

Underweight, Overweight, and Anemia among Elderly Persons in a rural area of Ballabgarh, Haryana

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Abstract

Background: Underweight, overweight, and anemia are common public health problems among elderly individuals. **Objectives:** The current study was conducted in a rural area of Ballabgarh, Haryana, to estimate the prevalence of underweight, overweight, and anemia among elderly persons and to find their association with sociodemographic variables. **Materials and Methods:** A total of 420 elderly persons aged ≥ 60 years were selected by simple random sampling. Information on variables was collected by an interview schedule. Body mass index (BMI) was calculated from height and arm-span of elderly persons. Hemoglobin was estimated with HemoCue[®] Hb 201⁺ system. **Results:** Of the total participants, 33.6% were underweight, 13.8% were overweight, 15.6% were obese, and 37.0% had normal BMI. None of the sociodemographic variables was found to be significantly associated with being underweight. Being female was significantly associated with being overweight/obese. The prevalence of anemia was 36.4%. None of the sociodemographic variables was associated with anemia. **Conclusions:** Underweight and anemia are common among elderly persons in rural areas. These need to be addressed through community-based interventions.

Keywords: Anemia, elderly, obesity, overweight, underweight

INTRODUCTION

Globally, it is estimated that the elderly population (age ≥ 60 years) shall increase from 12% in 2015 to 22% in 2050.^[1] Nutrition influences disease development and progression in elderly persons. Elderly persons are particularly vulnerable to malnutrition. Attempts to provide them with adequate nutrition may face several practical problems.^[2] The World Health Organization (WHO) Expert Committee recommended anthropometric data collection of adults aged 60 years and above, and monitoring of their health through anthropometric surveys at regular intervals for timely intervention, and also for development of appropriate strategies and programs.^[3]

Anemia is a significant public health problem among elderly persons globally. It is often overlooked because its symptoms such as weakness and fatigue are also associated with the physiological aging process. It is a multifactorial disease, which can be due to nutritional deficiency, or due to chronic disorders. Anemia is associated with increased mortality, cognitive decline, cardiovascular diseases, delay of elective operative procedures, and long duration of hospitalization, etc. However, in India, the interventions for anemia are mostly

targeted toward women in reproductive age group, pregnant and lactating women, children, and adolescents.^[4] The objective of the study was to estimate the prevalence of underweight, overweight, and anemia among elderly persons in a rural area of Ballabgarh, Haryana, and to find their association with sociodemographic variables.

MATERIALS AND METHODS

This was a cross-sectional study conducted in the 28 villages of the Comprehensive Rural Health Services Project, Ballabgarh, Haryana. The total population was 99,756 in April 2018, which included 7470 elderly persons aged ≥ 60 years. As the prevalence of underweight (24.8%) was lowest among the three health problems investigated;^[5-7]

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it was used for sample size estimation. With absolute precision of 4.5, $z = 1.96$, and alpha of 5%, the required sample size was 354. With 5% correction for death and migration, and 10% for nonresponse, the final sample was 414, rounded off to 420 elderly persons. Simple random sampling was used for the selection of participants from the Health Management Information System. The data were collected in May and June 2018. A pretested self-developed interview schedule was used for recording of demographic and anthropometric details.

Data were collected by house-to-house visits. If a participant could not be contacted despite three house visits, s/he was considered as a nonrespondent. Weight was measured using digital weighing machine (Rossmax, model: WB100); arm-span was measured using measuring tape.^[3] Arm-span was used instead of height for calculation of body mass index (BMI). Hemoglobin was measured by HemoCue® Hb 201+ system with blood from finger prick done aseptically (Angelholm, Sweden).

In men, hemoglobin 11–12.9 g/dl was classified as mild anemia, 8–10.9 g/dl was classified as moderate anemia, and <8 g/dl was called severe anemia.^[8] The corresponding cutoff values for women were 11–11.9, 8–10.9, and <8 g/dl, respectively.^[8] Elderly persons were those who were aged 60 years or above. Former smoker was a person who had been smoking but had not smoked for at least last 1 year. A person was considered economically independent, if his/her source of personal income or any monetary benefit from social scheme was perceived to be sufficient to maintain himself/herself. The person was considered partially dependent, if she/he had some personal income or any monetary benefit from social scheme, but which was not perceived to be sufficient to maintain himself/herself. The person was classified as economically dependent, if there was no personal income or monetary benefit from any social scheme and was totally dependent on other family members. BMI was calculated by weight in kilograms divided by arm-span in meter square. Persons with BMI <18.5 kg/m² belonged to underweight category, and those with BMI ≥23.0–24.9 kg/m² belonged to overweight category, and those with ≥25.0 kg/m² were obese.^[9] Physical activity was any bodily movement produced by skeletal muscles that required energy expenditure, for example, playing, and carrying out household chores.

Ethical clearance was obtained from the Ethics Committee of the All India Institute of Medical Sciences, New Delhi. Informed written consent was obtained from all participants. Participants requiring treatment were referred to the nearest health center for management.

Statistical analysis

Data were entered in Microsoft Excel 2010 and analyzed in Stata 12.0 (College Station, Texas, USA). Prevalence was reported as proportion along with 95% confidence interval (CI). Logistic regression analysis, both univariate and multivariate, was carried out to find the association of underweight,

overweight, and anemia with sociodemographic variables. Strength of association was reported as odds ratio (OR) and 95% CI. The variables having $P < 0.2$ in univariate analysis were included in multivariate analysis. The $P < 0.05$ was considered statistically significant.

RESULTS

Out of the sample of 420 elderly persons, 27 were found to be deceased or migrated. Of the remaining 393 participants, seven could not be contacted after three house visits. Anthropometry could be recorded among 381 participants and blood for testing hemoglobin level could be collected from 382 participants.

Among the studied 382 participants, 60% were below the age of 70 years, two-third were illiterate, and half of them were not doing anything at the time of data collection. Majority of participants were living in extended family, and two-third of them were married [Table 1].

The prevalence of underweight was 33.6% (95% CI: 28.8–38.6). It was higher among men (37.7%) than women (30.6%). The prevalence of overweight and obesity (combined) was 29.37% (95% CI: 24.8–34.2). Overweight and obesity were higher among women (34.3%) than men (22.6%). The prevalence of overweight was 13.8% (95% CI: 10.4–17.6) and prevalence of obesity was 15.6 (95% CI: 12.1–19.7).

The sociodemographic variables which were included for univariate analysis were gender, age, education, current occupation, type of family, marital status, living arrangement, economic dependence, smoking status, and engagement in physical activities. The variables with $P < 0.2$ in univariate analysis were included in multivariate analysis. Only these variables have been depicted in the table on association of anemia. Obesity was combined with overweight for analysis of association due to small numbers. No sociodemographic variable was found to be significantly associated with underweight. There was a significant association between gender and overweight/obesity – overweight/obesity being more common among women (adjusted OR – 2.24 [95% CI: 1.19–4.25]). No sociodemographic variable was found to be associated with underweight.

The prevalence of anemia among the elderly persons was 36.4% (95% CI: 31.5–41.2). Among men, 33.1% were anemic, and among women, 38.7% were anemic. Of the total number of participants, 26.7% were mildly anemic, 8.9% were moderately anemic, and 0.8% were severely anemic.

The sociodemographic variables which were included for univariate analysis of anemia were same as those for underweight and overweight, with the addition of BMI. None of the sociodemographic variables was found to be significantly associated with anemia [Table 2].

Table 1: Distribution of participants by sociodemographic variables

Variable name	Variable categories	Men (n=160), n (%)	Women (n=222), n (%)	Total (n=382), n (%)
Age (years)	60-64	59 (36.8)	58 (26.1)	117 (30.6)
	65-69	40 (25.0)	71 (31.9)	111 (29.0)
	70-74	31 (19.4)	39 (17.6)	70 (18.3)
	75 and above	30 (18.8)	54 (24.4)	84 (22.0)
Education	Illiterate	47 (29.2)	195 (87.6)	242 (63.2)
	Less than primary	29 (18.6)	20 (9.3)	49 (13.2)
	Primary	24 (14.9)	5 (2.2)	29 (7.5)
Current occupation	More than primary	60 (37.3)	2 (0.8)	62 (16.1)
	Homemaker	11 (6.9)	128 (57.6)	139 (36.4)
	Others	40 (25)	6 (2.7)	46 (12.4)
Type of family	Not doing anything	109 (68.1)	88 (39.6)	197 (51.6)
	Extended	149 (93.2)	209 (94.2)	358 (93.8)
	Nuclear	11 (6.8)	13 (5.8)	24 (6.2)
Marital status	Married	129 (80.1)	113 (50.9)	242 (63)
	Widow (er)	31 (19.9)	108 (48.9)	139 (36.8)
	Separated	0	1 (0.4)	1 (0.3)
Living arrangement	Living with spouse and children	119 (74.4)	108 (48.7)	227 (59.4)
	Living with spouse only/alone	10 (6.3)	8 (3.6)	18 (4.7)
	Living with children only	31 (19.4)	106 (47.8)	137 (35.9)
Economic dependence	Independent	94 (58.4)	10 (4.4)	104 (26.9)
	Partially dependent	59 (37.3)	173 (78.2)	232 (61.1)
	Dependent	7 (4.4)	39 (17.3)	46 (11.9)
Smoking	Never smoker	26 (16.8)	111 (50.2)	137 (36.3)
	Former smoker	30 (18.6)	38 (16.9)	68 (17.6)
	Current smoker	104 (64.6)	73 (32.9)	177 (46.1)
Physical activity	Engaged	98 (60.9)	132 (59.1)	230 (60.2)
	Not engaged	62 (39.1)	90 (40.9)	152 (39.8)

DISCUSSION

In our study, the prevalence of underweight was found to be 33.6%, 13.8% were overweight, and 15.6% were obese. In the study conducted by Kalaiselvi *et al.*, in rural Puducherry in 2016, the prevalence of underweight was estimated to be 24.8%. Being elderly male of age more than 70 years, and having per capita income <1000 INR, were significantly associated with undernutrition status (BMI \leq 18 kg/m²).^[7] In the study by Jamir *et al.*, in rural Ballabgarh, Haryana, among 948 participants, in 2013, the prevalence of underweight was estimated to be 53.7%. Significantly associated factors were increased age and male sex. In spite of study being conducted in the same region, the lower prevalence in our study could reflect a real reduction in the level of underweight over time, maybe due to improvement in socioeconomic status.^[10] In the study by Gupta *et al.*, from rural Uttarakhand, the prevalence of underweight was 26.6% in 2018.^[11] In the study by Barreto *et al.*, among 1443 elderly participants in Bambui, Brazil, in 2003, 14.4% of individuals were underweight (BMI \leq 20 kg/m²). Being underweight was frequent among current and former smokers and age group of \geq 80 years.^[12] In another study by Ashok *et al.*, in 2013, in population \geq 65 years, the prevalence of overweight and obesity was found to be 11.9% and 17.9%, respectively.^[13] The finding from this study is consistent with the prevalence observed in our study.

Sahli's method was used for hemoglobin estimation in all the following studies and WHO cutoff for hemoglobin was used. In the study by Agarwalla *et al.*, in 2016, in Boko-Bongaon block of Kamrup district, Assam, the prevalence of anemia was 45.5%, of which severe anemia constituted 15.3%. Significant associations were found with age, gender, calorie intake, type of diet, iron supplementation, and worm infestations.^[14] Malhotra *et al.* conducted a study in rural Telengana in 2015 in 633 individuals of age 50 years and above. The prevalence of anemia was estimated to be 29.86%. Among them, 17% were mildly anemic, 7.7% moderately anemic, and 4.7% were severely anemic.^[15] In the study by Paul and Abraham in rural Tamil Nadu in 2015 among 340 individual, the prevalence of anemia was 38.2%. In this study, prevalence increased with increased age and lower BMI.^[5]

Our study was a community-based study, in which simple random sampling was undertaken to select the sample, and the response rate was high. Generalizability of the study is limited to rural area. Our study reports a triple burden of underweight, overweight, and anemia among the elderly population in rural India. Considering the high burden and significant health impact, identification of malnutrition must be made an essential part of elderly care under programs such as the National Programme for Health Care of the Elderly.

Table 2: Association of anemia with sociodemographic and anthropometric variables

Variables	Number of participants (n=382)	Anemia present (n=139), n (%)	Unadjusted OR (95% CI)	P	Adjusted OR (95%CI)	P
Education						
Illiterate	242	98 (40.5)	Reference	-	Reference	-
Less than primary	49	16 (32.7)	0.59 (0.59-0.32)	0.32	0.43 (0.14-1.31)	0.13
Primary	29	6 (20.7)	1.10 (0.49-2.45)	0.82	1.08 (0.45-2.59)	0.86
More than primary	62	19 (30.6)	1.54 (0.85-2.80)	0.16	1.17 (0.55-2.55)	0.67
Current occupation						
Homemaker	139	51 (36.7)	Reference	-	Reference	-
Others	46	9 (19.6)	0.42 (0.19-0.94)	0.04	0.66 (0.26-1.67)	0.38
Not doing anything	197	79 (40.1)	1.16 (0.74-1.8)	0.53	1.49 (0.90-2.49)	0.12
Marital status						
Married	242	80 (33.1)	Reference	-	Reference	-
Widow (er)	140	59 (42.1)	1.48 (0.96-2.27)	1.48	0.96 (0.59-1.58)	0.88
Economic dependence						
Independent	104	27 (26)	Reference	-	Reference	-
Partially dependent	232	97 (41.8)	2.05 (1.23-3.41)	0.01	1.61 (0.81-3.19)	0.17
Fully dependent	46	15 (32.6)	1.38 (0.65-2.94)	0.04	1.11 (0.46-2.68)	0.81
Smoking						
Never smoker	137	52 (38)	Reference	-	Reference	-
Former smoker	68	35 (51.5)	1.73 (0.96-3.11)	0.07	1.86 (0.99-3.48)	0.05
Current smoker	177	52 (29.4)	0.68 (0.42-1.09)	0.11	0.76 (0.45-1.27)	0.28
BMI (kg/m ²)*						
Normal	140	47 (33.6)	Reference	-	Reference	-
Underweight	127	57 (44.9)	1.61 (0.98-2.64)	0.05	1.64 (0.97-2.75)	0.06
Overweight and obese	111	33 (29.7)	0.84 (0.49-1.43)	0.51	0.80 (0.46-1.39)	0.42

*Blood was tested for haemoglobin in 382 participants. Anthropometry could be recorded in 381 participants. In 378 participants, both haemoglobin estimation and anthropometry measurement could be done. BMI: Body mass index, OR: Odds ratio, CI: Confidence interval

CONCLUSIONS

One-third of the rural elderly population were anemic. One-third of the population was underweight, whereas one-sixth were overweight and obese. Anemia and underweight are underlying factors for various comorbidities. Community-level interventions are required for meeting the challenge of the high burden of these conditions. Mass awareness about nutritious diet may prove to be helpful in combating both the conditions. This, in turn will help in adding years to our greying population.

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Conflict of interest

There is no conflict of interest.

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