ORIGINAL ARTICLE

Double burden of malnutrition among elderly population of Delhi

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| Abstract | Introduction | Methodology | Results | Conclusion | References | Citation | Tables / Figures |

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Citation

Article Cycle

Abstract

Background: Nutritional status is an important determinant for elderly, directly influencing their susceptibility to diseases, adversely affecting their quality of life. **Aim & Objective**: To assess the nutritional status of elderly persons aged ≥60 years residing in an urban resettlement colony of Delhi. **Materials and Methods**: A community-based cross-sectional study was conducted in a resettlement colony in Delhi. Cluster random sampling was used. Three out of ten blocks were selected randomly. All elderly persons present in the selected blocks were included. Information on socio-demographic variables was collected. Arm span and weight were measured by trained investigators. Data was entered in MS Excel 2007 and analyzed in Stata 11.0. Multiple logistic regression was done to determine the association between nutritional status and socio-demographic variables **Results:** A total of 711 elderly persons were recruited. About half (53.2%) had normal nutritional status, 20.8% were underweight and 19.4% were overweight and 6.6% were obese. Under-nutrition was significantly associated with gender, while overweight/obesity was found to be significantly associated with age (p<0.001), gender (p<0.001), occupation (p<0.001) and economic dependency (p< 0.001). **Conclusion**: Dual burden of malnutrition was seen, so there is a need to promote healthy eating and lifestyle to address both spectrum of malnutrition.

Keywords

Under-Nutrition; Overweight; Obesity; Urban; Elderly; Nutrition

Introduction

Malnutrition is the cellular imbalance between the supply of nutrients and the body's demand to ensure growth and maintenance. It may be caused by the lack of nutrients (under-nutrition), or an excess of nutrients (over-nutrition). On one hand, elderly persons are vulnerable to under-nutrition due to poor appetite, poor dentition, loss of taste and smell; on the other hand, restriction of mobility and sedentary lifestyle puts them at risk of overweight and obese. Many studies in India have reported malnutrition in the elderly. A study from Assam reported that 15% of elderly were malnourished, 29.4% elderly had malnutrition in West Bengal, while 14.9% were malnourished in Allahabad. A study from Uttarakhand reported 48.6% elderly were underweight ,10.3% were overweight and 5.6% cases were in obese and 19.5 % were reported to be malnourished in Coimbatore. A study from Puducherry reported a prevalence of under-nutrition

in elderly to be 14% in urban areas. There is a wide range of prevalence reported from different parts of India. In urban areas, lack of social support, disintegration of the joint family system, and changing lifestyles all aggravate the health and nutritional problems of the elderly.

Aims & Objectives

To assess the nutritional status of elderly persons residing in an urban resettlement colony of Delhi.

Material & Methods

Study design: A community-based cross-sectional study. *Study area*: Study was conducted in Dakshinpuri Extension, a resettlement colony in Delhi. It is the urban field practice area of the Centre of Community Medicine, All India Institute of Medical Sciences, New Delhi, which serves a population of about 36,000 spread over 10 (ten) blocks. Elderly persons aged 60 years and above comprise about 4% of the population in this area.

Study population: all elderly persons aged 60 years and above. *Inclusion criteria*: Ambulatory older persons who were residents of the study area for at least past six months were included in the study. Study duration: January- March 2015. *Sample size calculation*: Taking the prevalence of under-nutrition to be 14% (5), relative error of 25%, design effect of 1.5, and 15% non-response, the sample size was calculated to be 694. A cluster random sampling was done where each block was one cluster. Out of the ten blocks under the study area, three blocks were selected randomly. All elderly present in the three selected blocks were included in the study.

Data collection: A structured interview schedule was prepared to collect information about socio-demographic variables. Two investigators were trained in carrying out the interviews and taking measurements. Information was collected through house-to-house visits. Participants who could not be contacted despite three visits to their houses, were categorized as non-respondents.

Measurements were made as per the guidelines of the World Health Organization. Body Mass Index (BMI) was derived from weight and arm span; BMI = weight (kg)/arm span (m^2). In older persons, arm span is a better proxy measure for height, because as a result of increased spinal curvature and postural problems, accurate measurement of height is difficult. Many studies have established that arm span can be a good substitute for height in situations when the height cannot be measured –bedridden patients, standardization of lung function tests in the elderly, calculation of body mass index for nutritional assessment. Studies have shown that arm span correlates highly with height, and can be used as its substitute in older persons (10,11, 12, 13,14,15,16). As per guidelines of the World Health Organization, under-nutrition was defined as a body mass index (BMI) of less than 18.5 kg/m^2; overweight was defined as BMI 25.0-29.9 kg/m^2, and obesity as BMI ≥30.0 kg/m^2.

Measurement of arm span was done using a flexible steel tape. Each measurement was taken twice, and the average was calculated. Arm span was taken with the participant standing against a wall, looking straight at eye level, with arms extended laterally at shoulder level. Then the steel tape was extended from the tip of the middle finger of one hand straight across the chest, to the tip of the middle finger of the other hand, and recorded to the nearest 0.1 cm. The weight was measured to the nearest 100 grams on a digital weighing scale (Dr. Morepen Homehealth, Model MS-8604) with participants wearing light clothing.

Data analysis: Data was entered in MS Excel 2007 and analysis was carried out using Stata 11.0 (College Station, Texas, USA). Prevalence of under-nutrition, overweight and obesity was estimated as percentages (95% confidence interval). The χ2 test was applied to find the association of malnutrition with socio-demographic factors. Multiple logistic regression was used to identify factors independently associated with under-nutrition and overweight/obese as the outcome variable. For this analysis, overweight and obese were clubbed into a single category. Unadjusted odds ratios for under-nutrition/overweight/obese were first calculated for socio-demographic factors. All the variables with p-value < 0.2 (for unadjusted odds ratio) were entered into the model, and those with a p-value < 0.05 were retained. The results are reported as adjusted odds ratios (95% CI). A p-value <0.05 was considered statistically significant.

Ethical approval: Ethical clearance was obtained from the All India Institute of Medical Sciences Ethics Committee.
Consent: Informed written consent was obtained from all participants. If any participant needed medical care, s\he was referred to the nearest health centre.

Results

A total of 851 elderly persons were approached to participate in the study. Of these, 110 were not available even after three visits and 30 refused to participate. Thus, a total of 711 elderly persons were recruited to the study, giving a non-response rate of 16.5%. There were 298 men (41%) and 413 (58%) women. Among the study participants, 56% were economically partially independent and 661 (93 %) were living with their families (Table 1).

The mean weight was 59.6 kgs in males and 56.4 kgs in females. Mean arm span was 154.9 cms in males and 169.6 cm in males (Table 2).

Nutritional status as expressed by BMI was calculated for all participants. It was seen that half of the elderly persons (53.2%) had normal nutritional status, while 20.8% were underweight, 19.4% were overweight, and 6.6% were obese (Table 3).

 For further analysis, overweight and obese were combined. The mean BMI was higher in women (23.4 + 4.8 kg/m2) as compared to men (20.7 + 3.8 kg/m2). The bivariate analysis is shown in Tables 4 & Table 5. On multivariate analysis, under-nutrition was more common in men (Table 6). However, overweight and obese categories, when clubbed together and compared with normal category by socio-demographic variables showed that there was a significant association with age (p<0.001), gender (p<0.001), occupation (p<0.001) and economic dependency (p<0.001). The prevalence of overweight/obesity increased with age. Women were significantly overweight as compared to men and homemakers were significantly more overweight. Those who were economically fully dependent were also found to be significantly more overweight than the rest of the groups.

Discussion

In this study, it was seen that there was a dual burden of malnutrition among elderly persons. While 20.8%% of them were undernourished, 26% were overweight/obese. The prevalence of under-nutrition was similar as reported by studies from other parts of India (3-8, 17-19).

A study from Puducherry reported under-nutrition among 14% of elderly participants in a similar urban setting. (5,8) Coimbatore study reported a prevalence of undernutrition of 19% in urban areas. (7) Similarly, a study from rural Tamil Nadu reported a prevalence of 14% under-nutrition, while a study from rural Haryana reported a prevalence of 53%. A study from Kolkata showed that the prevalence of under-nutrition was 8.8% in women and 4.9% in men, whereas in our study under-nutrition was seen in 15% of women and 28.9% of men. In contrast to other studies, a study from Tamil Nadu reported that none of the study participants had undernutrition. Overweight/obesity was seen in 26% of participants in this study, which was slightly lower than that a study from Puducherry where the prevalence of overweight/obesity was 31% (8). Hence the prevalence of under-nutrition was seen to vary between different studies, due to different study settings and differences in methodology.

We found that under-nutrition was not associated with any of the socio-demographic factors, whereas other studies found a significant association with age, (17,18) gender, (18) education, (19) occupation, (18) and financial dependence. (19) However, overweight/obesity was found to be statistically significantly associated with age, gender, occupation and economic dependency. Similar findings were reported from a study in Orissa where overweight was statistically significantly associated with increasing age and female gender. Many of these factors studied are not only specific to rural areas, but we have seen that in urban population too, undernutrition is a significant problem. This could be due to neglect of the elderly by the society and families. This could also be due to inherent problems of old age like poor dentition which in turn leads to poor nutrition. The health of the elderly deserves special attention in the urban resettlement colonies because this strata of population is neither too low in the socio-economic scale as compared to urban slums, but they don't have sufficient resources to avail private health care in urban areas. With the changing demographic scenario in India, the health of the elderly persons is becoming increasingly important as they contribute to the dependant population requiring health care especially for chronic diseases. The effect of migration from rural to urban areas also plays a role in a misbalanced nutritional system in elderly people living in resettlement colonies e.g., change of food habits, poor housing conditions leading to lack of physical activity, which increases the risk for overweight and obesity. A combination of all these factors together is responsible for the double burden of malnutrition that we have seen in elderly population.

Conclusion

This study has highlighted the dual burden of malnutrition in the elderly population in urban areas, where both under-nutrition and over-nutrition exist. Under-nutrition was not associated with any of the socio-demographic factors, while overweight/obesity was found to be statistically significantly associated with age, gender, occupation and economic dependency.

Recommendation

Health promotion activities emphasizing on healthy eating and healthy lifestyle should be done so as to achieve healthy and graceful ageing.

Limitation of the study

1. Since the study was conducted in an urban resettlement colony, it is not generalizable to other parts of urban India.
2. Due to the possibility of recall bias, information about the dietary intake was not collected, though it is directly related to the nutritional status of an individual.

Relevance of the study

This study is relevant in modern context especially in urban India. With increasing life expectancy, the number of elderly is increasing. Preventive and control measures for both under & over nutrition are different, hence presenting a challenge for the public health system. While under-nutrition needs to be tackled, at the same time long term debilitating health effects of obesity and its complications resulting in chronic diseases needs to be addressed.

Authors Contribution

AKG- concept, literature search, data acquisition, manuscript review; BN- concept, design, manuscript preparation, manuscript review; MK- concept, design, data analysis, manuscript review, manuscript editing; SKG- concept, design, statistical analysis, manuscript review, manuscript editing; CSP- concept, design, manuscript review, manuscript editing.

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Tables

TABLE 1 DISTRIBUTION OF STUDY PARTICIPANTS BY SOCIO-DEMOGRAPHIC VARIABLES

Socio-demographic variables		Number (%) n = 711
Gender	Men	298 (41.9)
	Women	413 (58.1)
Age (years)	60 to 64 years	333(46.9)
	65 to 69 years	178(25.1))
	70 to 74 years	113 (15.8)
	≥75 years	87 (12.3)
Economic Dependence	Independent	59 (8.3)
	Partially dependent	401 (56.4)
	Fully dependent	251 (35.2)
Marital status	Currently married	451 (63.3)
	Single\separated\widowed	260 (36.6)
Living status	Living with family	661 (93.0)
	Living with spouse	42 (5.9)
	Living alone	8 (1.1)
Occupation		
	Homemaker	371 (52.2)
	Self-employed	106 (14.7)
	Non-Govt. employee	98 (13.8)
	Govt. employee	111 (15.6)
	Others	25 (3.5)
Education	No formal education	415 (58.3)
	Less than primary	56 (7.8)
	Primary school completed	162 (22.3)
	Secondary school completed or above	78 (10.9)

TABLE 2 DISTRIBUTION OF MEAN WEIGHT AND ARM SPAN BY GENDER

		Mean	95%CI
Weight (kgs)	Total	57.7	56.8-58.6
	Female	56.4	55.1-57.5
	Male	59.6	58.3-60.9
Arm span (cms)	Total	161.1	160.3-161.8
	Females	154.9	154.3- 155.5
	Males	169.6	168.7-170.5

TABLE 3 DISTRIBUTION OF STUDY PARTICIPANTS BY BODY MASS INDEX (BMI)

BMI	BMI Category	Number n = 711	Prevalence % (95% CI)
≤ 18.5 kg/m2	Undernourished	148	20.8 (17.9, 24.0)
18.5-24.9 kg/m2	Normal	378	53.2 (49.4, 56.9)
25– 29.9 kg/m2	Overweight	138	19.4 (16.6, 22.5)
≥ 30 kg/m2	Obese	47	6.6 (4.8, 8.7)

TABLE 4 DISTRIBUTION OF UNDERNOURISHED PARTICIPANTS BY SOCIO-DEMOGRAPHIC VARIABLES

Socio Demographic Variables	Undernourished		p- value	Odds Ratio (95% C.I.)	
	Yes (n=148)	**No (n=378)**		**Unadjusted**	**p-value**
Age (years)					
60-64	55 (25.2)	163 (74.8)		1.0	
65-69	35 (26.3)	98 (73.7)	0.347	1.06 (0.65, 1.73)	0.821
70-74	31 (33.0)	63 (67.0)		1.45 (0.87, 2.47)	0.161
75 and above	27 (33.3)	54 (66.7)		1.48 (0.86,2.57)	0.164
Gender					
Women	62 (23.2)	205 (76.8)	0.011	1.0	
Men	86 (33.2)	173 (66.8)		1.65 (1.11, 2.41)	0.011
Educational Status					
No formal education	92 (30.2)	213 (69.8)	0.251	1	
Primary	12 (26.7)	33 (73.3)		0.85 (0.41, 1.70)	0.632
Secondary education	25 (21.2)	93 (78.8)		0.63 (0.37, 1.03)	0.066
Senior Secondary & above	19 (32.8)	39 (67.2)		1.13 (0.61, 2.05)	0.694
Occupation					
Homemaker	56 (23.6)	181 (76.4)		1.0	
Self- Employed	37 (40.2)	55 (59.8)	0.003	2.17 (1.30, 3.63)	0.003
Non-Govt. Employee	20 (24.1)	63 (75.9)		1.02 (0.57, 1.84)	0.931
Govt. Employee	24 (25.8)	69 (74.2)		1.12 (0.64, 1.95)	0.678
Others	11 (52.4)	10 (47.6)		3.56 (1.43,8.80)	.006
Marital Status					
Married	95 (29.1)	231 (70.9) 147 (73.5)	0.513	1.0	
Single	53 (26.5)			0.88 (0.59, 1.30)	0.513
Living Status					
Living alone	1 (16.7)	5(83.3)	0.656		0.428
Living with spouse	11(33.3)	22 (66.7)		2.49(0.25,24.09)	0.548
Living with family	136(27.9)	351 (72.1)		1.94(0.22,16.73)	
Economic Dependency					
Independent	14 (29.2)	34 (70.8)	0.559	1.0	
Partially Dependent	93 (29.6)	221 (70.4)		1.02 (0.52, 1.99)	0.949
Fully Dependent	41 (25.0)	123 (75.0)		0.81(0.39, 1.65)	0.563

TABLE 5 DISTRIBUTION OF OVERWEIGHT AND OBESE PARTICIPANTS BY SOCIOECONOMIC VARIABLES

Table 5: Distribution of overweight and obese participants by socioeconomic variables					
Socio Demographic Variables	Overweight\obese		p- value	Odds Ratio (95% C.I.)	
	Yes (n=185)	No (n=378)		Unadjusted	p-value
Age (years)					
60-64	115(41.4)	163(58.6)	<0.0001	1.0	
65-69	45 (31.5)	98 (68.5)		0.66 (0.42, 0.99)	0.048
70-74	19 (23.2)	63 (76.8)		0.42 (0.24, 0.75)	0.003
75 and above	6 (10.0)	54 (90.0)		0.15 (0.06, 0.37)	<0.001
Gender					
Women	146 (41.6)	205 (58.4)	<0.0001	1.0	
Men	39(18.4)	173 (81.6)		0.31 (0.21, 0.47)	<0.001
Educational Status					
No formal education	110 (34.1)	213 (65.9)	0.681	1.0	
Primary	11 (25.0)	33 (75.0)		0.65 (0.31, 1.32)	0.233
Secondary education	44 (32.1)	93 (67.9)		0.92 (0.59, 1.40)	0.687
Senior Secondary and above	20 (33.9)	39 (66.1)		0.99 (0.55, 1.78)	0.981
Occupation					

Homemaker	134 (42.5)	181 (57.5)		1.0	
Self- Employed	14 (20.3)	55(79.7)	<0.0001	0.34 (0.18, 0.64)	0.001
Non-Govt. Employee	15(19.2)	63(80.8)		0.32 (0.17, 0.58)	<0.001
Govt. Employee	18 (20.7)	69(79.3)		0.35 (0.20, 0.61)	<0.001
Others	4 (28.6)	10 (71.4)		0.55 (0.16, 1.75)	0.307
Marital Status					
Married	125 (35.1)	231 (64.9)	0.136	1.0	
Single	60 (29.0)	147 (71.0)		0.76 (0.52, 1.09)	0.136
Living Status					
Living alone	2 (28.6)	5(71.4)	0.868	1.0	
Living with spouse	9 (29.0)	22 (71.0)		1.02 (0.16, 6.27)	0.981
Living with family	174 (33.1)	351 (66.9)		1.23 (0.23, 6.45)	0.799
Economic Dependency					
Independent	11(24.4)	34 (75.6)	0.003	1.0	
Partially Dependent	87 (28.2)	221 (71.8)		1.21 (0.59, 2.50)	0.595
Fully Dependent	87 (41.4)	123 (58.6)		2.18 (1.05, 4.55)	0.037

TABLE 6 MULTIVARIATE ANALYSES OF SOCIO DEMOGRAPHIC VARIABLES ON MALNOURISHED (N=148) AND OVERWEIGHT/OBESE (N=185) VERSUS NORMAL ELDERLY (N=378) AGED 60 AND ABOVE

Socio Demographic Variables	Adjusted Odds Ratio (95% CI)	
	Under-nourished (n=148)	Overweight / obese (n=185)
Age (years)		
60-64	1.0	1.0
65-69	0.88 (0.52, 1.48)	0.83 (0.52, 1.31)
70-74	1.13 (0.63, 2.02)	0.62 (0.33, 1.15)
75 and above	1.29 (0.70, 2.40)	0.22 (0.09, 0.56)
Gender		
Women	1.0	1.0
Men	3.33 (1.24, 8.93)	0.29 (0.12, 0.72)
Education		
No formal education	1.0	1.0
Primary education	0.53 (0.24, 1.15)	0.98 (0.44, 2.16)
Secondary education	0.46 (0.26, 0.84)	1.57 (0.93, 2.65)
Senior secondary and above	0.81 (0.40, 1.65)	2.61 (1.23, 5.53)
Occupation		
Home maker	1.0	1.0
Self employed	0.91 (0.33, 2.50)	0.65 (0.26, 1.63)
Non-Government employee	0.47 (0.15, 1.40)	0.50 (0.19, 1.30)
Government employee	0.45 (0.15, 1.32)	0.64 (0.24, 1.65)
Others	2.20 (0.70, 6.92)	0.75 (0.20, 2.75)
Marital Status		
Married	1.0	1.0
Single	0.97 (0.59, 1.59)	0.67 (0.42, 1.05)
Living Status		
Living alone	1.0	1.0
Living with spouse	2.00 (0.19, 20.90)	0.72 (0.10, 4.88)
Living with family	1.55 (0.16, 14.32)	1.09 (0.19, 6.14)
Economic Dependency		
Independent	1.0	1.0
Partially dependent	1.34 (0.64, 2.81)	0.71 (0.31, 1.62)
Fully dependent	1.16 (0.52, 2.60)	0.83 (0.35, 1.94)