost all the world regions is growing at a faster rate. This is occurring because of declining fertility rates, lower infant mortality, and increasing survival at older ages due to medical advancement. According to the 2011

census, the elderly population in India is enumerated at 104 million. Between 2001 and 2011, India added 2.7 million annually to its population of aged. Assuming the same growth, their population stands at 123 million in 2018. This is a matter of great concern as India has entered the list of one of the aging societies of the world as per the United Nations.[1]

Population aging has significant social and economic implications at the individual, family, and societal levels besides important consequences and opportunities for a country's development. While people's longevity had increased, they also live with various challenges and issues such as financial insecurity, lack of social support, and so on. However, the most important concern for the elderly population is health. Longer life implies living a morbid status with multiple illnesses and physical ailments. Hence, in many developed countries quality of care, especially long-term care and rising healthcare costs are major issues related to ageing population. Although not an inevitable outcome of growing old, it is viewed that the number of elderly affected by mental health problems is increasing and due to its multi-dimensional characteristic, both developing and developed countries are facing challenges in its management (UNFPA & HAI 2012).

The poor mental health of the elderly also implies their significant suicide risk, compared to any other age group because suicide rates increase with age (WHO 1992). Suicide ranks in the top ten causes of death in the elderly (Blazer, Bachar, and Manton 1986). Ageing individuals by nature, tend to suffer from multiple physical, psychological, economic, social, and existential problems that collectively contribute to the emergence of suicidal ideations and completed suicide (Behera *et al.,* 2007). In India, more than one lakh people commit suicide every year. Official records reveal that in the decade of 2005–2015, the number of suicides has increased by seventeen per cent in 2015 from 2005; while for the same period the rate of suicides increased slightly by 2.9 per cent (NCRB 2015). Despite this, suicides among the elderly group receive scant attention and is sparsely studied (Cattel, 1988; Conwell and Brent, 1995). As a result, studies with a specific focus on them are lacking. There has been no major advance in the understanding of elderly suicides in recent years. This is an area in

need of study since factors associated in the development of suicidal behavior in aged people may differ from those of younger cohorts (Lindesay, 1991; Pearson and Conwell, 1995; Fässberg, Cheung, *et al.,* 2015; Ghose *et al.,* 2019)

Understanding Late-life Suicide

According to suicidologist, Edwin Shneidman (1993), suicide is a complicated, multidimensional, conscious, and unconscious choice of the best possible practical solution to a perceived problem, dilemma, impasse, crisis, or desperation. Suicides are of considerable social and medical significance besides being emotive (Shah and Ganesvaran, 1994; Little, 1992)

As the proportion of elderly in the population will increase all over the world in the coming decades, the number of suicides by them also expected to be on the rise consequently. Proper understanding of their status, risks, and issues are therefore important. Few theoretical underpinnings explore the insights of Suicidology and aging.

Emile Durkheim (1951), a French Sociologist, presented the earliest explanations for suicide in the year, 1897 in his book '*Le Suicide'*. He viewed it as a conscious act out of an individual's will although, a result of one's social conditions or circumstances. As a multi-faceted phenomenon, it is influenced by various interacting factors such as psychological, social, economic, and biological/psychiatric along with cultural and environmental factors. For him, man is a social being whose sense of self-belonging depends highly on her/his interaction with their community/society. Suicide is a result of the level of individuals' relationship with society. Based on this relationship he categorized four types of suicides. They are (i) egoistic suicide, i.e. suicide resulting from little social integration. (ii) Altruistic suicide, i.e. suicide committed because of high interaction, integration, and interconnection. (iii) Anomic suicide, i.e. occurrence of suicide due to exceedingly limited social regulation and integration. (iv) Fatalistic suicide, i.e. suicide because of heightened overregulation in society and the inability of an individual to cope with it. Durkheim opined that the more a person feels socially integrated, connected, or has a sense of social belonging, the likeliness of him/her committing suicide is less. However, if there exists a more unstable social

integration quotient in an individual's life, more likely is of the individual committing suicide.

In terms of Durkheim's classifications, late-life or elderly suicides could be related to egoistic suicides, which happens because of low social integration and closeness with the group or community. Lack of integration might be the reality for many elders who are living alone or in the family. Due to changes in family structure and changing social roles in the family, many elders feel neglected, lonely, and isolated. Such feelings build up negative thoughts and turn up the cause of suicide. It is found that interpersonal relationships are regularly a factor in elderly suicides. If older adults find themselves not integral to family or have trouble in establishing or maintaining relationships, they develop disturbed, insufferable interpersonal tragedies leading to a condition of self-harm (Das, 2017).

The interpretive approach as another social explanation of under-standing suicide looks at why people choose to commit suicide and try to understand why humans behave differently to take their life. Under this approach, Joiner (2005) put forward the interpersonal theory of suicide. It states about two psychological states that could lead to thoughts of suicide if present simultaneously and if a person believes it to be irreversible. One state is a lack of social connectedness or a dissat-isfied/low sense of belongingness where persons feel as though they do not belong to a social group. The other condition is perceiving high burdensomeness when persons believe themselves as a burden on others. This occurs due to the misperception of incompetence by the individuals and they come to believe that others would be better if they die. These two interpretations are primary reasons for individuals to consider suicide and all other suicidal risk factors operate via their influence on these two psychological states.

With respect to the elderly, this approach hypothesizes suicides by the elderly to their dissatisfied belongingness and sense of burden in the family setting. Demeaning societal attitudes as being unproductive and burdensome conjures feelings of despair and hopelessness among the elderly, thus leading to their increased levels of suicidal behavior (Bhatia *et al.,* 1987). Medical seriousness also adds a sense of sadness

from life as illness nurtures the feeling of the elderly's liability to the family along with the sense of incompetence and unproductiveness. Such situations imply reduced social importance and increased dependency, influencing their vulnerability to depression, suicidal ideation, and attempt (Van Orden, Wiktorsson *et al.,* 2015; Kimberly and Conwell, 2016).

Explaining the link between aging and suicide, the vulnerability hypothesis (Lindesay, 1991), attempts to highlight the vulnerability of the elderly to negative thoughts about their life because of multiple social factors or events in their later life. Some of the factors prompting suicides among them could be illustrated as:

Figure 1
Factors Contributing To Elderly Suicides
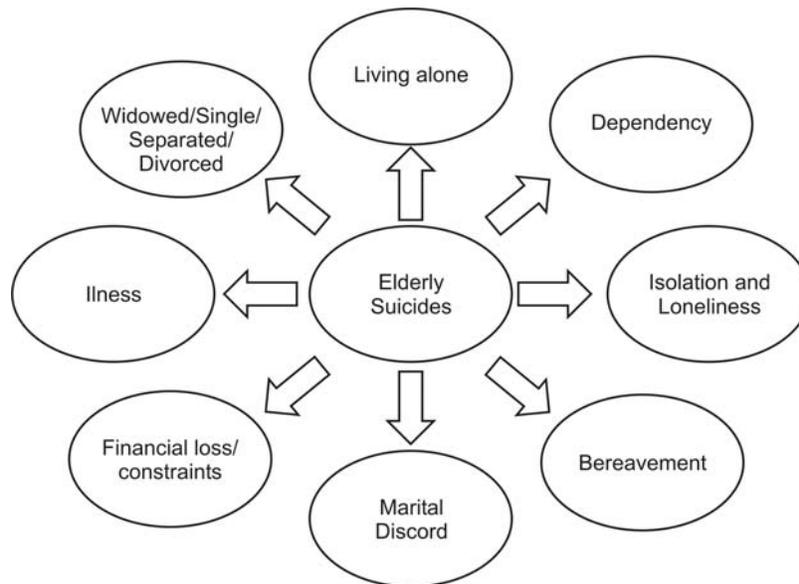
The vulnerability approach would view the lives of the elderly especially women subjectively as empty and without meaning. Some women in later years suffer from material (no financial resources) and symbolic losses (loss of social status) along with the feelings of burden, abandoned, lonely, isolated, neglected, and abused (mental and

physical). Poverty, the overload of excessive caregiver responsibilities, or illness further enhance their problems. Living in such situations and suffering builds up adverse thoughts in them about their lives and in the process develops suicidal ideations or tendencies (Behera *et al.*, 2007). It is observed that elderly people who kill themselves are often reported to be lonely or live alone especially in the case of women thus over-representing the group of widowed, single, or divorced people among their suicidal deaths (Barraclough, 1971; Heikkinen and Lonnqvist, 1995; Catell and Joky, 1995). The perception of low belongingness and burdensome are important aspects of the suicides among the elderly, however, their acknowledgment thus far in the mental health literature is very little (Hagerty and Patusky, 1995)

As there is not much work on the suicides by ageing people in India, this paper presents an overview of their suicide scenario on certain socio-demographic variables for the period of 2011 to 2018.

Methods and Materials

Paper is based on secondary data for suicides for the consecutive eight years (2011 to 2018) taken from National Crimes Record Bureau (NCRB) annual statistical records on 'Accidental Deaths and Suicides', published by Ministry of Home Affairs, Government of India. The report provides data on the number of suicidal deaths (based on police stations recorded cases) across the country on the variables of: suicide rates, number of incidents, age group, gender, causes, professional status, marital status, economic status, educational status, means or methods adopted for committing suicides. Since not all variables provide age details, thus the paper limits its discussion to the selected variables.

Results and Findings

Numbers

Overall during the eight years, elderly suicides[2] constituted 07–08 per cent of the total suicides across all age groups. Studies had revealed the global trend towards increased late-life suicides, especially among men (WHO, 2014; Almeida, McCaul *et al.,* 2016; Crepet *et al.*, 1991; Adamek and Kaplan, 1996). This holds for India as well because over the

years males outnumbered females, almost with a difference of 02 per cent. Over the years, both genders showed a similar trend, displaying an increased proportion over 2011 to 2013 and a drop in 2014.

Figure 2
Distribution of Elderly Suicides (%)
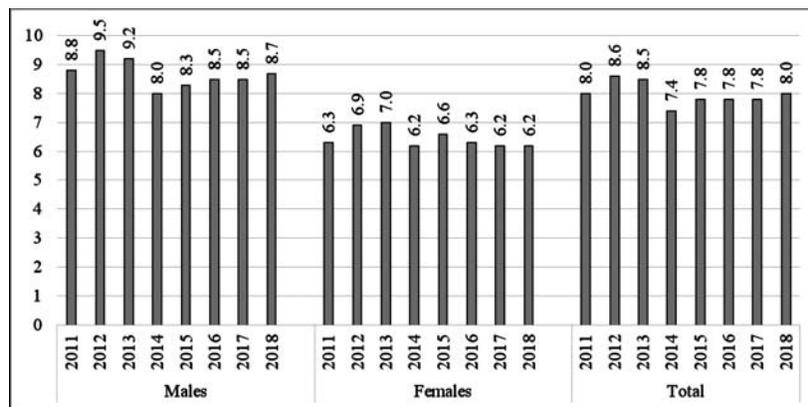
For higher suicides by men, some argue that their suicidal behavior is relatively higher since men are socially reared to be more alone and independent, and tend to face more difficulty in seeking help and support when in distress. These characteristics often make them easier sufferers of suicide ideation and attempts. Handling of adverse situations also defines the proneness of men to suicide as it is argued that the coping conditions and styles of men to overcome stress are more aligned to fighting, violence, anger, and modification by acute substance abuse, which in the end could create circumstances for the suicidal act (Canetto and Sakinofsky, 1998). Inherent differences due to traditional beliefs in men and women psychology could be another reason for higher incidences of suicides among the former as they impact greater social stigma and the lack of social networks of support and help against the male depression or mental illness in general.

Occupation

Occupational details of ageing people who committed suicide reveal the majority of them being self-employed, largely constituting men. Across the years, around 14 per cent of non-working elderly

women (as housewives) have committed suicide making them the next major occupational group (see Table 1). Being married is not necessarily a protective factor for females; suicide attempts are closely viewed as an impact of family relationships. A growing feeling of loneliness and alienation in their lives due to diluted respect for elders, lack of moral support from family members, dependency, less interaction and communication within and outside the world in changing times are some situations that act as a higher risk factor for suicides among elderly housewives (Gururaj *et al.,* 2004; Sandhu and Bakshi, 2004). Suicides by aged people engaged in service and retirees showed a slight upward trend across the years.

Table 1
Distribution of Elderly Suicide by Occupation (%)

Occupation	2011	2012	2013
Housewife	14.2	14.1	14.5
Service (all)	4.8	4.9	6.3
Unemployed	4.3	5.5	5.4
Self-employment	45.9	45.3	44.2
Retired Person	5.7	5.7	7.1
Others	25	24.6	22.5
Total	100	100	100

Note: For 2014 to 2018, age-wise occupational data is not available.
Source: NCRB

It is to note that among self-employed, major suicides was observed for those involved in agriculture (around 11% to 16%) compared to business (04%) or other professionals (around 02% to 03%). Similarly, among service occupational group, private job workers (04%) committed more suicides than the government officials (less than 01%) did.

Unemployed and retirees committing or attempting suicide suggests certain common link in terms of induced economic and social strains. Stress-induced mental health problems, lack of protective supporting factors such as family and loved ones, dependence on others for economic support due to unemployment and lack of steady income, medical costs, non-active life are the suicide risk factors in the elderly (Mishara, 2008; Christensen *et al.*, 2009; Das 2017). According to Kposowa (2001), unemployment and suicide share a rather

complementary relationship with it being stronger in men than in the women.

Causes

In the eighteenth century, the social meaning and perception of suicide was highly influenced and shaped by religion; it was regarded as a concern of vices and virtues such as morality. Since the beginning of the twentieth century, it acquired the status of a social issue demanding an explanation for its causes in order to reduce its impact on individuals (Hendin, 2008).

Explanations of reasons among older adults suggests it to be multiple (see Table 2); illness and family problems, however, remain prominent. A similar result was reported by Behera *et al*, (2007) in their forty-three autopsy cases of suicides by people above 60 years in Delhi at All India Institute of Medical Sciences. Study highlighted that highest share of suicides were due to illness (51%) while family problems prompted 21 per cent towards suicide. The result also showed that interpersonal discord, financial and job problems, and legal difficulties were more typical of suicides in young and middle adulthood, whereas physical illness and other losses were the most common stressors in older adults who end their own lives. Waern *et al.,* (2002) in a population based case-control study also found that illnesses such as visual impairment, neurological disorders, malignant disease, cardiovascular disease, and musculoskeletal disorders were related with the suicide in elderly. In addition, serious physical illness is found to be a stronger risk factor for suicide in men than in women.

Table 2
Distribution of Elderly Suicide by Causes (%)

Causes For Suicide	2011	2012	2013	2014	2015	2016	2017	2018
Bankruptcy/Sudden change in Economic Status	2.6	2.2	1.7	1.7	3.2	3.4	4.1	4.4
Unemployment	0.3	0.5	0.3	0.8	0.8	0.6	0.7	1.1
Professional/Career Problem	0.4	0.4	0.5	0.4	1.1	0.7	1.0	0.9
Poverty	1.4	1.2	1.3	1.1	1.2	1.0	1.0	0.7
Family Problems	18.3	19.7	21.0	18.0	22.3	20.8	24.4	25.4
Marriage related Issues	0.2	0.3	0.3	0.9	1.0	0.5	0.2	1.1

Cont'd...

Cont'd...

Extra marital affairs/suspected relationships	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.0
Love Affairs	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1
Other social causes	1.2	2.0	2.0	1.8	2.2	2.2	2.0	2.0
Property Dispute	1.0	0.9	0.5	0.7	2.9	1.7	1.0	0.9
Illness	**37.8**	**39.5**	**38.2**	**39.2**	**34.2**	**37.6**	**41.4**	**39.8**
(i) AIDS/STD	0.5	0.6	0.6	0.2	0.0	0.2	0.1	0.1
(ii) Cancer	1.4	1.3	1.5	1.4	1.7	1.9	2.7	2.7
(iii) Paralysis	1.3	1.3	1.8	1.0	1.5	1.5	2.4	2.4
(iv) Insanity/Mental Illness	9.1	9.9	7.6	7.5	9.2	11.5	12.5	13.1
(v) Other Prolonged Illness	25.4	26.4	26.8	29.1	21.9	22.5	23.6	21.6
Drug Abuse/Addiction	2.1	2.4	2.8	2.3	2.3	3.6	4.7	5.6
Causes Not Known	18.1	13.5	12.7	10.4	10.4	10.6	7.9	7.6
Other Causes	16.4	17.1	18.5	22.5	18.0	17.2	11.3	10.9
Total	100	100	100	100	100	100	100	100

Source: NCRB

As visible in Table 2, illness as a cause for the given years was around 38 per cent to 39 per cent, except in 2015, which reported lower suicides (34%) than against previous years. Further, among the causes, most suicides happened due to prolonged or long-term diseases. From 2011 to 2014, it reported above 25 per cent showing an upward trend with a rise of around 04 per cent, however, in 2015, the cause saw a significant drop. The other important ailment for suicide was mental illness. In the five years, it showed around 08 per cent to 09 per cent. From 2012 to 2014, the percentage reduced by 2.4 per cent but in 2015 it showed a 02 per cent rise over 2014.

Illnesses causing suicide among the elderly is well established. It is reported that physical illness in the elderly interacts with psychological and social variables promoting their suicide. Poor physical health or recurrent chronic illness leads to depression, a sense of hopelessness, and despair among the elderly. It also brings a lack of self-esteem in them as illnesses raise their dependency on others. Since health sufferings result in pain, discomfort, or interfere with daily living, many elders thus feel to end life (Conwell, Rotenberg, and Caine, 1990; Heikkinen and Lonnqvist, 1995; Murphy, 1983; Ahmedani *et al.,* 2017). Besides generating stress physical ill-health raises the burden on caregivers, and can drain the financial resources of

the family. These social-economic consequences thereby increase the vulnerability of the elderly, heading them to commit suicide (Conwell *et al.,* 2000; Das, 2017). Complicated grief reactions are also associated with increased risk for the presence and persistence of passive and active suicide in the ageing individuals. Due to bereavement, not taking medications or not eating food show the indirect presence of suicidal behaviors in older adults (Szanto *et al.,* 2006).

Similarly, existing studies on mental illness showed that elderly suicide victims are more likely to suffer from depressive illness than their younger counterparts are (Conwell & Brent, 1995). The National Mental Health Survey, 2016, reported that the lifetime prevalence of mental morbidity was 15.1 per cent (14.9%–15.3%) after 60 years (NIMHANS, 2016). Depression is common among geriatric patients and is a risk to suicidal tendencies especially in India. Moreover, it is significantly associated with increasing age, female gender, absence of support from a spouse, economic dependence, and nuclear family (Kundap, Singru, and Fernandez, 2016). After the depression, dementia and anxiety disorders are the next most common psychiatric disorder among the elderly population (Girdhar *et al.,* 2019). Despite such pieces of evidence, mental illness of the elderly is poorly recognized and treated. Lack of sensitization of the primary health caregivers concerning the geriatric mental health issues further magnifies late-life suicides (Oriordan *et al.,* 1989; Das, 2017). It is argued that the availability of social support and assistance from friends and family can enhance coping and offer a buffer against stress to elderly, as it directly or indirectly functions in decreasing the vulnerability to physical and mental illnesses (Coyne and Downey, 1991; Monahan and Hooker, 1997).

After illnesses, family problems were the next major cause of suicide. Over years, it saw a continuous rise of 2.7 per cent from 2011 to 2013. In 2015, it regained 4.3 per cent by 4.3 per cent as against 2014 (see Table 2). Though kinds of family problems in the NCRB data was not detailed concerning the elderly, one can assume that many of them might be facing social sufferings in the household such as lack/no emotional and physical support from family members, issues of inter-personal stressors/conflicts, insecurity and dependency, physical and mental abuse and so on. Such sufferings could make an elderly person

to take their own life. Suicides of the elderly to an extent also point to the question of their integration, respect, and caring responsibility in the family by the children and kins (Kumar *et al.,* 2015; Shukla *et al.,* 1990). Cause of bankruptcy/sudden change in economic status, property dispute, drug-abuse/addiction among the elderly was below five per cent over the years (see Table 2).

Gender distribution and causes of suicides suggest more males than females committed suicide due to family problems across years except 2015. Moreover, across years the suicidal share for both gender increased from 2011 to 2013, and in 2015 over 2014. For all the given years, females reported a higher share (constituting above 40%) than males for the cause of illness. From 2011 to 2014, it grew by 3.1 per cent and a drop in 2015. For the same cause, males too showed increased proportion but for alternate years from 2011 to 2015. Likewise, females represented more suicides because of prolonged illness and mental illness with the former displaying a growth of 3.2 per cent (2011 to 2014). Mental illness remained largely at 10 per cent to 11 per cent with 2015 showing an increase of 2.5 per cent over 2014. Even males reported increased suicide share for prolonged illness as it grew by almost 04 per cent from 2011 to 2014. The cause of mental illness across years in males was below 10 per cent. Suicides due to bankruptcy/sudden change in economic status (less than 05%) and poverty (less than 02%) showed a larger share among males than females (except 2013 for poverty). Other social causes, however, remained higher for females with an increasing pattern over years (see Table 3, Annexure 1).

Means

There exist various forms of means to commit suicide (see Table 3), but the most frequent means was consuming poison and hanging. Together they were used by more than 55 per cent of the elderly. Over the years hanging mode reported a rising trend as it grew by 6.1 per cent from 2011 to 2013 while the use of poison decreased by 2.1 per cent for the same years. Other important means were self-immolation and drowning but their use declined over years. Though of fewer occurrence, coming under vehicles/trains and excessive alcoholism formed important means of committing suicide by the elderly.

Table 3
Distribution of Elderly Suicide by adopted Means (%)

Means used For Suicide	2011	2012	2013
Excessive Alcoholism	1.4	1.7	1.8
Drowning	7.8	7.3	6.3
Fire/Self-Immolation	7.0	7.2	6.7
Hanging	27.8	30.6	33.4
Consuming Poison	33.0	30.0	30.9
(i) Insecticides	16.5	14.4	16.6
(ii) Other Poison	16.6	15.4	14.3
Jumping (building/other sites/moving vehicles)	1.6	1.5	1.2
Overdose of sleeping pills	0.5	0.5	0.5
Coming under running vehicles/trains	3.8	3.5	4.8
Self-Infliction Injuries	1.4	1.2	1.1
Others mean	15.6	16.8	13.4
Total	100.0	100.0	100.0

Note: For 2014 to 2018, age-wise data of adopted means for suicides is not available. Source: NCRB.

The frequent means of hanging and poison compared to other forms to commit suicide is due to their easy access. Ceiling fans (for hanging) and poisonous substances like pesticides, phenyl, etc. are easily accessible to the person who intends to commit suicide. It is stated that in rural communities, consuming poison is more prevalent. Most people living in rural areas in India are involved in agriculture. They keep pesticides in their homes or close to their homes for agriculture purposes. However, ignorance and carelessness about the safe storage of pesticides and its easy disposal make it a readily available suicide method (Eddleston, 2004; Thanh *et al.,* 2005; Gajalakshmi and Peto, 2007; Salve *et al,* 2013).

Gender distribution and means used showed consumption of poison as a major frequent method used by both genders followed by hanging, however, males showed a larger presence for the use of hanging mode (see Table 2, Annexure 1). In terms of trend, in the three years, the use of poison declined in males while increased in females (by almost 04%). Hanging as a mode of suicide recorded an increase for both males and females over the same period by 6.8 per cent and 2.2 per cent respectively. Males also used self-immolation to commit

suicide, but the method was centric mainly on females and was the third commonly used known mode. In males, drowning was the third most used suicide means. A study by Chowdhury *et al*. (2010) also described the gender division of suicide methods. It found ending one's life by consuming poison as the most common method used by both sexes, while hanging was marginally more common among men, and burning of oneself was slightly more common to the women. Similarly, Kumar (2004) pointed out that considering that majority of men are farmers in India who may have easy access to insecticides and pesticides would invariably, choose its consumption as a way to commit suicide. On the other hand, since most women of India are housewives and have limited mobility of moving outside one's home; they tend to have more accessibility to medicines/drugs, kerosene, ceiling, etc. which explains their proneness to the method of intake of drugs/medicines, self-immolation or hanging. Parker *et al*. (2009) also observed from a specific community of slum-dwellers that burning oneself with kerosene was the most frequent method of committing suicide, especially among women.

Conclusion

The number and proportion of older persons are growing faster creating concerns to address the challenges and issues associated with them. Among others, the issue of health and elderly care need foremost attention as for aging population they become risk factors for suicide.

Suicide represents an important public health issue in general and for the elderly in particular. The suicidal picture of India highlights that their suicides are witnessing a slow growth. The causes of suicide highlighted that over years, family problems, prolonged illness, and mental illness lead most elders to commit suicide. The frequent mode of suicide remained specific to hanging and poison consumption. Gender distribution reveals suicide being a male phenomenon in India as in the given reference year elderly males outnumbered females with an increasing pattern. In terms of occupation, housewives and self-employed are the major risk groups to suicide for elder females and males respectively. In addition, if family issues showed more or less

common cause among both gender, illness compelled more elderly males than females to commit suicide.

The expression of suicidal ideations and a risk factor for death in the elderly suggests its association largely to the late-life changes. The diminishing traditional support systems due to societal changes such as rapid urbanization, industrialization, and emerging family systems, all leave elderly people vulnerable. During old age, they live with multiple losses along with changes in health status, autonomy, roles, and relations which result in socio-psychological vulnerabilities. Poor geriatric care and inadequate mental health services further enhance their suicide risk considering that many of the elderly suicide committers tend to have a relatively more chronic course of illness and some even suffering from psychological issues or mental disorders. The elderly tend to dismiss their health problems as an inevitable part of aging. As a result, they may not seek medical care and may suffer needless discomfort and disability thus risking their lives to suicidal ideations. In Indian culture, an old person always sees family as a form of insurance or support. However, in recent times the rapid socio-economic transformation has affected the integrity of the family as the primary source of care thus reflecting the challenge to their needs of physical attention and emotional caring.

Recent developments of decriminalizing suicide and the permission of passive euthanasia (through a living will) in the near future would become an important concern in the area of aging and suicidology. Passive euthanasia talks about physician-assisted suicide mainly for terminally ill patients by deliberately withdrawing medical treatment. Considering that with passing years, old people might form a large percentage of such patients because of their depleting health and no source of care (personal and financial), seeking passive euthanasia would grow with more elders seeking it. Moreover, palliative and terminal care are weak in India, which could be an additional reason for pursuing voluntary euthanasia over expensive palliative treatment and care in the years to come. However, in a cultural society like India, wherein the elders in the families are still regarded to be respected and cared for (though the emotional bond is weakening to some extent presently), family members accepting euthanasia for their aged

parents/relatives is a complex and debatable issue, especially on the moral grounds. Nonetheless, the process seems significant and a future reality.

Suicide in late life presents two different scenarios. One is a social problem as suicides by the elderly highlight various issues and difficulties that they live with which compels them to commit suicide. It also points the families' failure in taking their care and responsibility. Second, from an elder's perspective, suicide might involve the ending of their longing for survival and freedom to die by discontinuing their burdensome life on others in their later stage of life. Both conditions imply the challenges of aging people in our changing social surroundings.

Suicidology as a discipline in India is very young. Since suicide is a multidimensional aspect, there is a need for systematic research with a multidisciplinary approach. In view of India becoming an ageing society and with the increasing incidence of suicides by the elderly, late-life research by placing views and needs of elders at the center is the need of the hour. We need to understand why older adults think about and act on suicidal thoughts. By doing so we can intervene and reach those at risk along with building up a network of policies and programs on mental health and care valuable to elders as well as to other age groups.

Society as a whole, including friends, family, and neighbors, should be made aware that mental illness and suicidal behavior can be recognized and treated. This can be achieved through public education campaigns designed to provide information on the recognition and treatment of mental illness, and on availability and accessibility of services. Simultaneously equally important is addressing and promoting active ageing. It calls for acknowledging the productive role of the elderly, i.e. their economic or non-economic contribution to the family or household. This has a psychological implication, as it would give the elderly people a sense of dignity and social importance thereby enhancing their overall mental status and lesser risk to suicidal thoughts and attempts.

Annexure 1

Table 1

Gender Distribution of Elderly Suicides by Occupation (%)

Occupation	2011		2012		2013	
	M	F	M	F	M	F
Housewife	-	50.6	-	52.3	-	53.8
Service (all)	5.8	2.4	5.9	2.0	7.6	2.7
(i) Government job	0.1	0.3	0.4	0.1	0.6	0.5
(ii) Private job	4.6	1.8	4.5	1.5	5.8	1.7
(iii) Public sector undertaking	1.1	0.3	1.1	0.3	1.2	0.4
Student	-	0.1	-	0.3	0.1	0.2
Unemployed	5.1	2.3	6.7	2.4	6.4	2.6
Self-employment	56.1	19.9	55.1	18.4	53.5	19.3
(i) Business	5.3	0.2	5.8	0.4	4.9	0.3
(ii) Professional activity	3.3	1.5	3.0	0.5	2.5	0.8
(iii) Farming/agriculture	17.3	3.0	19.7	5.3	14.5	4.9
(iv) Other self-employed jobs	30.2	15.1	26.5	12.3	31.5	13.3
Retired Person	6.9	2.6	6.9	2.5	8.3	3.8
Others	26.1	22.0	25.5	22.2	24.1	17.7
Total	100	100	100	100	100	100

Note: Age-wise data by occupation and gender not available for 2014 to 2018. Source: NCRB.

Table 2

Gender Distribution of Means used by the Elderly for Suicide (%)

Means of Suicide	2011		2012		2013	
	M	F	M	F	M	F
Excessive Alcoholism	1.9	0.3	2.1	0.7	2.5	0.1
Drowning	7.1	9.5	6.5	9.3	5.3	8.9
Fire/Self Immolation	3.9	15.1	3.8	15.8	3.5	15.4
Fire-Arms	0.2	-	0.3	0.3	0.2	0.3
Hanging	29.5	23.3	33.8	22.0	36.3	25.5
Consuming Poison	35.7	26.2	31.2	26.9	31.1	30.4
(i) Insecticides	18.1	12.4	15.0	12.8	16.2	17.4
(ii) Other Poison	17.6	13.8	16.0	13.9	14.8	13.0
Self-Infliction of injury	0.6	0.8	0.3	0.1	0.4	0.5
Jumping (building/sites/moving vehicles)	1.7	1.4	1.6	1.2	1.3	1.1
By Machine	0.1	0.1	0.1	-	-	-
Overdose of sleeping-pills	0.5	0.5	0.4	0.8	0.4	0.7
Self-electrocution	0.6	0.3	0.6	0.7	0.4	0.4
Coming under running vehicles/trains	4.4	2.4	4.2	1.7	5.3	3.4
Others mean	13.8	20.2	15.3	20.7	13.4	13.5
Total	100	100	100	100	100	100

Note: Age-wise gender data for the means of suicide is not available for 2014 to 2018.

Source: NCRB

Table 3
Gender Distribution of Causes behind Elderly Suicides (%)

Causes of Suicide	2011 M	2011 F	2012 M	2012 F	2013 M	2013 F	2014 M	2014 F	2015 M	2015 F	2016 M	2016 F	2017 M	2017 F	2018 M	2018 F
Bankruptcy/Sudden change in Economic Status	3.4	0.6	2.5	1.6	1.9	1.2	2.2	0.5	4.0	1.0	4.3	0.6	5.1	1.0	5.4	1.2
Unemployment	0.3	0.1	0.7	0.2	0.4	0.1	1.1	0.0	1.0	0.5	0.7	0.3	0.7	0.5	1.3	0.4
Professional/Career Problem	0.4	0.4	0.6	0.1	0.6	0.1	0.5	-	1.3	0.6	0.9	0.2	1.0	1.1	1.0	0.5
Poverty	1.6	0.8	1.4	0.9	1.0	1.9	1.3	0.5	1.5	0.4	1.1	0.6	1.1	0.6	0.9	0.3
Family Problems	18.4	18.2	19.7	19.5	21.3	20.1	18.2	17.3	21.9	23.6	20.9	20.8	24.1	25.3	25.6	25.0
Marriage Related Issues	0.2	0.4	0.2	0.4	0.2	0.5	0.8	1.2	1.2	0.6	0.4	0.7	0.2	0.4	1.3	0.4
Extra marital affairs/Suspected Relationships	0.2	0.1	0.1	0.0	0.3	0.0	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.3	0.0	0.0
Love Affairs	0.0	0.0	0.0	0.0	-	0.0	0.1	-	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Other social causes	1.0	1.7	2.0	2.1	2.0	2.2	1.7	2.0	1.8	3.4	2.0	2.5	1.8	2.6	1.9	2.3
Property Dispute	0.8	1.4	1.0	0.5	0.5	0.4	0.7	0.5	3.2	2.2	1.9	1.2	1.1	0.8	1.0	0.6
Illness	36.0	42.3	38.3	42.9	36.5	42.9	36.9	45.4	32.1	40.1	35.3	44.4	38.7	49.3	36.5	49.9
(i) AIDS/STD	0.5	0.6	0.6	0.7	0.7	0.4	0.7	0.2	0.1	0.0	0.2	0.2	0.2	0.0	0.1	0.0
(ii) Cancer	1.4	1.6	1.3	1.3	1.5	1.4	1.2	1.7	1.6	1.8	1.6	2.8	2.7	2.9	2.5	3.3
(iii) Paralysis	1.4	1.2	1.4	1.1	1.9	1.3	1.0	1.2	1.4	1.8	1.6	1.4	2.4	2.7	2.3	2.8
(iv) Insanity/Mental Illness	8.6	10.2	9.3	11.4	6.8	10.0	6.6	10.1	7.9	12.6	10.4	14.6	11.3	16.1	12.0	16.3
(v) Other Prolonged Illness	24.1	28.8	25.7	28.4	25.6	29.8	28.0	32.2	21.1	23.8	21.5	25.4	22.3	27.6	19.7	27.5
Drug Abuse/Addiction	2.8	0.3	3.4	0.3	3.7	0.3	3.1	0.2	3.1	0.3	4.7	0.2	6.1	0.5	7.3	0.3
Causes Not Known	18.3	17.6	13.3	13.8	13.1	11.6	11.1	8.5	10.4	11.2	11.0	9.1	8.1	7.5	7.4	8.1
Other Causes	16.6	16.0	16.9	17.8	18.5	18.6	22.0	23.9	18.8	15.9	16.5	19.1	11.8	10.0	10.9	11.1
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: NCRB

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Notes

1. United Nations defines a society as aging once its proportion of those aged 65 and above cross more than 7 per cent of its total population. India has crossed this percentage with 123 million elderly population in 2018.

2. In this paper, elderly suicide refers to suicides by people who were above 60 years.

ADL Difficulties among Rural Elderly: A Social Work Study

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ABSTRACT

The purpose of this study was to examine empirically the Activities of Daily Living of 221 rural elderly (male = 111 and female = 110) age varying from 60 to 80 years and above, from two villages (one most backward and one relatively developed) in Kalaburagi district of Karnataka. A semi-structured interview schedule and Life Satisfaction Index-A were used to collect primary data. The techniques of interview, observation, and case study were used. The data was analysed adopting descriptive and inferential statistical techniques with the help of Statistical Package for Social Sciences. The findings of the study revealed that the elderly belonging to middle and upper age cohorts (71 years to 80 years and above) had more ADL difficulties and were least satisfied with life when compared to the elderly belonging to the lower age cohort (60 to 70 years).

Keywords: Elderly, ADL difficulties, Life Satisfaction, Rural, Social Work Intervention.

Difficulties in the Activities of Daily Living (ADL) among the elderly population are at an increase across the world due to increasing longevity. The present life expectancy at birth in India is 70.4 per cent including both the genders. The per cent of the population of the

elderly 65 years and more is 6.3 per cent. The elderly living alone, neglected, orphan, destitute, never married, divorced, widow/widower, illiterates, unskilled, suffering from chronic illness, living in nuclear families, belong to upper age cohort, worked in the unorganized sector, institutionalized, and disabled are more vulnerable to difficulties in Activities of Daily Living than their counterparts. It is a challenge to address by the Government and Non-governmental organizations in a country like India, which ranks 129th in the Human Development Index in the world, to ensure successful ageing. Gerontological social work is one of the emerging areas of social work practice. Social Work Interventions have a vital role to play with elderly individuals and groups with ADL difficulties.

ADL Difficulties among Elderly: A Review

It will be worthwhile to revisit the studies on Activities of Daily Living for a better conceptualization and to understand research gaps so that the present study would contribute something new to the existing body of knowledge in the field of gerontological social work. Himes (2000) in his longitudinal study tried to find out the effects of obesity among the elderly population. The findings of the study revealed that there is an increase in the prevalence of obesity, over a period of time among the elderly aged 70 years and more. Obesity became a hurdle to elderly women to perform Daily Living Activities and reduced their mobility. Obesity is found to have an association with the prevalence of diabetes, arthritis, and hypertension. Soldo, *et al.,* (1985) suggested that the elderly population requires several services due to chronic morbidity and lack of mobility. The integrated health service system should include the service needs of the elderly population. Hence, the policy guidelines related to the elderly should ensure fulfilling the service needs of the elderly.

Elnitsky, *et al.,* (1998) explored that the elderly population in rural areas is vulnerable to health issues and lack of access to health services. This descriptive study, with the help of the cluster analysis method, assessed their health status and risk factors of the elderly 65 years and above. A community health nurse intervention was sought for the elderly who had difficulties in two or more Daily Living

Activities. Kaufert, *et al.,* (1979) studied the performance of 13 mobilities and self-help activities of 92 elderly patients.

Quinn, *et al.,* (2011) revealed that chronic illness among the elderly population affects their Daily Living functions. This makes them dependent on others and require institutional care. It is suggested that timely identification of functional difficulties may help to introduce appropriate interventions to prevent further complications. Lang, *et al.,* (2007) studied the ability of the elderly population to perform Activities of Daily Living and care during hospitalization. Data obtained from 1,306 elderly were analysed using multinomial logistic regression. The dependency level was assessed using Katz's ADL index. The functional factors like lack of autonomy, walking difficulties, risk of falling are associated with geriatric treatment and rehabilitation measures. Torres, *et al.,* (2007) explored that the cause of psychological distress among the elderly is insomnia. 424 elderly patients were studied adopting a cross-sectional approach. The findings revealed that the elderly having anxiety, least satisfaction with life, and consumption of psychopharmaceuticals are associated with sleeplessness.

Hao (1998) explored the Chinese elderly's dependency, or need for assistance, in four key functional areas: physical, mental, social, and economic, based on data from the 1992 National Survey on the Old-age Support System (NSOSS). The data revealed that a very small proportion of the elderly was found physically dependent or partially dependent. However, all of them were economically dependent. The dependency rates vary with reference to age cohorts, gender, and domicile (urban-rural). The elderly women and elderly in rural areas are found to be more dependent. Tabbarah, *et al.,* (2001) conducted a longitudinal study on disability and socio-demographic aspects of the American elderly aged 70 years and above. It is suggested to provide special housing to the elderly to remain in their home and promote independence.

Sulander, *et al.,* (2003) studied the functional ability of the elderly aged between 65 to 79 years in Finnish. It was found that the variables gender, age cohorts, previous occupation, and marital status were associated with the functional ability of the elderly. This association is being changed over one decade. The elderly in the lower age cohort

were found to have better functional ability than their counterparts, i.e. from the 1980s to 1990s. It was suggested that most of the daily Living Activity difficulties could be postponed subject to timely diagnoses and proper treatment of age-related illness.

Holstein, *et al.,* (2007) observed the change in the functional ability among elderly who were not institutionalized with reference to gender, age cohorts, and household composition. Adopting random sample, 1,231 elderly 70 years and above were studied. The per cent with unchanged, improved, and deteriorated functional ability were 51 per cent, 13 per cent, and 37 per cent respectively. Considerable elderly persons improved in their functional ability and a majority of them were stable. Hence, it is suggested for the promotion of health among the elderly, as it is largely neglected in the health policy.

Angel, *et al*. (2003) examined the financial strain experienced due to health issues among Mexican-origin elderly. It employed eight years of a longitudinal study of 3,000 elderly representing five southwestern states. The study revealed that financial strains caused by health expenditures are associated with depression. Tripathi (2014) conducted a study in India and expressed concern that not enough justice was given to poor elderly who are dependent. It was also reported that there is a lack of reliable data on the situation of the elderly who are having meager resources in India. A glance at the available literature reveals that there is a dearth of studies on Activities of Daily Living and social work intervention. In view of this, the study was conducted with the following objectives;

1. to examine the Activities of Daily Living related difficulties and identify its association with the age cohorts and life satisfaction of the elderly; and

2. to suggest social work interventions with the elderly having difficulties in Activities of Daily Living

Method

Sample

221 elderly, age varying from 60 to 80 years and above, belonging to two rural villages (one most backward and another relatively developed) of Kalaburagi district of Karnataka, were selected

randomly from the list of the elderly, procured from the household register maintained by Anganwadi worker of ICDS.

Tools Used

A semi-structured interview schedule was developed and standardized to collect primary data. Besides, Life Satisfaction Index-A (Neugarten, Tobin, and Havighurst; 1961) was used. The Life Satisfaction Index A (LSIA) measures the psychological well-being in the elderly, with dimensions such as zest for life, fortitude, congruence between desired and achieved goals, physical, psychological and social self-concept. This tool consists of 20 (12 positive and 8 negative) statements of Life Satisfaction. Agree with positive statements and disagree with negative statements scored one. The minimum score was one and the maximum was twenty. To see the level of satisfaction, three categories, viz. (0–6) dissatisfied, (7–13) least satisfied, and (14–20) highly satisfied were formed In-depth interviews, observation, and case study techniques were also used.

The data collected was subjected to data processing. The processed data were entered into a computer. With the help of Statistical Package for Social Science; descriptive and inferential data analysis was made. Case studies are presented in support of quantitative data.

Findings and Discussion

An attempt was made to understand the profile of the elderly in rural communities. More than half of them represent the most backward rural community and slightly less were from the comparatively developed rural community. More than half were males and slightly less proportion was female elderly. With reference to age cohorts, a majority of them, more than three-fifth, were in the lower age cohort (60 to 70 years). A good proportion of more than one-fifth was in the middle-age cohort (70 to 80 years), and A significant proportion of more than one-tenth was in the upper age cohort (80 years and above). Less than seven-tenths were from joint families and more than three-tenths were from nuclear families. More than three-fourth were illiterates; significant proportions more than one-fifth were literates, and only 2.7 per cent had obtained formal education. Less than three-fifth were married; more than three-tenths were widow/widower,

and 2.3 per cent each was divorced and never married respectively. Less than three-fifths were economically unsound but have someone to care; more than one-fourth were economically sound and have someone to care; Less than one-tenth were economically unsound and have no one to care, and 5.4 per cent were economically sound and have no one to care. About three-fourths belong to other backward classes; less than one-fifth belongs to Scheduled Caste; less than one-tenth belong to Scheduled Tribe, and only 0.9 per cent belong to the general category. With reference to Life Satisfaction, about three-fifths were least satisfied; more than one-fourth dissatisfied, and only more than one-tenth were satisfied (see Table 1).

Table 1
Profile of the Elderly

N = 221

S. No.	Variable	Description	Frequency	Per cent
1.	Community	Relatively developed	109	49.3
		Most backward	112	50.7
2.	Gender	Male	111	50.2
		Female	110	49.8
3.	Age cohorts	Lower (60–70)	143	64.7
		Middle (70–80)	50	22.6
		Upper (80 + and above)	28	12.7
4.	Type of Family	Joint	148	67.0
		Nuclear	73	33.0
5.	Education	Illiterate	167	75.6
		Literate	48	21.7
		Formal Education	6	2.7
6.	Marital Status	Married	132	59.7
		Never married	5	2.3
		Widow/widower	79	35.7
		Divorcee/separated	5	2.3
7.	Socio-economic background	Economically sound and someone to care	61	27.6
		Economically sound and no one to care	12	5.4
		Economically unsound & someone to care	129	58.4
		Economically unsound and no one to care	19	8.6
8.	Caste Category	SC	40	18.1

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			16	7.2
		ST	16	7.2
		OBC	163	73.8
		Other	2	0.9
9.	Life Satisfaction	Satisfied	32	14.5
		Least satisfied	130	58.8
		Dissatisfied	59	26.7

It was clear from the above table that equal proportions of the elderly were spread into the relatively developed and most backward rural community; and males and females. Most of them belong to lower age cohort; joint families; illiterates; married; economically unsound but have someone to care for; belong to other backward class communities. It may be true because, in rural areas, illiteracy among the elderly population is a common phenomenon. Since a good chunk of them belong to the lower age cohort, obviously most of them were married. Most of the elderly represent joint families because they still exist in rural India. It is to be noted that the elderly in rural areas have a support system due to the existence of joint families. Since they were to work in the unorganized sector and mostly depend on agriculture, most of them were economically not affluent.

Table 2
ADL difficulties among Elderly

N=221

S. No.	Variable	Description	Frequency	Per cent
1.	Can see properly	Have difficulty	156	70.6
		Do not have difficulty	65	29.4
2.	Can hear properly	Have difficulty	177	80.1
		Do not have difficulty	44	19.1
3.	Can walk independently	Have difficulty	103	46.6
		Do not have difficulty	118	53.4
4.	Can climb independently	Have difficulty	220	99.5
		Do not have difficulty	1	0.5
5.	Can lift easily	Have difficulty	220	99.5
		Do not have difficulty	1	0.5
6.	Can eat easily	Have difficulty	93	42.1
		Do not have difficulty	128	57.9

It was attempted to understand the ADL difficulties among the elderly. A majority of the elderly except one have difficulty in climbing and lifting respectively; more than four-fifths had difficulty in hearing; more than seven-tenths had difficulty in seeing; less than half can't walk independently; and more than two-fifths had difficulty in eating as their teeth's were not intact. It was clear that the majority of the elderly in a rural area had difficulties with Activities of Daily Living. It may be true because the mean value of the elderly age was 69.52 years as they are on the verge of entering the middle age cohort. Poor quality of life, neglect, and delay in seeking medical interventions made them develop complications. Economic insecurity and lack of access to specialized geriatric health services were the major threats for them in this regard (see Table 2). It was true in the case of Parvathi (name changed), *a 66-year-old widow living with children. She used to work actively in agriculture. One day she fell and got her leg fractured. Family members scolded her instead of offering treatment. The local treatment was given after a few days but there was no improvement and she became disabled. Now she faces several difficulties in daily life and altogether her life has become miserable.*

Table 3

Association of Age cohorts with ADL difficulty among the Elderly

N = 221

S. No.	Variable	Chi-square value	DF	Significant Level	Result
1.	Can see properly	20.411	3	0.00	Significant
2.	Can hear properly	8.411	3	0.38	Non-Significant
3.	Can walk independently	9.077	3	0.028	Significant
4.	Can climb independently	0.581	3	0.901	Non-significant
5.	Can lift easily	0.581	3	0.901	Non-significant

Association of age cohorts with ADL difficulties among the elderly was explored by applying the Chi-square test. It was found that the variable with seeing and walking independently had a significant association with the variable age cohorts. Hence, the null hypothesis was rejected. It can be stated that the elderly belonging to lower age cohorts (60 to 70 years) were better at seeing and walking independently when compared to the middle (70 to 80 years) and upper (80

years and above). The variables climbing independently, hearing, lifting, and eating had no significant association with the variable age cohorts. Hence, calls for the acceptance of the null hypothesis (see Table 3). It was clear that the ability to see and independent walk deteriorates as age increases. It was true in the case of Rajanna (name changed); *87 years old can see by using goggle and walk with the help of a walker. He retired from Central Government service, availing pension. Therefore, he can get timely quality treatment of the illness and afford the aids and instruments essential to perform Activities of Daily Living.*

Table 4

Association of ADL difficulty with Life Satisfaction among the Elderly

N = 221

S. No.	Variable	Chi-square value	DF	Significant Level	Result
1.	Can see properly	26.297	2	0.00	Significant
2.	Can hear properly	26.525	2	0.00	Significant
3.	Can walk independently	5.634	2	0.04	Significant
4.	Can climb independently	2.696	2	0.26	Non-significant
5.	Can lift things easily	2.696	2	0.26	Non-significant
6.	Can eat things easily	7.058	4	0.13	Non-significant

Association of ADL difficulties with life satisfaction of the elderly was explored adopting the Chi-square test. The variables seeing, hearing, and walk independently had a significant association with the life satisfaction of the elderly. Hence, reject the null hypothesis. It can be stated that the elderly whose vision was good, can hear properly, and walk independently were found to have been more satisfied with life than their counterpart. The variables climb independently, lift easily, and eat easily were found to have no significant association with life satisfaction. Hence, it calls for the acceptance of the null hypothesis (see Table 4).

Conclusion

An attempt has been made empirically to examine the ADL difficulties among the rural elderly in Kalaburagi district of Karnataka. The Elderly in rural areas lack access to geriatric health services. The ADL difficulties are found in the elderly belonging to middle and

upper age cohorts. The elderly in the unorganized sector who lack economic security are more vulnerable. To ensure successful aging, the quality of life needs to be ensured. Social work interventions have a vital role to play with the elderly in rural areas in this regard. Because of this, the following suggestions are made to enhance Activities of Daily Living of the elderly;

1. Professional Social Workers can use the social casework method to deal with the issues of individual elderly and help them to help themselves.

2. Social workers need to adopt the Micro-Planning technique in the rural communities, make need assessments related to ADL-related difficulties, make an action plan, and implement the plans.

3. Social group work needs to be used by forming the self-help groups of the elderly in rural areas and create awareness about nutrition, health, yoga, meditation, government facilities available for them.

4. Intervention research needs to be taken up by social workers to make interventions related to ADL difficulties.

5. Senior Citizen Forums be formed in rural areas and social action is initiated to prevent elderly abuse and ensure their rights.

6. Health check up camps needs to be organized regularly in the rural areas to identify ADL difficulties and make timely interventions for its prevention.

7. Social workers can play a major role of mediators and facilitators and help the elderly to get aids for their ADL difficulties such as hearing aid, goggles, wheelchair, etc.

Younger generations of the rural communities in general and of family members in particular need sensitisation about ADL difficulties of the elderly and their role in helping them to cope up better.

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Factors Affecting Sleep Disorder among Rural Elderly in North-Eastern Part of Bangladesh

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ABSTRACT

This research paper attempts to examine the prevalence and determinants of sleep disorder of rural elderly in the northeastern part of Bangladesh. A total of four hundred elderly both males and females were selected randomly from the rural area of the Sunamgonj district in Bangladesh. Descriptive statistics, Chi-square test, and Logistic regression model were applied to analyze the data. The results show that about fifty-seven per cent of the elderly were suffering from a sleep disorder. Male elderly were suffering more than female elderly. Unmarried elderly were suffering more than married elderly. Chi-square analysis shows that sleep disorders of the elderly are significantly associated with their income, age, blood pressure, physical exercise, smoking behavior, and family type. The logistic regression analysis shows that economic condition, family type, blood pressure, and physical exercise are significant factors of sleep disorder of the elderly. The present findings may be helpful for the policymakers and researchers of rural geriatric of the country.

Keywords: Elderly, Sleep disorder, Blood pressure, Geriatric

Population ageing is defined as an increase in the proportion of age 60 and above population, which is elderly. As mortality declines and public health interventions improve population ageing has become a worldwide phenomenon. According to the UN report in 2017, there are an estimated 962 million people aged 60 or over in the world, comprising 13 per cent of the global population, and the population aged 60 or above is growing at a rate of about 3 per cent per year. The number of older persons in the world is projected to be 1.4 billion in 2030 and 2.1 billion in 2050 and could rise to 3.1 billion in 2100 (UN, 2017).

Bangladesh is currently undergoing a demographic transition and the proportion of the population 60 years and older is rapidly increasing in this country (Islam *et al.,* 2004). It is estimated 7.3 million people are currently 60 years or older, and it is projected that these numbers will increase by 17.3 per cent by 2025 (Biswas *et al.,* 2006). The population aged 60 years and older is growing faster than the total population (Kabir *et al.,* 2013).

Sleep is the most important factor for the overall health and well-being of the elderly (Suzuki *et al.,* 2017). General physicians, Psychiatrists, neurologists have observed the changing pattern of sleep from early age to old age. The quality of life of the elderly is affected by inadequate and inappropriate sleep. Recently sleep problem of the elderly has gained attention from the researcher (Neikrug and Ancoli-Israel, 2010; Miner and Kryger, 2017; Fuchs, 2016). It is necessary to assess all older individuals with sleep disorders for identifying and treatment of risk factors (Hussani *et al.,* 2018).

A newborn, spends 16–20 hours in sleep each day, adults need only about 8 hours sleep daily. However, many elderly may struggle to obtain that 8 h in one block. As people age, they tend to have a harder time falling asleep and more trouble staying asleep. Older people spend more time in the lighter stages of sleep than in deep sleep. The prevalence of sleep disorders is higher among older adults (Kamalesh and Kumar, 2018).

Sleep disorders are a major risk factor for the development of hypertension among rural older adults in southwest China. The prevalence rates of sleep disorders were 46.5 per cent. Age, sex, hypertension, and residential status of the elderly are associated with

sleep disorder. The elderly of minority ethnicity had a higher prevalence of sleep disorders than the Han ethnic majority. Attainment of higher levels of education and lower annual household income were also associated with a greater risk of sleep disorders (Guo *et al.,* 2020)

With the increasing of age, there is a high chance of having both physical and mental impairment. One of the important factors that influence the severity of the disease among the elderly is their health seeking behavior (Bhat and Kumar, 2017). Elderly people suffer from multiple morbidities to which they often attribute to aging (Kamble *et al.,* 2012). In rural areas, the aged people are suffering more than in urban areas due to the unavailability of healthcare facilities (Uzobo and Dawodu, 2015).

Age and health conditions are the two most important factors associated with sleep quality and duration. Sixty-five per cent of Chinese elders reported good quality of sleep. The average number of self-reported hours of sleep was 7.5. It was observed that gender, residence, ethnicity, higher socioeconomic status, and good health conditions were associated with good quality of sleep. Elders with poorer health status have relatively shorter sleep duration (Gu *et al.,* 2010).

A high prevalence (66.66%) of sleep disorder among medical students has been observed. Sleep disorder affects their academic performance. So, undergraduate medical students should be educated about the importance of adequate sleep for their academic performance (Rasekhi, *et al.,* 2016)

Socio-economic development. Life expectancy is increased due to the advancement of medical science. This increase in the aged population will bring with it a huge burden of health-related problems. Compared with younger people, elderly people show more age-related sleep changes. Although ageing is a global phenomenon surprisingly a very few studies have been performed on sleep-related problems of the elderly in the rural area of Bangladesh. Therefore the objective of the present study is to assess the prevalence and determinants of sleep disorder of rural elderly in the northeastern part of Bangladesh.

Material and Methods

The empirical data of this study is collected from 400 randomly selected respondents in the rural area of Sunamgonj district in Bangladesh from June to August 2018. The respondents are persons aged 50 years and over. A structured questionnaire is administered for collecting the required information. Descriptive statistical tools along with Body Mass Index, Chi-square test, and logistic regression model have been applied for data analysis.

Results and Discussion

Socio-economic and demographic characteristics of the rural elderly

The per cent distribution of selected socio-economic and demographic characteristics of rural elderly is demonstrated in Table 1. It is observed that the average age of the elderly is 62.35 years. The minimum and maximum age of the elderly is 50 and 90 years respectively. Most of the elderly are in the age group of 60–69 years and 35.8 per cent are in the age group 70–79 years. About 59.5 per cent of the elderly are male and the rest (40.5%) are female. Almost all (99%) of the elderly are married. It is found 97 per cent elderly are Muslim. Education is one of the most important factors, which affects the socio-economic condition of the elderly. A literate person leads a better life than an illiterate person. More than half of the elderly (59.8%) are illiterate. Most (72%) of the elderly are involved in a private job. About 33.3 per cent of the elderly have an income of 500 to 10000 Taka and 5.9 per cent of the elderly have an income of more than 20000 Taka. So, the majority of the elderly belong to middle income and below middle income. It is observed that the average monthly income of the elderly is 13868 Taka. Family type is an important factor of the elderly. More than half of the elderly live in a nuclear family and 32.2 per cent live in a joint family. Only 10.9 per cent of the elderly are from extended family. It is observed that 25.3 per cent of the elderly have single living arrangements followed by 70.9 per cent are double arrangement and only 3.8 per cent are extended living arrangements. A majority (55%) of the elderly are suffering from high and low blood pressure problems. About 40.7 per cent of the elderly take homeopathic treatment and 59.3 per cent of

the elderly take allopathic treatment. About 57 per cent of the elderly are suffering from a sleep disorder. It is noted that 44.3 per cent of the elderly are regular smokers (Table 1).

The overall prevalence of sleep disorders of the elderly in the northern region of Iran was 24.8 per cent (Hosseini, *et al.,* 2018). The percentage of the global population aged 65 years or older is expected to double by 2040 and 36–69 per cent of older adults report sleep disturbances (Cauley, 2013; Foley *et al.,* 2004). The prevalence rate of sleep disorder of rural elderly in southwest China was 46.5 per cent (Guo *et al.,* 2020). The present study indicates that the prevalence rate of sleep disorder of rural elderly is 57 per cent which is higher than the rural elderly in China and Iran.

Table 1
Socioeconomic and demographic characteristics of the elderly

Characteristics		Frequency	Percentage
Age	60–69	198	49.5
	70–79	143	35.8
	80 and above	59	14.7
Gender	Female	162	40.5
	Male	238	59.5
Education	Illiterate	238	59.8
	Primary	122	30.7
	Above Primary	38	9.5
Occupation	Public	109	27.5
	Private	228	72.5
Family Type	Nuclear	227	56.7
	Joint	129	32.2
	Extended	43	10.7
Income (inTk.)	500–10000	126	33.3
	10000–19999	195	51.2
	20000–70000	59	5.9
Living arrangement	Single	101	25.3
	Double	283	70.9
	Extended	15	3.8
Religion	Muslim	388	97.0
	Non-Muslim	12	3.0

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Marital status	Married	396	99.0
	Un-married	4	1.0
Smoking behavior	Yes	177	44.3
	No	223	55.7
Treatment seeking behavior	Allopathic	236	59.3
	Homeopathic	162	40.7
BP	High	67	16.8
	Low	153	38.2
	Normal	180	45.0
Sleep disorder	No	172	43.0
	Yes	228	57.0

Association of sleep disorder among elderly with socio-economic and demographic characteristics

Sleep disorders of the elderly may be affected by their socio-economic and demographic characteristics. For this a set of socio-economic and demographic variables such as income, age, family type, marital status, disease, smoking habit, BP and BMI, physical exercise, living arrangement, and self-perceived psychological stress have been considered in the study.

It is found that the age of the elderly is significantly ($P < 0.03$) associated with a sleep disorder. Young elderly (62.6%) are suffering more than the oldest old elderly. Unmarried elderly (75%) are suffering more than married elderly.

The income of the elderly significantly ($p < 0.00$) influenced their sleep disorder. The poor elderly (65.9%) are suffering more than middle and rich class elderly.

It is observed that family type is significantly ($p < 0.00$) associated with a sleep disorder of the elderly. The elderly who live in a nuclear family are suffering from sleep disorders more than the elderly who live in a joint family. Overweight and obese elderly are suffering from sleep disorders more than underweight elderly.

Physical exercise is significantly ($P < 0.01$) associated with sleep disorder of the elderly. The elderly (53.9%) who perform physical

exercise regularly are suffering less than the elderly (69.7%) who do not perform physical exercise.

It is found that there is an association (p < 0.03) between sleep disorder and Blood pressure of the elderly. The elderly who have low and high BP are suffering more from sleep disorder than the elderly whose BP is normal. Female elderly are suffering less than male elderly.

From the analysis, it is found that age, income, family type, physical exercise, living arrangement, and blood pressure are significantly associated with a sleep disorder of the elderly. Thus it is clear from the analysis that socio-economic and demographic characteristics are important determinants of sleep disorder of the elderly (Table 2).

A study in China reveals that gender, residence, ethnicity, socio-economic status, and good health conditions of the elderly were associated with their good quality of sleep. Elderly with poorer health status have relatively shorter sleep duration (Gu *et al.,* 2010).

Sleep disorder of students is significantly associated with their academic achievement. Female students have more sleep disorders than male students. Marital status, habitat, smoking, and physical activity also have a significant relationship with sleep quality. These factors may affect students' academic performance (Rasekhi, *et al.,* 2016)

Table 2

Association of sleep disorder with socio-economic and demographic factors of rural elderly

Characteristics		Sleep disorder		Total	Chis-quare value	p-value
		No	*Yes*			
Age	60–69	74 (37.4%)	124(62.6%)	198 (100%	6.94	0.03
	70–79	65(45.5%)	78(54.5%)	143 (100%)		
	80 and above	33(55.9%)	26(44.1%)	59 (100%)		
Sex	Female	73(45.1%)	89(54.9%)	162 (100%)	0.47	0.49
	Male	99(41.6%)	139(58.4%)	238 (100%)		
Marital status	Married	171(43.2%)	225(56.8%)	396 (100%)	0.53	0.46

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	Unmarried	1(25%)	3(75%)	4 (100%)		
Income status	Poor	43(34.1%)	83(65.9%)	126 (100%)	18.56	0.00
	Middle	74(37.9%)	121(62.1%)	195 (100%)		
	Rich	39(66.1%)	20(33.9%)	59 (100%)		
Family type	Nuclear	72(31.7%)	155(68.3%)	227 (100%)	27.26	0.00
	Joint	100(57.8%)	73(42.2%)	173 (100%)		
BMI	Under weight	35(56.5%)	27(43.5%)	62 (100%)	5.42	0.06
	Normal	112(40.4%)	165(59.6%)	277 (100%)		
	Overweight and obese	25(41%)	36(59%)	61 (100%)		
Physical exercise	Yes	149(46.1%)	174(53.9%)	323 (100%)	6.32	0.01
	No	23(30.3%)	53(69.7%)	76 (100%)		
Disease	No	53(46.1%)	62(53.9%)	115 (100%)	0.75	0.39
	Yes	117(41.3%)	166(58.7%)	283 (100%)		
Psychological stress	No	77(44.5%)	96(55.5%)	173 (100%)	0.28	0.60
	Yes	95(41.9%)	132(58.1%)	227 (100%)		
Smoking behaviour	Yes	67 (37.9%)	110(62.1%)	177 (100%)	3.431	0.06
	No	105(47.1%)	118(52.9%)	223 (100%)		
Living arrangement	Single	38(37.6%)	63(62.4%)	101 (100%)	6.83	0.03
	Double	122(43.1%)	161(56.9%)	283 (100%)		
	Other	11(73.3%)	4(26.7%)	15 (100%)		
BP	High	20(29.9%)	47(70.1%)	67 (100%)	6.83	0.03

Determinants of Sleep disorder among the elderly using a logistic regression model

Results of the logistic regression model, where sleeping disorder of the elderly is taken as dependent variable and sex, marital status, family type, blood pressure, body mass index (BMI), suffering disease, health problem, income, physical exercise, smoking status, psychological stress, and treatment-seeking behavior, considered as independent variables, are presented in Table 3. It is found that the elderly living in a nuclear family have suffered from sleep disorder 3.17 times more than the elderly living in a joint family. The elderly who belong to the poor and middle economic condition are suffering from sleep disorder more than the elderly who are in good economic condition. The elderly who have high and low blood pressure (BP) are

suffering from sleep disorder more than the elderly who have normal BP. It is observed that aged people who do not take physical exercise are suffering 2.64 times more than the elderly who take physical exercise. The elderly who have health problems are suffering from sleep disorder 1.54 times more likely than the elderly who have no health problems. Unmarried elderly are more likely to suffer from sleep disorders than married elderly. From the logistic regression analysis, it is observed that economic condition, family type, blood pressure, and physical exercise are significant factors of sleep disorder of the elderly (Table 3).

A study in Iran reveals that Gender, drug use, marital status, depression, education level, occupation, and diabetes were associated with the prevalence of sleep disorders. Female elderly had a higher prevalence of sleep disorder than males (Hussani *et al.,* 2018). In the present study it was found that male elderly have higher sleep disorders than the female which is contradicted in the mentioned studies. It may be due to geographical variation.

Table 3
Logistic regression estimates of the effects of socio-economic and demographic characteristics on sleeping disorder

Characteristics	Category	B	Wald Statistic	p-value	Exp(B)	95% C.I. for EXP(B)	
						Lower	Upper
Sex	Female*						
	Male	.032	.007	.932	1.032	.502	2.121
Marital status	Married*				1		
	unmarried	1.070	.771	.380	2.914	.268	31.731
BP	Normal*		4.396	.111	1		
	High	.757	3.991	.046	2.132	1.014	4.480
	Low	.086	.090	.764	1.090	.621	1.912
Smoking status	No*				1		
	Yes	.150	.184	.668	1.161	.586	2.301
Treatment seeking behavior	Homeopathic*				1		
	Allopathic	.352	2.070	.150	1.422	.880	2.298

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Family Type	Joint*				1		
	Nuclear	1.153	17.928	.000	3.169	1.858	5.404
Physical exercise	Yes*				1		
	No	.972	9.145	.002	2.644	1.408	4.964
Income status	Rich*		10.381	.006	1		
	Middle	1.074	7.576	.006	2.927	1.362	6.288
	Poor	1.123	9.721	.002	3.075	1.518	6.230
BMI	Underweight*		3.077	0.215	1		
	Normal	.516	2.309	.129	1.675	.861	3.260
	overweight	.145	.117	.732	1.157	.503	2.658
Disease	No*				1		
	Yes	-.222	.626	.429	.801	.461	1.389
Psychological stress	No*				1		
	Yes						
	0.164	0.375	0.540	1.178	0.697	1.990	
Health problem	No*				1		
	Yes	.433	2.615	.106	1.542	.912	2.607

* denote reference category

Conclusion and Recommendation

Various socio-economic and demographic characteristics that are associated with the geriatric health status have been studied in this paper. The study indicates that the mean age of the elderly is 62.23 years. It is found that unmarried elderly suffered from sleep disorder more than married elderly. The male elderly are suffering from sleep disorder more than the female. It is observed that the aged people who are living in a nuclear family are suffering more than the elderly who live in a joint family. It is noted that low and high BP of the elderly causes more suffering from sleep disorder than normal BP. Poor and middle income elderly suffer more than the rich elderly. The elderly who do physical exercise suffer less than the elderly who do not take physical exercise. More than half of the elderly are suffering from a sleep disorder. The finding suggests that age, family type, BP, physical exercise, and income are significant factors for sleep disorder among rural elderly.

Good quality of sleep among the elderly may have some implications for achieving healthy longevity. The findings of this study may have some policy implications that would help the stakeholders as well as the Government to take necessary steps to improve the sleep disorder of the elderly. The aged people especially those who are highly educated play an important role in sharing their experiences. So, we should take care of them to build a healthy and prosperous nation. Since the data is not representative of entire Bangladesh, generalizations of the findings and recommendations are risky. More studies at different points of the country should be carried out for this purpose.

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Life Satisfaction and Ego Integrity among Older Adults: A Comparative Study

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ABSTRACT

This study aimed to compare the role of the home environment in the form of old age homes and conventional home settings on ego integrity and life satisfaction among older adults. By using a purposive sample 80 older adults from old age homes (N=40, male –13 and female–27) and localities in Hyderabad (40, male =17 and female=23) age varying from 60 years and above, with a mean age of 74.5 years, were selected. The participants were assessed on measures of ego integrity and life satisfaction using Ryff and Heincke's Ego Integrity Scale (1983), and the Satisfaction with Life Scale by Deiner and others (1985). The findings revealed a positive correlation between life satisfaction and ego integrity. It was also found that older adults residing in old age homes have a higher level of ego integrity compared with those living with their families. No significant difference was found between the life satisfaction scores of older adults residing in old age homes and those living with their families. Unmarried/divorced/widowed older adults were found to have a higher level of ego integrity compared with married older adults. No significant difference was found between the life satisfaction scores of married and unmarried/divorced/widowed older adults. There was no

significant difference between the ego integrity scores of male and female older adults. No significant difference was found between the life satisfaction scores of male and female older adults.

Keywords*: Ego integrity; Life satisfaction; Old age homes; Conventional home setting; Older adults.*

"Development is concerned with growth as well as those changes in behavior which result from environmental situations." (Crow and Crow, 1962) Development is a process from the womb – to –tomb, thus is lifelong. Human Development occurs in various stages from the pre-natal stage to old age. Though old age is the last stage of development, it is the most crucial stage. People in this stage learn to acknowledge their achievements in life and look back at their life with either contentment or regret. Late adulthood is characterized by several significant changes physically, cognitively, and socially. In recent times, old age homes and retirement homes have become popular for various reasons. The reasons for the increasing need for senior care homes range from the inability to take care of ageing parents to the pressure of responsibility.

Ego Integrity

According to Erikson, *Ego Integrity* is "the acceptance of one's only life cycle as something that had to be" (1950) and "a sense of coherence and wholeness" (1982). In this stage, the life long process of accumulating psychosocial strengths in the previous stages becomes an integral part of achieving integrity at old age. Longitudinal studies on achieving ego integrity indicate that generativity at age 53 predicts ego integrity at age 62. (Torges *et al.,* 2008) During this stage, the individual faces a lack of occupational productivity and also confronts death. Previous studies reveal that ego integrity and physical health are both significant negative predictors of death anxiety among older adults. (Haroon *et al.,* 2018). Older adults who have high degrees of social support have high levels of ego integrity and are mentally healthy, though their physical health is poorer (Tahreen & Shahed, 2014). Previous research studies have comprehensively analyzed the nature of the relation between age, gender, occupation, family income, religion, marital satisfaction and education with ego integrity. (Helm, 2020; J.B. James, and Nicole Zarrett, 2005; Vinsi, M S., 2015; Rao, M.S., *et al.,* 2016.

Life Satisfaction

"Life satisfaction refers to an individual's judgment of wellbeing and quality of life based on his or her own chosen criteria" (Diener, 1984). Life Satisfaction, in old age, can be measured using various domains such as physical health, mental health, socio-economic status, interpersonal relationships, and the environment. Constant social-izing, as well as an active lifestyle, is associated with an increase in life satisfaction. (Wallace, 2008; Ng, SorTho, *et al.,* 2017) Studies indicate that while economic status, education, sex, and living arrangement are significant determinants of life satisfaction, age, and marital status had no effects on life satisfaction (Ng, SorTho*; et al.,* 2017). However, some studies contradict this finding stating that gender might not be a signif-icant factor affecting life satisfaction (Wallace, 2008). Inability to accept life changes and dissatisfaction with life achievements has been associated with lower levels of well-being and satisfaction with life among older adults (Torges *et al.,* 2008; Dezutter *et al.,* 2013). Ego Integrity and life satisfaction are closely related. Existing literature indicates a positive correlation between ego integrity and life satis-faction. (Woods, and. Witte, 1981)

Method

This study aimed to find out the impact of the home environment on the level of ego integrity and life satisfaction among older adults and to compare between the elderly living in old age homes and living in homes with their family members.

It was hypothesized that:

- the older adults residing in Old age/Retirement homes will have higher ego integrity when compared to the older adults living with their families.

- the older Adults residing in Old age/Retirement homes will have a higher level of life satisfaction when compared to the older adults living with their families.

- the older adults who are living with their spouses will have a high level of ego integrity and life satisfaction when compared with older adults who are widowed/single/divorced.

- female older adults will have a higher level of ego integrity and life satisfaction when compared with male older adults.

- Compare to show similarity between two objects whereas with indicates difference.

Sampling

A sample of 80 older adults –40 adults from old age homes and 40 adults living with their families in and around Hyderabad – was selected for this study using a purposive sampling method. The participants included in the sample were above the age of 65 who were either residents of old age/retirement homes (institutionalized) or living with their families with no history of mental illness. Most of the sample belonged to the middle to higher socio-economic status. The mean age of the sample was found to be 74.53 years.

Tools Used

Socio-demographic form: A socio-demographic questionnaire was prepared by the authors. It consisted of socio-demographic variables such as age, gender, marital status, and place.

Ego Integrity: The ego integrity of the participants was measured using Ryff and Heincke's (1983)

Socio-demographic form: A socio-demographic questionnaire was prepared by the authors. It consisted of socio-demographic variables such as age, gender, marital status, and place.

Ego Integrity: The ego integrity of the participants was measured using Ryff and Heincke's (1983) Ego Integrity Scale. The scale consisted of 16 items that included 9 reverse coded items designed to assess the evaluation of success and failures in one's life. The participants were asked to rate the items from *1(strongly disagree) to 6 (strongly agree)*. Ryff and Heincke reported internal consistency of .82 and a test-retest coefficient of .85 (for 6 weeks). Cronbach's alpha for the 16 items was. 58.

Life Satisfaction: Life satisfaction of the participants was measured using the Satisfaction with Life Scale (SWLS) by Deiner & others (1985). The scale consisted of 5 items designed to assess the level of self-acceptance and life satisfaction in older adults. The participants were asked to rate the items from *1 (strongly disagree) to 7 (strongly agree)*. According to recent findings, the scale showed an internal consistency of .88 (Yun, *et al.,* 2019*).* The scale was also found to have

good test-retest correlations of .84, .80 over a month interval. (Pavot, W., & Diener, E. 2008) The Cronbach's alpha for the 5 items was found to be .76.

Procedure

The participants were first asked to sign a consent form in which details about the researcher and the study was mentioned clearly. They were given the socio-demographic forms and the two questionnaires and were asked to rate the items (21 in total). The responses were collected in residential settings and through Google forms and were then scored and interpreted. Data was collected from the participants in January and February 2020.

Data Analysis

The data collected was entered in Microsoft Excel. To assess normality, the Kolmogorov – Smirnov test was performed on the data and the results obtained are given in Table. 1. As mentioned in the table, the data was not normally distributed. Thus, non-parametric tests like Spearman's correlation and Mann-Whitney U Test were performed.

Results

Descriptive Analysis of Data

The descriptive analysis of the data collected from both the scales is given in the Table. 7. For the total sample, the descriptive data for the Ego Integrity scale was $M = 56.35$, $SD = 10.27$ while that for the Satisfaction with Life scale was $M = 25.23$, $SD = 6.69$. For the older adults residing in old age homes, ($N = 40$) the descriptive data for the Ego Integrity scale was $M = 59.45$, $SD = 10.86$ while that for Satisfaction with Life scale was $M = 24.55$, $SD = 7.46$. For those staying with their families, ($N = 40$) the descriptive data for the Ego Integrity Scale was $M = 53.25$, $SD = 8.88$ while for the Satisfaction with Life scale was $M = 25.92$, $SD = 5.94$.

Table 1
Results of Kolmogorov-Smirnov Test

	Standard Deviation	Kurtosis	Skewness	D-value	p-value
Ego Integrity	10.34	–0.58	–0.12	0.074	0.737
Life Satisfaction	6.73	0.34	–0.94	0.157	0.033

Table 2
Analysis of Demographic Data

Socio-demographic variable	Older adults residing in old age homes N =40 F (%)	Older Adults living with their family N=40 F (%)
Age		
60–69	14 (35%)	11 (27.5%)
70–79	10 (25%)	24 (60%)
80 and above	16 (40%)	5 (12.5%)
Gender		
Male	13 (32.5%)	17 (42.5%)
Female	27 (67.5%)	23 (57.5%)
Marital Status		
Married	10 (25%)	22 (55%)
Divorced/Single/Widowed	30(75%)	18 (45%)

Analysis of Gender Differences

Table 3
U–test results for scores of males and females on Satisfaction with Life Scale

Sample	Sum of ranks	Mean of ranks	Median	U–value	p–value
Male	1,177.5	39.25	26	787.5	0.711
Female	2,062.5	41.25	27	712.5	0.711

Table 4
U–test results for scores of males and females on Ego Integrity Scale

Sample	Sum of ranks	Mean of ranks	Median	U–value	p-value
Male	1,129	37.63	54	836	0.395
Female	2,111	42.22	58	664	0.395

The sample consisted of 30 males and 50 females with a mean age of 74.7 years and 74.44 years respectively.

Life satisfaction: As mentioned in Table 3 Mann Whitney's U-test indicated that there was no significant difference between the scores of male older adults (*Mdn* = 26) and female older adults (*Mdn* =27) on the Satisfaction with Life scale, U(Men, N = 30, Women N = 50) = 712.5, $z = 0.36$, $p > 0.05$.

Ego integrity: As mentioned in Table 4 Mann Whitney's U-test indicated that there was no significant difference between the scores of male older adults (*Mdn* = 54) and female older adults (*Mdn* =58*)* on the Ego Integrity scale, U(Men, N = 30, Women N = 50) = 664, *z* = 0.84, *p* > 0.05.

Comparison between Married and Unmarried/Divorced/Widowed Older Adults

Table 5

U–test results for scores of unmarried and married/divorced/widowed/ single older adults on Satisfaction with Life Scale

Sample	Sum of ranks	Mean of ranks	Median	U–value	p–value
Married	1,261	39.41	26.5	803	0.727
Unmarried/divorced/widowed	1,979	41.23	26.5	733	0.727

Table 6

U–test results for scores of married and unmarried/divorced/widowed/ single older adults on Ego Integrity Scale

Sample	Sum of ranks	Mean of ranks	Median	U-value	p-value	Effect size (r)
Married	951	29.72	50	1113	0.00072	0.378
Unmarried/divorced/widowed	2,289	47.69	60.5	423	0.00072	0.378

The sample consisted of 32 married older adults and 48 unmarried/divorced/widowed older adults with a mean age of 72.34 years and 76 years.

Life satisfaction: As mentioned in Table 5 Mann Whitney's Utest indicated that there was no significant differencebetween the scores of married older adults (*Mdn* = 26.5*)* and unmarried/divorced/widowed older adults (*Mdn* = 26.5*)* on the Satisfaction with Life scale, U (Married, N = 32, Unmarred/Divorced/Widow, N=48) = 733, z = 0.33, p > 0.05.

Ego Integrity: Mann Whitney's U test conducted on the scores of married and unmarried/divorced/widowed older adults on the ego integrity scale gave the results as mentioned in Table 6. Scores of

unmarried/divorced/widowed older adults (*Mdn* = 60.5) were higher than those of married adults on the ego integrity scale. (*Mdn* = 50) The Mann Whitney test indicated that this difference was statistically significant, U (Married, N = 32, Unmarred/Divorced/Widow, N=48) = 423, z = 3.38, $p < 0.05$. Effect size r proposed by Cohen (1988) was used to compute the effect size between the two groups. (Fritz *et al.,* 2011) The difference between 10.5 scale units indicated a medium effect. (Scale range: 0 to 1; r = 0.378)

Analysis of the relationship between Life Satisfaction and Ego Integrity

The Spearman's rho revealed a significant strong positive correlation between the scores on the life satisfaction scale and ego integrity scale, r_s = 0.996, p (2-tailed) = 0, N = 80.

Comparison between Older Adults living in Old Age Homes and Older Adults living with their Families on the Satisfaction with Life scale

Table 7
Descriptive Analysis for each variable

	Mean	*Median*	*Standard Deviation*
Old age home residents			
Life Satisfaction	24.55	26	7.46
Ego Integrity	59.45	61	10.86
Staying with family			
Life Satisfaction	25.925	27.5	5.94
Ego Integrity	53.25	54	8.88

Table 8
U–test results for scores of old age home residents and older adults staying with their families on Satisfaction with Life Scale

Sample	*Sum of ranks*	*Mean of ranks*	*Median*	*U-value*	*p-value*
Old age home residents	1526.5	38.16	26	893.5	0.373
Staying with family	1713.5	42.84	27.5	706.5	0.373

Mann Whitney U test indicated that the difference between the scores of older adults staying with their families (*Mdn* = 27.5) and those at old age homes (*Mdn* = 26) on the Satisfaction with Life scale was not statistically significant, U(Home remedies N=40, Staying with family, N=4) = 706.5, z = 0.89, $p > 0.05$. (Table 8)

Comparison between Older Adults living in Old Age Homes and Older Adults living with their Families on the Ego Integrity scale

Table 9

U–test results for scores of old age home residents and older adults staying with their families on Ego Integrity Scale

Sample	Sum of ranks	Mean of ranks	Median	U-value	p-value	Effect size (r)
Old age home residents	1,878	46.95	61	542	0.013	0.277
Staying with family	1,362	34.05	54	1058	0.013	0.277

Scores of old age home residents (*Mdn* = 61*)* was higher than that of older adults living with their families (*Mdn* = 54) on the Ego Integrity scale. Mann Whitney's test indicated that the difference was statistically significant, U(Home remedies N=40, Staying with family, N=4) = 542, z = –2.47, $p < 0.05$ (Table 9). The difference of 7 scale points indicated a low effect. (Scale range: 0 to 1; r = 0.277)

Discussion

The overall goal of this study was to compare the difference in ego integrity and life satisfaction of the older adults living in old age homes and those living with their families. More specifically, the current study aimed to analyze the impact of the residential environment on ego integrity and life satisfaction in older adults. The results indicated that older adults residing in old age homes had higher ego integrity than those living with their families. Older adults residing in old age homes receive a higher degree of social support as a result of engaging in group activities like picnics, indoor games, etc conducted by the old age homes. Many older adults living with their families are deprived of vital social interaction with their peers due to the pre-occupation of younger family members with work

commitments and home errands. This might be one of the main reasons for the significant difference in the scores between the two groups. There was no significant difference found between the scores of the two groups on the Satisfaction with Life Scale. Autonomy is one of the determinants of life satisfaction. While older adults residing in old age homes lack a sense of autonomy, most of the older adults at home also experience loss of control related to relinquishing responsibilities that had been central to their sense of personal identity. (Ryff and Keyes, 1995; Diaz and Arroyo, 2013; According year Russo – Netzer and Littman-Ovadia, 2019)

While analyzing the impact of marital status on ego integrity, results indicated that unmarried/divorced/widowed older adults had a higher level of life satisfaction when compared to married older adults. This contradicts the findings of previous studies that state that ego integrity is significantly related to marital satisfaction (Jacquelyn and Zarrett, 2005*)*. Many older adults experience a persistent concern in the form of death anxiety about the welfare of their loved ones, especially their spouses, after their death. This leads to a lower level of ego integrity. (Goebel & Boeck, 1987; Haroon, *et al.*, 2018; Russo – Netzer and Littman-Ovadia, 2019) There was no significant difference between the scores of married older adults and unmarried/widowed/divorced older adults on the Satisfaction with Life Scale. This is in accordance with the previous studies. (Ng, SorTho, & others, 2017) While married people experience marital satisfaction, James, (Jacquelyn, and Zarrett, 2005; Li and Liang, 2007) most of the single and divorced people do not regret their decisions and engage in social activities to cope with solitude. Social support provided by family and friends helps foster emotional satisfaction to widowhood. (Pinquart, 2003; McAuley *et al.,* 2007; Kang and Ahn, 2018)

Analysis of the impact of gender on the two variables indicated that the scores of women were not significantly different from the scores of men on the ego integrity scale. This is in accordance with earlier findings. (Helm, Ginger; 2000) Most men and women in the sample had to adhere to specific gender roles dictated by their respective cultural norms and have achieved their goals successfully –

men on the work front and women as home-makers. This sense of achievement might have led to the similarity in scores. (Boylin, *et al.,* 1976) The analysis also indicated that there was no significant difference between the scores of men and women on the Satisfaction with Life scale. This contradicts previous studies which found out that females have a higher level of life satisfaction when compared with males (Akbar, A., *et al.,* 2020). Life satisfaction in older adults is determined by several factors like social, physical, mental, and financial aspects that interact with each other. The financial aspect as a determinant factor of life satisfaction in old age in both genders assumes prominence as older adults tend to have fragile financial security. Culturally, women in the sample might face several social disadvantages like a lower level of education and might also be less likely to receive government pensions in comparison with males. On the other hand, men might face financial instability due to the inability to ask for money from their children. (Teresa and Napaporn, 2003) The results indicated a strong and positive correlation between ego integrity and life satisfaction. Previous studies also found a positive correlation between life satisfaction and ego integrity. (Woods and Witte, 1981; Lowis and Raubenheimer, 1997) This suggests that people who look back at their life with a sense of contentment and no regrets also experience a feeling of satisfaction.

Limitations and Suggestions

Demographic variables like health conditions and religiosity were not controlled during the data collection, and thus should be taken into consideration for future studies. The data was collected using purposive sampling; it is recommended that further research should be conducted using a probability sampling technique. Moreover, future studies can also use a combination of personal interviews and standardized measures to elicit more accurate responses.

Conclusion

The present study is concerned with understanding the living conditions of older adults residing in old age homes and retirement homes. The main aim of this study was to determine whether older

adults can lead to contened and satisfying life away from their families in old age homes. The findings of the study suggest that old age homes provide good care and maintenance that helps its residents have a higher level of ego integrity. Thus, they do not experience much regret and accept their past which nearing death. The reason behind this can be the constant care they are provided and the company of people of the same age group. Most of the children of these older adults meet their materialistic needs but not their emotional and psychological needs. According to the United Nations, the share of the old age population in India is expected to increase to nearly 20 per cent in 2050. Thus, there is an urgent need for more health care centers and infrastructure for the aged to be provided by the government. Old age homes are required now because of the proliferation of nuclear family settlements in urban India combined with the inability of a working-class couple to look after their aging parents. This study attempts to bring insight into the importance of old age homes and retirement homes in society. The researcher believes that provided enough funds and resources, old age homes can help older adults lead a happy and satisfying life.

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Digital Technology Usage and Cognitive Functioning in Older Adults

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ABSTRACT

The objectives of the study were to assess the usage of digital technology in 35 older adults, (21 females and 14 males), age varying from 65 years to 87 years, to assess the cognitive functioning in older adults, and to understand the relation between the variables of the study. The study was conducted using a survey research method. Digital technology includes devices as well as applications associated with them. A self-constructed tool was designed to assess digital technology usage. Cognitive functioning includes components of episodic verbal memory (immediate and delayed), working memory, verbal fluency, reasoning, and processing speed. This was assessed using the Brief Test of Adult Cognition by Telephone (BTACT) by Tun & Lachman. Analysis of the data indicated a relation between usage of digital technology and reasoning, speed of processing, and working memory domains of cognitive functioning. The implication of the study is the need to address barriers to usage of digital technology to promote usage.

Keywords: Digital technology usage, Cognitive functioning, Older adults

Old age is a period of decline in health, physical abilities, and some aspects of cognitive functioning. The elderly population in India is expected to increase by around 300 million by 2050. This means that 20 per cent of the total population of the country would be elderly adults by that time (India Ageing Report, 2017). The life expectancy in India has increased from 54 years in 1981 to 67 years in 2011 (Singh *et al.,* 2017). Hence the general well-being, physical, and cognitive functioning of this segment of the population is a huge concern.

American Psychological Association defines cognitive functioning as the performance of the mental processes of perception, learning, memory, awareness, understanding, judgment, reasoning, language, and intuition. Late adulthood has been defined as the period of human development including the age 65 years and above. Since late adulthood corresponds to the post-retirement age, it may be considered that there is a possibility of cognitive deterioration due to a decrease in activity engagement. At the same time, there is growing evidence that neuroplasticity of the ageing brain can be retained through cognitive stimulation. Supplementing this, Millicent (2016) evinced that elderly well-being is enhanced by technology.

We see changing trends in the usage of technology over the past few years with the world becoming a more digitized one. India is one of the biggest and fastest-growing markets for digital consumers, having more than half a billion internet subscribers ("Digital India: Technology to transform a connected nation", 2019). This is supported by the fact that age lags in technology use are expected to be reduced as future cohorts of older adults will have been users of computers and the internet when they were young (Charness & Boot, 2009). According to the Ericsson Mobility Report (2013–2015), the proportion of people aged over 50 who use smartphones has increased. Nuclear families are mushrooming which necessitates elderly adults to have to stay independently with their spouse. According to Elder Abuse Study (2018), as compared to elderly adults living alone (3%) and with family (4%), elderly adults living with 'spouse only' have high internet users (7%).

Income, age (within the older adults group itself), and education are three demographic factors that create a distinction in the adoption rate concerning internet and broadband use in older adults. Also, smartphone ownership and adoption rate is seen to be less than for cell phone in older adults. Assistance for learning how to use technology devices and services has been reported to be required by a majority of older adults ("Older Adults and Technology Use", 2014).

Charness & Boot (2009) have tried to understand the reasons why computers and the internet are not preferred as much as mobile phone communication. The major barriers to technology use were concluded to be abilities and attitudes. Under the attitudinal barriers, the emphasis was laid on access and interest factors. Emphasis was also laid on age-related changes. Findings from the study (Czaja *et al.,* 2006) suggested that self-efficacy is one important predictor of the use of technology. The study shows older women to have reported having computer anxiety. It suggests the need to provide them with training programmes to improve their computer use skills. The case study (Harley & Fitzpatrick, 2008) highlights the interrelation between proficiency in technology and social involvement. The author proclaims that designers of technology for older adults should make the interface suitable taking into consideration the issues specific to the latter.

According to Wilmer and a few others (2017), there is a negative relationship between attention and smartphone usage. Likewise, mobile technology habits were found to harm memory. The research also posits the need for future researchers to distinguish the different aspects of smartphone usage and study its effect on users. Chan and a few others (2014) did an experimental study with participants aged 60 to 90 who were assigned to learn how to use a tablet computer and associated software applications. A placebo group and social group were used as two separate controls. IPad training was found to help improve the episodic memory and processing speed in elderly adults. Tun and Lachman (2010) did a study with participants who were aged 32 to 84; participants had to rate how often they used a computer on a 6 point scale from 'never' to 'daily'. Using the Brief Test of Adult Cognition by Telephone (BTACT), cognitive performance was assessed through telephone interviews. Results suggested that frequent

computer activity is associated with good cognitive function, especially executive function across adulthood. Alternately, Slegers, and a few others (2008) suggested that computer and internet related learning had little or no effect on cognitive measures. Umemuro (2004) suggested the possibility of relationships among cognitive abilities, computer attitudes, and technology usage among older adults. Here, possession and experience of usage of different technologies by participants who were Japanese adults aged 60 to 80 were assessed. Technology usage here is considered to be influenced by the attitude towards it as well as cognitive abilities.

Aim and objectives: The objectives of the study were: (i) to understand the digital technology usage by older adults, (ii) their current cognitive functioning, (iii) influence of demographic factors like gender, whether working before retirement and whether living with children and (iv) to understand the association between digital technology usage and cognitive functioning in older adults.

Method

The various devices that function through a binary computational code and the activities that one would engage in using these devices would be referred to as digital technology. This would include landline phones, ordinary mobile phones, smartphones, tablets, and laptops/computers, and the various applications associated with them. Cognitive functioning would refer to the following domains – episodic verbal memory (immediate and delayed), working memory, verbal fluency, reasoning, and processing speed.

A survey research method was used to study the variables. Convenience sampling was the sampling technique used. Adults aged 65 and above who used at least one of the digital technologies as defined were included. The study was done on adults residing in Chennai, India (N = 35) comprising 21 females and 14 males with ages ranging from 65 to 87. Data was collected from households in the locality through in-person interviews. Demographic details that were obtained include gender, age, whether they lived with their children, and occupation before retirement.

Cognitive functioning was assessed using the Brief Test of Adult Cognition by Telephone (BTACT), a battery of tests compiled by Tun and Lachman. Data were collected by interview method using the regional language. The key domains of the battery assessed were (1) Episodic verbal memory (immediate) using Word List Recall – Participants were given 90 seconds to recall a list of 15 words immediately after they were read out to them; (2) Working memory using Digits Backward – Participants were asked to reproduce orally series of digits read out to them, in the reverse order. The series of digits kept increasing in length through the levels. A second trial was given in case of an error in the first one; (3) Verbal fluency using Category Fluency: To assess executive functioning, participants were given 60 seconds to generate orally names of as many animals as possible; (4) Reasoning using Number Series: Here, participants had to generate the next number in the series of numbers read to them by identifying their pattern; (5) Speed of processing using 30-Seconds And Counting Task: Participants were given 30 seconds during which they had to count backward from 100 by ones; (6) Episodic verbal memory (delayed): Participants were again given 90 seconds to recall the list of 15 words read out to them in the beginning. Factor analysis had previously labeled two factors – episodic memory (immediate and delayed word recall) and executive functioning (the other cognitive measures). Studies (Lachman *et al.*, 2013) have shown that the battery has good test-retest reliability, convergent validity, and discriminant validity.

The extent of digital technology usage was measured using the number of applications used. Participants were asked to check those applications that they used from the given list. The list of applications includes a Phone call, SMS, Whatsapp, Hire vehicle (Like Uber), Social networking (Like Facebook), Email, Online shopping, Netbanking/Card payment, Video (Like YouTube), and Others. The degree of digital technology usage was then measured based on the usage of various digital technology devices like a landline phone, ordinary mobile phone, smartphone, tablet, and computer/laptop. The frequency of usage was measured on a scale consisting of 'Often', 'Sometimes', and 'Never'.

Results and Discussion

Table 1

Shows the percentage of people using each digital technology application on an overall sample of N=35.

Appli-cation	Phone call	SMS	Whats App	Hire vehicle	Social networking	Email	Online shopping	Net-banking	Video	Other
Males N=14	100%	78.57%	71.43%	42.86%	44.44%	57.14%	21.43%	35.71%	57.14%	42.86%
Females N=21	100%	47.62%	47.62%	9.52%	55.55%	9.52%	0.00%	0.00%	52.38%	23.81%
Total	100%	60.00%	57.10%	22.90%	25.70%	28.60%	8.60%	14.30%	54.30%	31.43%

It is seen that social networking usage in males is slightly lesser than in females unlike in "Older Adults and Technology Use" (2014) where older women compared to older men and younger cohorts of older adults were more likely than to be users of social networking sites. Every other application, however, has a greater proportion of male users compared to female users. On introspection, lack of interest was cited as the reason by many older women for lesser usage. Usage of Video applications like YouTube is almost the same in older men and women. None of the female participants in the study used online shopping and net banking applications. Therefore, we may infer that older women are more likely to use digital technology applications for recreational purposes.

Table 2

Shows the percentage of people using each digital technology device on an overall sample of N=35.

Device/ Frequency	Landline phone	Ordinary mobile phone	Smartphone	Tablet	Computer/ Laptop
Often	37.10%	25.70%	54.30%	17.10%	5.70%
Sometimes	34.30%	22.90%	11.40%	14.30%	22.90%
Never	28.60%	51.40%	34.30%	68.60%	71.40%

People who have smartphones may also have other devices like landline phones at home and hence the frequency of usage may vary. When people switch using ordinary mobile phones to smartphones, people stop using the former although they may continue using landline phones for phone call purposes. It is also seen that some

people who still use ordinary mobile phones may use tablets instead of smartphones for additional purposes like entertainment. Interestingly, 81.81 per cent of those who do not live with their children were seen to have been using at least one of the devices including smartphones, tablets, or laptops. Also, the digital technology applications usage of those who had been working before retirement was found to be only 15.96 per cent more than the others.

Table 3
Shows the mean analysis of the difference between females (N=21)
and males (N=14) in each subtest.

Domain	Mean		t value
	Females	*Males*	
Episodic verbal memory (immediate)	5.95	5	1.14
Working memory	3.86	4.29	−1.1
Verbal fluency	13.57	12.14	1.13
Reasoning	1.14	1.86	−1.35
Speed of processing	30.52	35.93	−1.61
Episodic verbal memory (delayed)	3.9	3.07	1.23

No gender difference is seen in the measures of cognitive functioning as the performance of females and males is not found to be significantly different from each other in all the domains of cognitive functioning. However, according to one study (Lee *et al.*, 2014)[17], it was found that men performed better than women in tasks for immediate and delayed episodic memory. This disparity was explained to be due to unequal attainments in terms of education and occupation.

Table 4
Shows the mean analysis of the difference between adults aged 65–74 years
(N=19) and adults aged 75 years and above (N=16) in each subtest.

Domain	Mean		t value
	65–74	*75 & above*	
Episodic verbal memory (immediate)	5.89	5.19	0.83
Working memory	4.32	3.69	1.7
Verbal fluency	12.84	13.19	−0.24
Reasoning	2.11	0.63	3.36*
Speed of processing	33.63	31.56	0.64
Episodic verbal memory (delayed)	3.74	3.38	0.45

* The result is significant at $p < .01$.

There appears to be no significant difference between the performance of adults aged 65–74 years and adults aged 75 years and above in all domains of cognitive functioning except reasoning. We may hence infer that across the years in late adulthood, the decline is explicitly seen only in an individual's reasoning capacity.

Table 5

Shows the correlation between digital technology usage and cognitive functioning on an overall sample of N=35.

Domain	Episodic verbal memory (immediate)	Working memory	Verbal fluency	Reasoning	Speed of processing	Episodic verbal memory (delayed)
Landline phone	.05	– .07	.10	.11	.03	– .03
Ordinary mobile phone	.13	– .02	.14	– .30	– .03	.14
Smartphone	.27	.47**	.02	.71**	.42*	.28
Tablet	.08	.35*	– .03	.64**	.27	– .01
Laptop/PC	– .14	.12	.07	.62**	.31	– .13
No. of applications	.16	.49**	– .06	.76**	.41*	.24

* The result is significant at $p < .05$.

** The result is significant at $p < .01$.

Digital technology usage has a significantly strong positive correlation with the domain of reasoning. Those who use both PCs and Tablets performed better in the reasoning task at 62.6 per cent as against the overall average of 28.6 per cent. Those who use phone call application only, performed at 1.8 per cent in the reasoning task as against the overall average of 28.6 per cent. Landline phones and ordinary mobile phones are seen to have no significant correlation with any of the domains of cognitive functioning. A few digital technology devices are seen to be positively correlated with the domains of working memory and speed of processing as well. Quinn (2018) demonstrated that social media intervention had no effects on working memory, but caused improvements in inhibitory control in older adults. Adequate evidence is required to establish the relation of digital technology usage with working memory. It is also inferred that

adequate usage of digital technology applications can suggest good cognitive functioning albeit in only a few domains.

Conclusion

Digital technology usage is seen to have a relation with a few domains of cognitive functioning, i.e. working memory, reasoning, and speed of processing. The implications for the study include a need to address barriers that older adults face in using digital technology. On introspection, some older adults cited a lack of interest to be a reason for not engaging in digital technology usage. So, older adults can be encouraged and motivated to use digital technology by making digital technology devices more user-friendly, relevant, and meaningful to them. When there is a health-related benefit, i.e. cognitive, it is natural for people to have a greater incentive to do the needful. However cognitive functioning cannot be considered as the only single factor determining digital technology usage. Other mediatory variables need to be considered as well. A prospective study and higher statistics would be required to explain the relation between cognitive functioning and digital technology usage better.

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Book Review

The book is an outcome of a study carried out by the author as Sarat Chandra Roy Research Fellow of the Asiatic Society, Kolkata, from the year 2007 to 2012. The major focus of the book is on the concept of aging in a Santal society and how the Santals culturally constructed aging. As an empirical study the author did an extensive survey in Santal villages in six districts of West Bengal namely; Kolkata, Burdwan, Nadia, Birbhum, Bankura and, Paschim Medinipur. The book begins with the introduction of the area. The study is an "age-specific tribal study" for the understanding of the tribal situation for development planning. A theoretical overview is given on "old age as social construct" and its reflection in the responses of youths. A review of existing literature was done on demography, social-cultural aspect, health, and behavioural aspects to understand the present scenario of the old age population in India as well as in the world. The book is divided into eight chapters.

Chapter I outlines the methods of study to understand the social construct of the Santals at the micro-level with a logical explanation of the selection of districts, determination of sample size, selection of the aged, duration of the fieldwork, rapport establishment, method of data collection, structures of schedules, data processing, and data analysis. The socio-demographic profile of the Santal aged in the studied areas is comprehensively discussed in chapter II with age, sex, sex-ratio, material status, level of education, place of birth, and duration of stay in the present location. Tribal-urban differences in the social life

of tribal aged are also discussed comprehensively. The percentage of aged males tends to decline with the progression of age. Elderly males outnumbered the female aged population which is the reverse situation in respect of the world scenario. Sex ratio of aged in an urban area is lower than in tribal areas. Old age dependency is quite high both in tribal and urban areas. The percentage of elderly widows is higher than widowers. The educational level of aged males is somewhat better than females. The majority of the individuals in the studied samples, follow the traditional Santal religion and a few are converted to Christianity. Most of the respondents live in their native villages.

Chapter III is the economic background of the aged Santals. The economic profile of the Santal respondents has been shown in the framework of earning status, indebtedness, liability, economic dependency, and nature of satisfaction or dissatisfaction with monthly expenses. Santal aged males leave their job with the progression of age, though elderly females generally continue to be engaged in household activities even after 60 years of age. Poverty is a common fact among elderly Santals. Satisfaction with their monthly expenses also varies in urban and tribal areas. In urban areas, due to personal financial stability, aged males are satisfied with their monthly expenses. The condition is reversed in the tribal areas under study. Assets of Santal elderly in tribal areas are; their house, utility goods made of copper, brass, and a few pieces of jewelry. In the case of tribal areas both aged males and females possessed lands. They also have to suffer from indebtedness and are liabilities to their family members in their old age. Old age dependency is 50 to 55 per cent in the urban areas and more than 90 per cent in tribal areas. The government has taken several policies for the old age people, such as National Old Age Pension (NOAPs), National Policy for Senior Citizens (NPSC), to support them to live a healthy and peaceful life.

Chapter IV gives a comprehensive discussion about the health status and health care system of the Santal aged including present health condition, nature of the illness, indigenous view of health and diseases, belief system regarding diseases and their treatment, the process of diagnosis, caregiving, long term care, stress experienced by the caregiver and care receiver. In tribal areas, causes of diseases and

unwellness are still believed to be related to supernatural powers. The process of diagnosis and treatment is also related to an indigenous belief system. However, in urban areas, Santals also visit health units in respective Wards, and in tribal areas, people visit Primary Health care (PHCs) Centres. Several other problems are experienced by the care receivers in the form of health and cure of diseases, psychological problems due to negligence, loneliness, and nostalgia. The health-seeking behavior of Santals is gradually changing at present.

Family life of the aged Santal in terms of residence pattern, location, floor area, separate room for self-use, satisfaction with the condition of living room, availability of civic amenities, family status, decision-making role, active aged network with kins, friends and neighbours are discussed in the Chapter V. Generally, they prefer to live with their son's family and with extended family members. They enjoy the headship status and decision-making position in the family. Regarding space utilization, they generally share rooms with their spouses, grand-children, and widow daughters. Network maintenance and contact with other kins decrease with the advancement of age. Chapter VI is the behavioural aspects of the aged Santal in terms of interpersonal relationship with other family members, intergenerational solidarity, grievance about their basic needs; attitude towards neighbour, state, and society; and attitude towards family members. They have many griev-ances about economic dependence, cultural practices, and social behavior of the family members. However, they continue to enjoy the position in the traditional village Panchayat system.

Chapter VII highlights the major issues and policy implications of the present study based on empirical data and with personal involvement in the field situation. The author raised some emerging issues which are very important for policymaking about the future graying tribal population. Chapter VIII encompasses the discussion comprehensively with theoretical perspectives. Overall interpretation and analysis are supported with qualitative and quantitative data with tables. A schedule of data collection is given in detail. The book ends with the Index.

The book is a valuable monograph about ageing in the tribal society and cultural construct of ageing from the perspective of social

gerontology covering almost all the socio-demographic aspects including economy, health condition, family life, and behavioural aspects of aged Santals. The author explained how the matrix of cultural values, economic conditions, and individual life gave structure to the phenomena of ageing among the Santals. Aged tribals, both males and females, urban and tribal were equally treated in the book. It is a painstaking documentation of the consequences of ageing of Santals in specific, and aging among the tribals in general, in a theoretical background, with its problems and prospect in policy-making for the aged tribal people in India.

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