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Nutritional status and family dietary pattern among slum dwelling geriatric population in an area of Burdwan Municipality, West Bengal.

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Abstract:
Background: *Elderly population is vulnerable for malnutrition and their nutritional status is usually associated with family dietary pattern. Slum dwellers being disadvantaged might be at more risk and needs to be assessed for appropriate interventions.*
Objectives: *To determine nutritional status among geriatric population residing in slum area of a municipality and to find out association between nutritional status and family dietary pattern.*
Methods: *A cross-sectional study was conducted during June - November 2016 in slums of a ward of Burdwan Municipality. Sample size was 132 considering 19.5% prevalence of malnutrition (as revealed by a study), 95% confidence interval, 5% level of significance, 10% absolute error and design effect of 2 for multistage sampling. Nutritional status was assessed with Mini Nutritional Assessment (MNA) tool for elderly and family dietary pattern was assessed with 24 hours recall method. MNA tool categorizes nutritional status as – malnutrition, nutrition at risk and normal nutrition. Ethical approval was obtained from institutional ethics committee of Burdwan Medical College, West Bengal.*
Results: *Overall 31.8% subjects were malnourished and 53% were with nutrition at risk. 15.2% were of normal nutrition. Chi-square test revealed that nutritional status was significantly associated with gender (p=0.024), literacy of elderly (p=0.015) and socio-economic status (p=0.002). Significantly associated dietary factors were percentage of energy contribution from protein (p=0.047) and fat (p=0.034); intake of green leafy vegetables (p=0.002) and fats & oil (p=0.03) in their usual diet.*
Conclusion: *Geriatric malnutrition is alarmingly high among slum dwellers of Burdwan municipality. Focused attention and interventions are needed specially addressing the associated factors.*

Keywords: *Family Diet, Geriatric, malnutrition, MNA Tool***.**

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I. Introduction

Aging may come with an accumulation of diseases and impairments, including cognitive and physical decline, depressive symptoms and emotional changes, all of which may directly influence the balance between nutritional needs and intake[1]. Dietary behavior of older individuals may change because of health or social reasons, decrease in taste and smell, or a reduced ability to purchase and prepare food. This combination of symptoms or conditions put older individuals at a higher risk of malnutrition[1, 2].Malnutrition is a prognostic factor associated with morbidity, mortality and costs of care[3, 4]. It is therefore important to detect those older individuals who are at risk for malnutrition. Protein-energy malnutrition has been reported in up to 15% of community-dwelling and home-bound elderly individuals, up to 62% of hospitalized elderly patients, and up to 85% of residents of nursing homes[5-9]. Multi-morbidity is thought to have a direct influence on the balance between nutritional needs and nutritional intake and to contribute to a high prevalence of malnutrition[10]. The scientific progress has reached a level where nutritional interventions may play a part in the prevention of degenerative conditions of age, improvement of quality of life and impact on health care burden and resources. Moreover a timely intervention can stop weight loss in elderly at risk of malnutrition or undernourished[11].

Evaluation of nutritional status is important for any nutrition or dietary modification. Elderly population being more vulnerable needs to be continuously evaluated for appropriate interventions.

In this context, several studies had been done using Mini –Nutritional Assessment (MNA) tool for elderly to detect geriatric nutritional status and several associated factors.[11-16] Evidently, MNA tool for nutritional status assessment of the elderly is well accepted and reliable. But, there are hardly studies undertaken in India or West Bengal regarding geriatric malnutrition. Nutrition of geriatric population also depends on the regular dietary intake. In our country, diet of each elderly depends on the dietary pattern of the family they belong or depend. Thus, family dietary pattern is one of the most primary factors leading to family member's malnutrition including elderly. Studies regarding relationship between geriatric malnutrition and their family dietary intake are also lacking. In this context, the present study has been conducted with following objectives - to assess malnutrition status among geriatric population through Mini Nutritional Assessment tool for elderly and to find out association between nutritional status of elderly and family dietary intake in a slum area.

II. Materials and Methods

A descriptive cross-sectional study was conducted in a ward of Burdwan municipality among geriatric population (age >60 years) and their families residing in the slums from July-December'16 excluding seriously ill geriatric population, geriatric people's family undergoing fasting or feasts in last 24 hrs and geriatric population not present at home for long time.The study area was a slum dominated ward of Burdwan municipality with 6 slums and urban field practice area of Community Medicine, Burdwan Medical College[17]. A minimum sample of 132 was calculated considering 19.47% of prevalence of malnutrition among elderly[12]. (taking confidence interval 95%, level of significance 0.05, allowable error 10%, design effect 2). Selected slum elderly population proportion being 7.7% of total population[18] study subjects were recruited by simple random sampling and population proportion sample size calculation.

For geriatric nutritional status assessment, a schedule based on 'Bengali version of Mini Nutritional Assessment tool (MNA) for elderly (sensitivity 98.9%, specificity 94.3%, diagnostic accuracy 97.2%)[19] was used. MNA is a validated questionnaire for older geriatric population. The questionnaire comprises 18 questions clustered in four sections: anthropometric assessment (weight, height, and weight loss); general assessment (living situation, medicine use, and mobility); dietary assessment (number of meals, food and fluid intake, and autonomy of feeding), and subjective assessment (self-perception of health and nutritional status and nutritional status). A maximum score of 30 can be obtained. Geriatric nutritional status is divided in 3 categories: a score below 17 indicates malnutrition, a score of 17–23.5 indicates a risk of malnutrition (nutrition at risk), and a score of 24 or higher indicates a satisfactory nutritional status (normal nutrition)[19]. A pre-designed and pre-tested schedule for socio-demographic features and 24 hours dietary intake was formulated. A portable weighing machine was used to measure weight and a measuring tape was used to measure height, mid-upper-arm circumference and calf circumference as per MNA tool guidelines[19].

Dietary parameters were considered as follows: total calorie intake of the family is calculated by Recommended Dietary Allowances (RDA) according to number of family members and their working status (Sedentary/Moderate/Heavy). Percentage of energy consumption from each of protein , fat , carbohydrate were calculated as per their energy values respectively (carbohydrate-4 kcal/gm, protein-4 kcal/gm, fat-9 kcal/gm). According to dietary goals, dietary protein, fat and carbohydrate should account for 10-15%, 15-30% and 55-75% of daily recommended total energy intake.[20] So, percentage of energy consumption from 24 hours total protein intake was categorized as Excess, Normal, Low for the values >15%, 10-15%, <10% respectively, percentage of energy consumption from 24 hours total fat intake was categorizes as Excess, Normal, Low for the values >30%, 15-30%, <15% respectively, and percentage of energy consumption from 24 hours total carbohydrate intake was categorizes as Excess, Normal Low for the values >75%, 55-75%, <55% respectively. On the other hand, food groups variables like cereal, pulses, GLV, other vegetable, roots & tubers, milk & milk product, fat & oil, sugar & jagary [each food group intake/consumption unit(CU) variable was categorized as no consumption or consumption < its RDA as deficit, consumption≥ its RDA as normal or more] were calculated.

Age was categorized as 60-69 yrs, 70-79 yrs, 80 yrs & above. Gender has two category-male, female. Education of the elderly was categorized as illiterate, pre-primary and primary, middle, secondary & above. Socio-economic Status was categorized as lower, upper lower, lower middle, upper middle, upper as per Modified Kuppuswamy Scale[21] where income ranges are calculated taking Consumer Price Index 234.771 (CPI of urban wage earner and clerical worker[22]). addiction: It was categorized as no or yes of presence of Smoking/ alchohol/ tobacco chewing & brushing/ any other addictions. Co-morbidities: It was categorized as no or yes of presence of prescription proof of any co-morbidity- hypertension, Type-2 DM, others.

Having the ethical clearance of this study from the institutional ethics committee of Burdwan Medical College, West Bengal, the district and Urban municipal health authorities were intimated about the purpose of the study prior to data collection. Their permission and Cooperation of the health workers at the community

level were sought. At community level, the selected individual study unit geriatric peoples and their family was interviewed using pre-designed and pre-tested schedules. Before interviewing them, the nature and purpose of the study were briefed and written consent was taken. Besides, physical measurements like- weight measurement, height measurement, mid arm circumference measurement, calf circumference measurement was measured as per guideline[19].

The collected data was checked for completeness and consistency and was entered in the computer on excel data sheets. The scores of the MNA Tool of each subject was calculated before entering the excel sheet. In 24 hours family dietary survey, the amount of each food item was noted. When elderly person and family members both were non-vegetarians, all food group was considered in dietary intake of family, and when elderly person and family members both were vegetarians or elderly person was vegetarian and family members were non-vegetarian animal protein were excluded keeping other food group in dietary intake of family (As geriatric nutrition never depends upon Animal food group taken by other family members.). Data from the MNA tool and Diet survey were organized and presented applying the principles of descriptive statistics in the form of tables as well as calculating proportions. Data was analyzed using SPSS 20. Chi-square test was applied to analyse the relationship between geriatric nutritional status with age , gender, literacy, socio-economic status, addiction, co-morbidity, and selected all dietary variables.

III. Results

Total number of 132 elderly people and their families were interviewed. There were 54 male (40.9%) and 78 females (59.1%) among these study subjects. As per MNA Tool, 42 (31.8%) malnourished and 70 (53%) nutrition at risk elderly were present among these subjects (Fig-1).

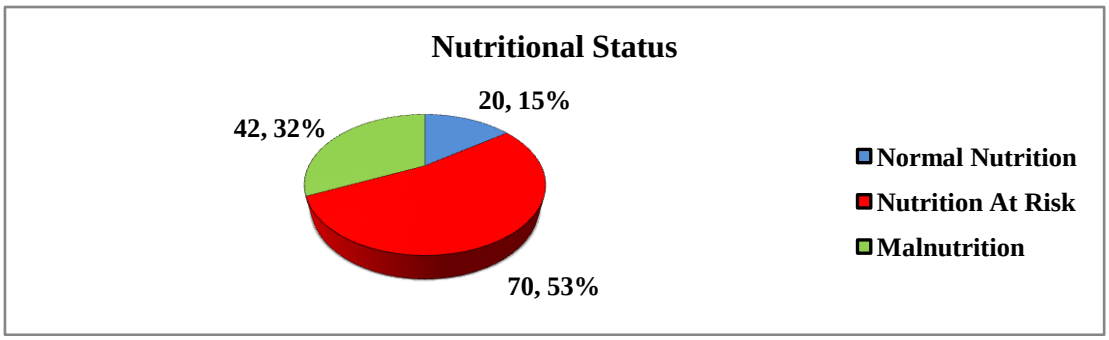

Fig-1: Nutritional Status of elderly as per Mini Nutritional Assessment Tool (n=132).

Table-1: Relationship of nutritional status with socio-demographic characteristics of the subjects (n=132).

Variables	Nutritional status as per MNA Tool				P value (Chi-square test)
	Total	*NN	NR (70)	M (42)	
Age (years)					
60-69	104	16(15.4)	58(55.8)	30(28.8)	0.095
70-79	22	2(9.1)	12(54.5)	8 (36.4)	
≥80	6	2(33.3)	0 (0)	4 (66.7)	
Gender					
Male	54	10(18.5)	21(38.9)	23(42.6)	**0.024**
Female	78	10(12.8)	49(62.8)	19(24.4)	
Education					
Illiterate	99	12(12.1)	52(52.5)	35(35.4)	**0.015**
Preprimary & Primary	25	4(16)	14(56)	7 (28)	
Middle	6	4(66.7)	2 (33.3)	0 (0)	
Secondary & above	2	0(0)	2 (100)	0(0)	
Socio-economical Status					
Lower	21	2(9.5)	6 (28.6)	13(61.9)	**0.002**
Upper lower	76	10(11.6)	53(61.6)	23(26.7)	
Lower middle	21	8(38.1)	9 (42.9)	4 (19)	
Upper middle	4	0(0)	2 (50)	2 (50)	
Any addiction					
Absent	81	14(17.3)	46(56.8)	21(25.9)	0.176
Present	51	6(11.8)	24(47.1)	21(41.2)	
Any comorbidity					
Absent	88	14(15.9)	46(52.3)	28(31.8)	0.938
Present	44	6(13.6)	24(54.5)	14(31.8)	

Note: *NN- Normal Nutrition, NR- Nutrition at Risk, M- Malnutrition Undernutrition. All parenthesis shows row percentage.

Table-2: Relationship between nutritional status of the elderly with dietary parameters. (n=132)

Variables	**Nutritional status as per MNA Tool (NN/NR/M)**				**p value**
	***NN**	**NR (70)**	**M (42)**	**Total**	**(Chi-square test)**
Percentage of energy consumption from total protein intake					
Excess	2 (10)	2 (2.8)	2 (4.8)	6 (4.5)	**0.047**
Normal	10 (50)	15 (21.5)	10 (2.38)	35 (26.5)	
Low	8 (40)	53 (75.7)	30 (71.4)	91 (69)	
Percentage of energy consumption from total carbohydrate intake					
Excess	10 (50)	26 (37.2)	14 (30.3)	50 (37.9)	0.326
Normal	10 (50)	32 (45.7)	22 (52.4)	64 (48.5)	
Low	0 (0)	12 (17.1)	6 (14.3)	18 (13.6)	
Percentage of energy consumption from total fat intake					
Excess	0 (0)	0 (0)	2 (4.8)	2 (1.5)	**0.034**
Normal	7 (35)	26 (37.1)	24 (57.1)	57 (43.2)	
Low	13 (65)	44 (62.9)	16 (38.1)	73 (55.3)	
Cereals intake per CU					
Deficit	9 (45)	48 (68.6)	28 (66.7)	85 (64.4)	0.142
Normal & Above	11 (55)	22 (31.4)	14 (33.3)	47 (35.6)	
Pulses intake per CU					
Deficit	18 (90)	60 (85.7)	31 (73.8)	109 (82.6)	0.175
Normal & Above	2 (10)	10 (14.3)	11 (26.2)	23 (17.4)	
GLV intake per CU					
Deficit	11 (55)	44 (62.8)	38 (90.4)	93 (70.5)	**0.002**
Normal & Above	9 (45)	26 (37.2)	4 (9.6)	39 (29.5)	
Other Vegetables per CU					
Deficit	12 (60)	29 (41.4)	25 (59.5)	66 (50)	0.112
Normal & Above	8 (40)	41 (58.6)	17 (40.5)	66 (50)	
Roots & Tubers per CU					
Deficit	1 (5)	6 (8.6)	1 (2.4)	8 (6.1)	0.404
Normal & Above	19 (95)	64 (91.4)	41 (97.6)	124 (93.9)	
Milk & Milk Products per CU					
Deficit	20 (100)	68 (97.1)	42 (100)	130 (98.5)	0.407
Normal & Above	0 (0)	2 (2.9)	0 (0)	2 (1.5)	
Fat & Oils Intake per CU					
Deficit	18 (90)	53 (75.7)	25 (59.5)	96 (72.7)	**0.030**
Normal & Above	2 (10)	17 (24.3)	17 (40.5)	36 (27.3)	
Sugar &Jagery per CU					
Deficit	10 (50)	36 (51.4)	17 (40.5)	63 (47.7)	0.519
Normal & Above	10 (50)	34 (48.6)	25 (59.5)	69 (52.3)	

***NN- Normal Nutrition, NR- Nutrition at Risk, M- Malnutrition Undernutrition.** All parenthesis shows column percentage.

As per 24 hours dietary survey in those selected geriatric families, percentage of subjects having energy consumption from total protein intake and total fat intake were low among 91 (68.9%) and 73 (55.3%). Percentage of energy consumption from total carbohydrate intake was normal among 64 (48.5%) elderly (Table-2). In case of food group analysis, cereal intake per CU was deficit in 85 (64.4%) and excess in 47 (35.6%). Pulses intake per CU no consumption or deficit and normal or excess were 109(82.6%) and 23 (17.4%) respectively (Table-2). GLV intake per CU No consumption or deficit were in 93 (70.5%) and normal or excess were in 39 (29.5%) families. Other vegetables intake per CU no consumption or deficit & normal or excess were 66 (50%) each. In case of roots & tubers intake per CU no consumption or deficit were in 8 (6.1%) and normal or excess were in 124 (93.9%) families. Milk & milk product intake per CU : no consumption or deficit were in 130 (98.5%) and normal or excess were in 2 (1.5%) families. In case of fat & oil intake per CU: no consumption or deficit was in 96 (72.7%) and normal or excess was in 36 (27.3%) families. Sugar & jagary intake per CU: no consumption or deficit was in 63 (47.7%) and normal or excess was in 69 (52.3%) families.

Relationship between Nutritional status of the elderly with dietary parameters and other socio-demographic features are shown in Table no. 1. Nutritional status in elderly are significantly associated with gender (7.464, 2, 0.024), literacy (15.790, 6, 0.015), socio-economical status (21.193, 6, 0.002), Percentage of energy consumption from total protein intake (9.645, 4, 0.047), Percentage of energy consumption from total fat intake (10.394, 4, 0.034), GLV intake per CU (12.324, 2, 0.002), Fat & oil intake per CU (7.015, 2, 0.03).

IV. Discussions

Alarmingly 31.8% of the elderly are malnourished in a slum area of Burdwan municipality. This is more concern another 53% at risk of malnutrition. Nutritional status is significantly associated with gender, literacy, protein consumption, fat consumption, GLV intake per CU, fat & oil intake per CU. There were only a few studies conducted in India using the MNA questionnaire to assess malnutrition. Similar study was done in Western Rajasthan and showed a prevalence of high malnourishment and risk of malnourishment among elderly (29% and 61% respectively).[23] Overall in this area 84.8% are either malnourished or at risk of malnutrition, almost equals to a proportion(90%) reported by a study in Rajasthan[23]. Our results showed more elderly to be at risk of malnutrition than actually malnourished. This finding has been seen among community-dwelling elderly from India and other parts of the world[24-26]. This is primarily because the MNA tool is better at identifying those at risk of malnutrition among healthy elderly in the community[23]. High prevalence of malnutrition among elders in poor socioeconomic status was reported in some earlier studies.[14, 27, 28] This is evident to the fact that socioeconomic conditions influence dietary choices and eating patterns thereby affecting the nutritional status. Early identification of malnutrition is a first step. The MNA fulfills many criteria for both screening and diagnostic measures[29]. Unlike other studies, our study reveals that males are more significantly associated with malnutrition. This may be because this study was done in a limited area of a municipality. Illiteracy is also highly associated with elderly malnutrition and supported by similar study by Baweja et al[23]. Illiteracy decreases the awareness regarding Healthy lifestyle, optimum diet which may attribute to individual nutritional status. Same study by Baweja et al[23] also shows that 'Low Protein and fat consumption', 'deficit or no consumption of GLV and Fat & oils' were associated with malnutrition and nutrition at risk was also revealed in this study. Our study has several strengths. A validated questionnaire MNA tool was used to elicit the prevalence of malnutrition. The availability of a complete and extensive dataset is strength of the study.

However, one of the main limitation of this study is that 24 hours recall method for dietary assessment. This study was done in urban area of Burdwan municipality. Thus status of rural area are not reflected here accordingly. Moreover, the study being cross-sectional descriptive type, cause–effect relationship could not be established.

V. Conclusion

Based on the findings, it can be concluded that prevalence of geriatric malnutrition is alarmingly high in slums of Burdwan Municipality. Geriatric malnutrition is strongly associated with illiteracy, poor socio-economic status, low green leafy vegetable intake, low protein and fat rich food intake. Substantial proportions are at risk of malnutrition, thus, promotion of proper dietary education to the families, literacy and focused interventions are needed.

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