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Nutritional Status of Elderly Population at Gokarneshwor Municipality, Kathmandu

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ABSTRACT

Background: Elderly populations are the vulnerable population and yet still neglected one. The main aim of the research is to assess the nutritional status of elderly population at Gokarneshwor municipality, Kathmandu.
Methods: Quantitative cross sectional study was conducted in the time frame of July 15-Jan 15, 2020 among 301 elderly population of Gokarneshwor municipality, Kathmandu. Proportionate systematic sampling was applied for elderly selection. Descriptive and inferential statistical analysis was performed by using the software Statistical Package for Social Sciences and Microsoft Excel.
Results: Study reflected that most of the elderly (48.5%) had normal body mass index followed by overweight (24.6%), underweight (18.6%) and obese (8.3%) respectively. Currently 27.2% used to consume alcohol and 24.3% used to smoke. More than one third (39.1%) elderly reported psychological stress or disease. Most of the elderly (40.1%) had high pressure followed by Diabetes (27.1%), Chronic Obstructed Pulmonary Disease (23.6%), heart disease (7.1%) and heart stroke (1.9%) respectively. Elderly nutritional status was statistically significant among marital status (P=0.022), food intake in recent three month (P=0.024), weight loss (P=0.001), mobility (P=0.004), self-perception of health status (P=0.029), psychological stress (P<0.001) are associated with malnutrition.
Conclusion: Considerable numbers of elderly were found to be malnourished and many were at risk of malnutrition. Intervention focusing food habit, weight status, mental status, physical activity need to be developed which ultimately helps to balance nutritional status. Further intensive research could discover the factors for improving nutritional status of elderly.

Keywords: *Nutritional status, elderly population, health status, dietary intake, body mass index.*

INTRODUCTION

Malnutrition among elderly population is very important areas of concern. Elderly populations are the vulnerable population and yet still neglected one. There physical changes, less physical activity and lower the intake of nutritious food may lead to lack of access in everything leading to deterioration of their health. Among many other fields in which elderly requires care nutrition is one important factor to maintain healthy ageing. Health status of elderly deteriorates with age (1).

Worldwide, till now there are about 125 million elderly populations living above age 80. It is estimated that the number of people aged 60 years and older will outnumber children younger than 5 years and among them 80% will live in low and middle income countries. Nepal is growing steadily at the rate of 3.77 percent per year which was three times higher than the annual population growth rate(1.35%) during 2001-2011 (2). At this pace elderly population at will double in 20 years. Above all the growth rate of elderly in Southeast Asia has exceeded than normal population growth rate in total (3). According to 2011 census, percent of elderly population in Nepal is 8.1 percent which is on increasing trend (4).

Older people are predisposed to vitamin and mineral deficiencies due to reduced intake of unbalanced diet. Use of drug in elderly may cause many psychological as well and physiological changes like anxiety, lack of micronutrients and macronutrients. The dietary intake for elderly is basically the same as youth (2).

While the situation is very tragic for elderly population the health system is failing to address the demand of elderly. There is significant unmet need and major service gap among the population of elderly. This makes them more prone to chronic as well as infectious diseases resulting in under nutrition among elderly (4).

The biological changes weaken the general health status of elderly people in with several other digestive diseases like diabetes pancreatic liver disease and malignancy will have adverse effect on health. Several enzymes decrease with ageing as well as study suggest that liver size decreases with age. Body Mass Index (BMI) also decreases with age. Apart from that elderly suffer from different diseases like chronic heart failure, chronic obstructive pulmonary disease, gastrointestinal diseases, and many more. Social factor may directly influence nutritional status of ageing. This may include poverty; isolation as well as inability to shop prepare and cook meal (5).

In a study conducted at rural eastern Nepal 24.8% of people are malnourished and 49.6% are risk of malnutrition. It has also concluded that malnutrition is higher among elderly at rural area. This study also concluded that malnutrition is more among female than male in rural area (6). In US Elderly nutrition program is a key program to provide service regarding elderly nutrition (7). Regarding policies related to elderly nutrition in Nepal, there are no provisions but elderly is provided with NRs. 2000 as a social security. As elderly is a neglected topic here, government is still planning for health and nutrition policies (8). Likewise study by aging Nepal in 2012 showed that, nutritional problems are more in Dalit group and people are in depression (9). A study done after earthquake in 3 districts of Nepal showed that there are mainly 4 kinds of health problems in elderly i.e. variation in mood, single minded and low self-esteem and crying without reason (10).

The government of Nepal has formulated a national policy, act and regulations on ageing and the problems of elderly; however, this has not been operationalized because of limited resources (11). Sustainable Development Goals (SDGs) has also taken initiatives to address healthy ageing in their agenda. Elderly is a very critical stage of life which is addressed by SDG in goal 1,2,3,4,5,9,10,11 and 16. Especially goal 2 (End hunger, achieve food security and improve nutrition and promote sustainable agriculture) has also given hint to address elderly nutrition in world (12).

Although Nepal is moving towards elderly friendly country, some sort of hindrance is still there to negotiate with those problems. The high nutritional need blinded with financial aspect is one major concern for developing countries like Nepal. Thorough assessment and diagnosis of malnutrition among older age people are seen to be limited. Research study shows that considerable proportions of older

people are affected by malnutrition worldwide. The main aim of the research is to identify the nutritional status of elderly in the community and identify factors associated with them.

MATERIALS AND METHOD

Design and settings of study

Cross sectional study design and quantitative method of research was used to identify nutritional status among elderly of Gokarneshwor Municipality. Site for study was Gokarneswor Municipality which has nine wards. Among nine wards, Elderly population from ward 1, 2, 3 and 4 of Gokarneshwor Municipality was chosen.

Sampling Procedure

Purposive Sampling from nine wards of Gokarneshwor Municipality was taken because there was heterogeneous population in relation to cast, migration. Proportionate Sampling was done in all wards through which number of samples was taken according to their size. A total of 2210 elderly reside in those areas. The ward number 1 contain 499 elderly population, ward no 2 contain 471 sample, ward number 3 contain 611 elderly population, ward number 4 contain 630 elderly population. Systematic sampling was done from each stratum. Individual elderly from Gokarneshwor Municipality was taken as sampling unit. The detail of elderly was gained through voters' card registration system through each ward of Gokarneshwor Municipality.

Sample size was be calculated by the formula $n= Z^2PQ/ d^2$ where P=24.8% and d= 5%. Considering 10 percent non response rate, total sample for the study was 316. Data collection was done from 301 elderly populations. The sample for ward 1 was 71, ward 2 was 67, ward number 3 was 87 and for ward number 4 was 90. After this systematic sampling was done in each group where the difference between two items was 7 and by lottery first number was also obtained as 7.

Data collection

Data was collected from September to October using questionnaire. Technique for data collection was through face to face interview and anthropometric measurements. The study adopted the tool of Nestle institute regarding elderly Malnutrition. The tool had shown 98% sensitivity and 99% specificity in any institutional study. This tool had been used in community too with some consideration. Language simplification was done accordingly. Local language skill was used if applicable. Interview was taken from each sample. Each elderly was monitored for weight and height by using standard machines/ tapes. Elderly who are unable to take anthropometric measurements are excluded from study.

Operational Definition

Elderly had been defined as a chronological age of 60 years old or older, while those from 65 through 74 years old were referred to as "early elderly" and those over 75 years old as late elderly (WHO). Similarly, BMI was defined as a person's weight in kilograms divided by the square of the person's height in meters (kg/m^2) (13). Elderly BMI was categorized as underweight (below 18.5), normal weight (18.5-24.9), pre obesity (25.0-29.9) and obesity (30.0 and above) Nutritional status was categorized as normal nutritional status (24-30 points), at risk of malnutrition (17-23.5 points) and malnourished (less than 17 points) (13).

Validity and Reliability

Well tested tool relevant to study was adopted. Tool of elderly nutrition from nestle institute was used. This measures elderly nutritional status and malnutrition status at the same time. Questionnaire was back translated (English-Nepali-English) and modification was made accordingly as per context. The sensitivity and specificity of the tool was high as shown by different research. Questionnaire was developed in language in which its essence was alive for

data collection. Pretesting of the tool was carried out in similar population in 10% of sample size and the improvement in tools was made accordingly.

Statistical Analysis

The coded data were collected from respective wards and were cleaned immediately in the field and in residence as required. Analysis was carried out with software Excel and Statistical Package for the Social Sciences (SPSS) version 16. Interpretation of analyzed data was done through descriptive and inferential statistics and presented through tabulation. Univariate logistic regression analysis was done to determine association between each independent and dependent variable. All factors that were associated with dependent variable in univariate regression analysis with a P value of less than 0.05 were included for multiple regression analysis. Odds ratio with confidence interval was used to interpret the strength and direction of association.

Ethical Statement

Ethical approval was obtained from Manmohan Memorial Institute of Health Sciences with IRC No: MMIHS-IRC 446. Approval from Gokarneshwor Municipalities was obtained. Elderly was informed about the objective and method of the study. Informed and written consent was taken before the interview. Information received from respondent was only used for concerned objective. Respondent's choice of not participating in the study was respected. Plagiarism (<5%) was detected through free online site (https://plagiarismdetector.net/).

RESULT

Study findings are displayed in tables with different characteristics.

Table number 1, below shows the description of socio demographic status of elderly in Gokarneshwor Municipality. Among 301 respondents more than half (56.5%) were at age below 70, only 43.5% were above 70 years of age. Married represents 63.5% of respondent and 34.9% of respondents were widow whereas only 1.7% of respondent were unmarried. Most of the respondent are Hindu (78.1%) followed by Buddhist and Christian. More than two third of respondent are from advantaged Janajati (37.2%) followed by Brahmin/Chhetri (33.2%), disadvantaged Janajatis (28.2%) and Dalit (1.3%). More than half (63.5%) of respondent were married. Majority of respondents (77.4%) are unemployed and only 22.6 percent were employed

Table 1: Socio-Demographic Status of Elderly

Characteristics	Number (N=301)	Percentage
Age in years	70.51 (Max: 97: Min: 60)	SD: 7.905
Up to 70 years	170	56.5
More than 70	131	43.5
Religion		
Hindu	235	78.1
Buddhist	63	20.9
Christian	2	0.7
Others	1	0.3
Caste of respondent		
Advantaged Janajati	112	37.2
Bhramin/Chhetri	100	33.2
Disadvantaged Janajati	85	28.2
Dalit	4	1.3
Marital status of respondent		
Married	191	63.5
Unmarried	5	1.7
Widow	105	34.9
Employment status of respondent		
Yes	68	22.6
No	233	77.4

Table 2: Behavioral factor related to socio-demographic status

Characteristics	Number (N=301)	Percentage
Consumption of alcohol		
Yes	82	27.2
No	219	72.8
Quantity of alcohol intake by time		
Constantly Drunk	56	68.3
Only once a day	21	25.6
Once a week	2	2.4
Smoking status of respondent		
Yes	73	24.3
No	228	75.7
Quantity of cigarette per day Mean (7.22) SD: 5.392, Min: 0, Max:20		
1-4	27	37.0
5-9	17	23.3
10-14	21	28.8

Table number 2 showed behavioral factors related to elderly. More than one fourth (27%) of the respondent drink alcohol. Among those 68.3 percent constantly drink alcohol, 25.6 percent drink

only once a day and 2.4 percent drink alcohol only once a week. One fourth (24.3%) of the elderly smoked in which elderly 37 percent take one to four cigarettes followed by 5-9 (23.3%), 10-14 cigarettes (28.8%) cigarette a day.

Table 2: General Health Screening of Elderly

Characteristics	Number (N=301)	Percentage
Food intake in recent three months		
Severe decrease in food intake	14	4.7
Moderate decrease in food increase	113	37.5
No decrease in food intake	174	57.8
Weight loss in last month		
Loss of weight more than 3 kg	12	4.0
Don't know	69	22.9
Weight loss between 1 and 3	69	22.9
No loss of weight	151	50.2
Mobility		
Bed or chair bound	8	2.7
able to get out of bed/chair but does not go out	31	10.3
Goes out	262	87.0
Psychological stress or diseases		
Yes	119	39.5
No	182	60.5
Psychological problem in 3 months	Reported	
Depression	9	3.0
Mild dementia (forgetfulness) Reported Cases	190	63.1
No Psychological problem	102	33.9
Takes more than three prescriptions of medicine		
Yes	39	13.0
No	262	87.0
Morbidity status (Multiple response)		
Diabetes	58	19.26
COPD	50	16.6
Stroke	4	1.3
Heart disease	15	4.9
Pressure sore or skin ulcer		
Yes	18	6.0
No	283	94.0

Table No 3 shows description of elderly general health (food intake, employment status, weight loss, mobility, psychological status). Among the respondent 4.7 percent had severe decrease in food intake, 37.5 percent have moderate decrease in food intake and 57.8 percent had no decrease in food intake. Among the respondent, 31.9 percent are employed and 68.1 percent were unemployed. Half of the respondent had no decrease in weight, 22.9 percent have loss of weight more than 3kg and 22.9 percent don't know about any weight loss. The majority of the elderly (87%) can walk, 10.3 percent of the elderly can walk around beds while 2.7 percent were chair bound. More respondent (60.9%) doesn't have psychological stress or disease while only 39.1 percent have psychological stress or disease. Among the psychologically stressed people, 63.1 percent had mild dementia, 33.3 percent had no psychological problem and only 3 percent had depression. Among 301 respondents, most of the elderly (40.1%) had high pressure followed by diabetes, COPD, heart disease, and heart stroke (19.26%, 16.6%, 1.3%, and 4.9% respectively).

Table 3: Dietary Intake of Elderly

Consumption of Food	Number (N=301)	Percentage
Full meal a day		
1 Meal	7	2.3
2 Meal	168	55.8
3 Meal	126	41.9
Takes More than 3 prescription a day		
Yes	39	13.0
No	262	87.0
At least one servings of dairy product		
Yes	143	47.5
No	158	52.5
Two or more servings of legumes or eggs		
Yes	301	100
Meat fish or poultry consumption		
Yes	175	58.1
No	126	41.9
Meat fish or poultry consumption		
Per day	5	2.9
4 times a week	4	2.3
3 times a week	11	6.3
Once a week	77	44.0
Once 15 days	16	9.1
Once a month	9	5.1
2 times a week	53	30.3
Consumption fruits and vegetable		
1 Serving	170	56.5
2 Serving	122	40.5
3 Serving	8	2.7
4 Serving	1	.3
Mode of feeding		
Unable to eat without assistance	7	2.3
Self-fed with difficulty	13	4.3
Self-fed without any problem	281	93.0
Food Intake in recent three months		
Severe decrease in food intake	14	4.7
Moderate decrease in food increase	113	37.5
No decrease in food intake	174	57.8

Dietary intake of elderly people represented in table 3 illustrates that most of the people (55.8%) had two meals a day. Only 13% used to take more than 3

prescriptions a day. More than half (52.5%) didn't have any dairy product where as 47.5% had at least one serving of dairy product a day. All respondent had at least two serving of legumes or egg per day. More than half of the respondent (58.1%) consumed meat fish or dairy product while 41.9% didn't. Most of the respondent (44.4%) had at least meat fish or poultry consumption per week. Similarly, more than half of the respondent (56.5%) consumed fruits and vegetables as one serving a day. Majority (93%) could self-feed without any problem. Among the respondent, 57.8% had no decrease in food intake.

Table number 4 shows that majority (75.4%) view self as no nutritional status, 17.3 percent view self as malnourished and 7.3 percent are uncertain about nutritional value. Most of the respondents (39.9%) have lower perception on own health status compared to others.

Table 4: Psychology about Nutrition

Characteristics	Number(N=301)	Percentage
Self-perception on nutritional status		
View self as malnourished	52	17.3
Uncertain about nutritional status	22	7.3
View self as having no nutritional status	227	75.4
Self-perception on health status comparing to others		
Not good	120	39.9
Does not know	9	3.0
Good	106	35.2
Better	66	21.9

Nutritional status of elderly is explained in table 5. Almost half (48.5%) of the respondents had normal body mass index (BMI 18.5-24.9). One fourth (24.9%) of the elderly were malnourished.

Table 5: Nutritional Status of Elderly

Nutritional Status	Number (N=301)	Percentage
BMI category		
Underweight (BMI<18.5)	56	18.6
Normal (BMI: 18.5-24.9)	146	48.5
Overweight (25-30)	74	24.6
Obese (Above 30)	25	8.3
Category of Malnourished		
Malnourished	75	24.9
At risk of malnutrition	135	44.9
Normal nutritional status	91	30.2

Table 6: Association between Malnutrition Status and Socio-Demographic Characteristics

Characteristics	Nutritional status		P value	OR	95% CI
	Normal (%)	Malnourished (%)			
Sex					
Male	114(79.2%)	30(20.8%)	0.118	0.65	(0.38-1.11)
Female	112(71.3%)	45(28.7%)		Ref	
Marital status					
Married	157(82.2)	34(17.8)	>0.001*	0.36	(0.21-0.62)
Unmarried or Widow	69(62.7)	41(37.3)		Ref	
Age category					
60-70	135(78.9)	91(21.1)	0.490	0.59	(0.34-0.99)
More than 70	35(66.3)	40(33.7)		Ref	
Employment status					
Yes	71(74)	25(26)	0.758	1.09	(0.62-1.90)
No	155(75.6)	50(24.4)		Ref	
Size of family					
Nuclear	40(81.63)	9(18.36)	0.250	0.63	(0.29-1.37)
Joint	186(73.8)	66(26.19)		Ref	
Children					
2 or less	41(59.4)	28(40.57)	0.001*	2.73	(1.53-4.87)
More than 2	184(80)	46(20)		Ref	
Alcohol consumption					
Yes	55(67.1)	27(32.9)	0.051*	1.75	(1.00-3.06)
No	171(78.1)	48(21.9)		Ref	
Smoking					
Yes	47(64.4)	26(35.6)	0.016*	2.02	(1.14-3.58)
No	179(78.5)	49(21.5)		Ref	

**level of significance p value<0.05*

Table 6 displays the Univariate logistic regression between the study variables and outcome variables. Univariate analysis showed that risk of having malnutrition is 35 percent less in male than female. Likewise, married were 64 percent less likely to develop malnutrition than unmarried. Being in the age of 60-70 the chances of malnutrition is decreased by 41 percent. Employment status increased the

malnutrition by 1.09 times. Elderly in nuclear family were 37 percent less likely to develop malnutrition. Parents having less than 2 children had 2.73 times more chances of being malnourished. Elderly who consumes alcohol were 1.7 times more likely to be malnourished. Those who smoke had 2 times higher chances of being malnourished.

Table 7 shows that weight loss more than 3 kg a month increased malnutrition by 21 times while loss of weight between 1 to 3 kg increased malnutrition by 4 times compared to no loss of weight. Those who can't walk were 6.57 times more likely to develop malnutrition, those who can sit or able to go out were 4.78 times more likely to develop malnutrition than those who goes out.

Table 7: Association between Nutritional Status and General Health Status

Characteristics	Nutritional status		P value	OR	95% CI
	Normal (%)	Malnourished (%)			
Food intake in recent three months					
Severe decrease in food intake	2(14.3)	12(85.7)	>0.001*	37.5	7.89-178.05
Moderate decrease in food intake	74(65.5)	39(34.5)		3.29	1.84-5.88
No decrease in food intake	150(86.2)	24(13.79)		Ref	
Weight loss in last month					
More than 3kg	4(33.3)	8(66.67)	>0.001*	21.23	5.62-80.12
Don't know	36(52.2)	33(47.8)		9.73	4.64-20.37
Between 1 to 3kg	48(69.6)	21(30.4)		4.64	2.16-9.98
No loss of weight	138 (91.4)	13(8.6)		Ref	
Mobility status					
Bed or chair bound	3(37.5%)	5(62.5)	>0.001*	6.57	1.52-28.37
Able to stand up but can't go out	14(45.2)	7(54.8)		4.78	2.22-10.33
Can go out without help	209(79.8)	53(20.2)		Ref	
Psychological stress					
Yes	63(53.4)	56(46.6)	>0.001*	Ref	
No	163(89.6)	19(10.4)		0.13	0.072-0.238
Takes more than three prescription a day					
Yes	29(74.4)	10(25.6)	0.911	1.04	0.483-2.261
No	197(75.2)	65(24.8)		Ref	
Pressure Sore or skin ulcer					
Yes	9(50)	9(50)	0.016*	3.288	1.254-8.623
No	217(76.7)	66(23.3)		Ref	

**level of significance p value<0.05*

Table 8: Association between Nutritional Status and Dietary Intake

Variable	Nutritional Status		P value	OR	95% CI
	Normal %	Malnourished%			
Full Meal a day					
One meal	2(0.7)	5(1.7)	0.09	9.61	(52.40-1.76)
Two meal	124(41.2)	44(14.6)	0.269	1.36	(2.37-0.78)
Three meal	100(33.2)	26(8.6)	0.027	Ref	

Table 8: Association between Nutritional Status and Dietary Intake (continued)

Variable	Nutritional Status		P value	OR	95% CI
	Normal %	Malnourished%			
Full Meal a day					
Mode of feeding					
Unable to eat without assistance	3	4(1.3)	0.056*	4.41	(20.21-0.96)
Self-fed with difficulty	8	5(1.7)	0.216	2.06	(6.53-0.65)
Self-fed without difficulty	215(71.7)	65(21.7)	0.083	Ref	
Food intake in recent three months					
Severe decrease in food intake	2(7)	12(4)	0.000*	37.5	(7.89-178.05)
Moderate decrease in food intake	74(24.6)	39(13)	0.000*	3.29	(1.84-5.88)
No decrease in food intake	150(49.8)	24(8)		Ref	
Dietary intake more than three prescription a day					
Yes	29(9.6)	10(3.3)	0.911	1.04	(0.48-2.26)
No	197(65.4)	65(21.6)		Ref	

**level of significance p value<0.05*

The elderly who views him/herself as malnourished were 14 times more likely to develop malnutrition than those who view self as having no nutritional problem. Similarly, the elderly who perceive their health status as not good are 17.18 times

more likely to develop malnutrition and person who think that their health is good is 3.19 times more likely to develop malnutrition than those who perceives to have better health. The elderly with no psychological stress were 87% less likely to get malnourished than others. Likewise elderly with pressure sore and skin ulcer were 3.28 times more prone to malnutrition than others.

Table 9: Psychology and Nutritional Status

Characteristics	Nutritional status		P value	OR	95% CI
	Normal (%)	Malnourished (%)			
Self-view of nutritional status					
View self as malnourished	15(28.8.)	37(71.2)		14	(6.93-28.25)
Uncertain about nutrition status	18(81.8)	4(18.2)	0.69	1.26	(0.40-3.95)
Having no nutritional problem	193(85)	34(15)		Ref	
Self-perception of health status					
Not good	66(55)	54(45)	>0.001*	17.18	(5.10-57.77)
Doesn't know	5(55.6)	4(44.4)		16.8	(2.91-96.88)
Good	92(86.8)	14(18.7)		3.19	(0.88-11.58)
Better	63(95.5)	3(4.5)		Ref	

**level of significance P value<0.05*

Table 10: Multiple Logistic Regression Analysis

Characteristics	OR	95% CI	P value
Marital status			*0.022
Married	0.34	0.13-0.85	
Unmarried/Widow	Ref		
Number of children			0.567
2 or less	1.30	0.52-3.29	
More than 2	Ref		
Pressure sore			0.487
Yes	1.78	0.34-9.12	
No	Ref		
Alcohol consumption			0.760
Yes	1.17	0.42-3.27	
No	Ref		
Smoking habit			0.107
Yes	2.34	0.83-6.61	
No	Ref		
Food intake in recent three month			*0.024
No decrease in food intake	Ref		
Severe decrease in food intake	16.30	2.11-125.92	
Moderate decrease in food intake	1.12	0.41-3.05	
Weight loss in recent last month			*0.001
No loss of weight	Ref		
More than 3 Kg	10.71	1.39-82.22	
Don't know	9.74	3.07-30.85	
Between 1 to 3 kg	2.62	0.73-9.28	
Mobility			*0.004
Can go out without help	Ref		
Bed or Chair bound	6.32	0.64 -61.99	
Able to stand up but can't go out	6.75	2.04-22.28	
Comparing health status			*0.029
Not good	11.12	1.55-79.33	
Doesn't know	2.71	0.13-55.96	
Good	3.94	0.52-29.56	
Better	Ref		
Psychological stress			*<0.001
Yes	Ref		
No	0.16	0.06-0.42	

**level of significance p value<0.05*

Association between nutritional status and dietary intake is explained in table 8. The person who takes only one meal a day were 9 times more prone to malnutrition while those who take 2 times meal a day were 1.36 times more prone to malnutrition compared to those who had 3 or meal a day. Those who can't feed themselves were 4.41 times more likely to develop malnutrition while those who could self-fed without difficulty were 2.06 times more prone to malnutrition than those who could self-fed themselves. Severe decrease in food intake increased 37 times tendency to get malnourished while moderate decrease in food intake increased malnutrition by 3 times.

The table number 9 showed a significant relation between malnutrition and self-view of nutritional status (COR=14, 1.26 CI: 6.93-28.25, 0.42-3.95; P<0.001), self-perception about health status (COR=17.18, 16.8, 3.19 CI: 5.1-57.77, 2.91-96, 0.88-11.58; P<0.001). The elderly who views him/herself as malnourished are 14 times more likely to develop malnutrition, while those who are uncertain about their nutritional status are 1.26 times more likely to be malnourished than those who view self as having no nutritional problem. The elderly who perceives their health status as not good are seventeen times more likely to develop malnutrition, while people who don't know about their nutritional status are equally likely to develop nutrition (16.8%), and person who thinks that their health is good is three times more likely to develop malnutrition than others.

Multiple logistic regression analysis was carried out to determine the independent effect of each of the measured variables and to identify most associated factors of nutrition status. Table 10 demonstrates that elderly malnutrition is statistically significant to marital status, food intake in recent three months, mobility, and comparison of health status with other, weight loss, and psychological stress in this study. The table number 12 showed that elderly malnutrition is highly significant among marital status (P=0.022), food intake in recent three month (P=0.024), weight loss (P=0.001), mobility (P=0.004), self-perception of health status (P=0.029), psychological stress (P<0.001) is associated with malnutrition

DISCUSSION

In this study 24.9% elderly were found to be malnourished and 44.9% were at risk of malnutrition while in the study conducted in India, 31.2% was malnourished and 50% were at risk for malnutrition (13) which showed close findings between the studies. Study of Iran showed slightly higher rate of malnutrition (35.4%) and risk of malnutrition (64.6%) (23). Similar high malnutrition status was observed in the study conducted in Brazil (55.6%) Pharping (30%) whereas similar status was seen in Eastern, Nepal (24.8%) (9, 12, 24) Study of Romania (13.6%), Turkey (15%), and Japan (3.1%) showed very low malnutrition rate in comparison to current study (19, 20, 21).

Compared to present study (44.9%), study conducted by Harris showed minimum elderly people (10%) at shelter house were at risk of malnutrition (15).

Majority of the elderly lived in joint family (83.7%) while only 16.5% of elderly lived in nuclear family which is similar to the study conducted at Morang Nepal where majority of the elders (62.2%) lived in joint families and the rest (37.8%) in nuclear families (16).

In this study 24.3% currently smoke while 27.2 currently consume alcohol while similar study at Morang showed that 12.4% reported current smoking and 17.3% current alcohol use which is lower than this study. This might be due to the settlement of high number of ethnic group where smoking and alcohol are culturally accepted.

A similar study conducted in Okharpauwa had shown somewhat similar results in which malnutrition is directly related to loss of appetite (P<0.001), full meal a day (P<0.001), daily fluid intake (P<0.001),, mode of feeding (P=0.004), weight loss in past three months (P<0.001), psychological stress (P<0.001), neuropsychological problem (P<0.001), self-perceived nutritional status (P<0.001), and self-perceived health status (P<0.001) which is similar to the present study in which all these factors are significant in this study too (8).

The psychological stress is also one component identified as a cause for malnutrition in this research. Forty six percent of those with psychological stress have malnutrition while the study conducted at Okharpauwa showed that 56.9 percent with psychological stress has malnutrition which is ten percent higher than this study. This may be due to the change in settings. The Gokarneshwor is a semi urban area where elderly Okharpauwa is a rural area

Malnutrition and unintentional weight loss contribute to progressive decline in health while this increases health care utilization (18). Current study also showed statistical association between nutrition and weight loss (p<0.000).

In present study malnutrition is slightly higher among male than female which is similar to the findings from the study conducted in Morang district of Nepal and also similar to study conducted at Okharpauwa in Nepal however these findings are not significant (8,19).

As per this study, marital status, employment status, number of children, alcohol consumption and smoking were associated with malnutrition which contrasts with similar study conducted at India (1). Likewise similar study conducted in Nepal

concluded that ethnicity, occupation, physical activity, were major factor associated with malnutrition (12).

Among 301 participants, marital status (P=0.022), food intake in recent three month (P=0.024), weight loss (P=0.001), mobility (P=0.004), self-perception of health status (P=0.029), psychological stress (P<0.001) is associated with malnutrition which contrast with similar study conducted at India (1). This may be due to change in setting of study.

Systematic review and Meta analysis study showed risk of malnutrition as 1.64 times higher in single and divorced while malnutrition was significantly high among widow (22). In present study married were 66% less likely to develop malnutrition than unmarried and widow.

This study reflected that the elderly with no psychological stress were 84% less likely to get malnourished than others. Study conducted among dementia patients concluded significant association between dementia and malnutrition status (25).

Risk of having malnutrition was 35 percent less in male than female. This may be due to the fact that woman is less likely to get enough economic freedom during old age. Likewise, married were 66 percent less likely to develop malnutrition than unmarried in present study. Study conducted at Okharpauwa of Nepal showed the prevalence of malnutrition was more among females (29%) than males (18%). Married was one factor identified to be protective against malnutrition in Okharpauwa study which is similar to this study (p<0.000, COR: 0.36) (26).

This study concluded that employed individual had 1.09 times more chance of being malnourished which contrast to the study conducted on Morang Nepal, where unemployed elderly population were at 3.23 times more risk of malnutrition compared to those who were employed.

A study conducted in Syrian Arab Republic showed significant relation between malnutrition and age (27) while current study showed elderly of age of 60-70 had 41 percent decreased chances of malnutrition compared to elderly above 70 years. Study of Turkey showed that malnutrition was directly associated with age (OR=95% CI: 1.007–1.056; p=0.012), BMI (OR=95% CI: 0.702–0.796) (28). This may be due to with age the physiological condition deteriorates and malnutrition occurs.

Present study exemplified parents having less than 2 children had 2.73 times more chances of being malnourished. Study conducted in Turkey suggested a significant difference found in number of children (28).

Findings from Egypt had identified unemployment as a risk factor for malnutrition among the elders which also contrast with present study. The reason for this may be due to change in settings in present study. In current study most of the employed individuals are engaged in farming with less land leading to malnutrition (14).

In some association, cell frequencies were observed to be low and confidence intervals were a bit large which might have affected the relationship.

CONCLUSION

High numbers of elderly were found to be malnourished and many were at risk of malnutrition due to marital status, food intake in recent three months, mobility, and comparison of health status with other, weight loss, and psychological stress in this study.

Nutrition for elderly was a neglected issue in a family, community as well as in the country in pasts. Thus, more intervention is needed that focus on food habit, weight status, mental status, etc. which ultimately provides hint to balance nutritional status.

Promotion of several protective factors should be advocated like marital status, perception of own individual in himself/herself. Malnutrition should be addressed through multidisciplinary approach with emphasis on correct, feasible and quality nutritional advice. Further

research is needed to develop appropriate interventional programs and guidelines for control and prevention of malnutrition among elderly.

Authors' Contribution

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