Prevalence and associated factors of under-nutrition among adult patients admitted to medical wards at public hospitals of Dire Dawa city administration and Harari regional state, Eastern Ethiopia.

Henok Yoseph*, Kedir Teji, Melake Demena

Department of Multidrug-Resistant TB, Dil-Chora Referral Hospital, Dire Dawa, Ethiopia

Received: *27-Jan-2020, Manuscript No. AAJPHN-20-6747;* ***Editor assigned:*** *29-Jan-2020, PreQC No. AAJPHN-20-6747(PQ);* ***Reviewed:*** *12-Feb-2020, QC No. AAJPHN-20-6747;* ***Revised:*** *04-Aug-2022, QI No. AAJPHN-20-6747 (QI); Manuscript No. AAJPHN-20-6747(R);* ***Published:*** *01-Sep-2022, DOI: 10.35841/aajphn-5.4.123*

Abstract

Background: Malnutrition in hospitalized patients is a common public health problem that often under diagnosed and undertreated in hospital setting. However, there is no study conducted in Dire Dawa city administration and Harari regional state on prevalence of under nutrition among medical inpatients. Therefore, this study aimed to determine the prevalence and associated factors of under nutrition among adult patients admitted to medical wards at public hospitals in the area.

Objective: To assess prevalence and associated factors of under nutrition among adult patients admitted to medical wards at public hospitals of Dire Dawa city administration and Harari regional state from April 20/2019- June 20/ 2019.

Methods: A hospital based cross-sectional quantitative study was conducted using systematic random sampling technique with in the sample of 400 medical inpatients from four public hospitals of Dire Dawa and Harar regional state. Data was collected by anthropometric and face-to-face interview methods from each sampled patients. All analysis was done using SPSS version 24 and the variables which had significant association were identified on the basis of p-value ≤ 0.05, AOR and with 95% CI.

Result: Prevalence of under nutrition among medically admitted patients was 50.4%. Eighty seven percent of patients were admitted and left the hospital undiagnosed to malnutrition. Age group of 40-49 years {AOR=2.17, 95% CI (1.010, 4.70), age of more than 50 years {AOR=4.93, 95% CI (2.288, 10.65)}, being illiterate {AOR=2.36, 95% CI (1.32, 4.22)}, being diagnosed with TB {AOR=2.75, 95% CI (1.248, 6.081), length of hospital stay >7 days {AOR=2.24, 95% CI (1.31, 3.83)} and having gastro-intestinal symptoms {AOR=2.54, 95% CI (1.455, 4.436)} were found to be statistically significant and independent predictors of under-nutrition.

Conclusion: This study revealed high prevalence of under-nutrition among medical inpatients in the study area. Recognizing the burden of under-nutrition among hospital inpatients and screening who are at risk of malnutrition should be all health facility and health professional concern.

Keywords: Under-nutrition, Adult admitted patient, Associated factors, Dire Dawa and harare.

Introduction

Malnutrition in hospital setting described as "the skeleton in the hospital closet" by Butterworth in 1974. Forty-five years later, it remains as the major problem among hospitalized patients different studies around the world estimated that 15% to 78% of hospitalized patients are malnourished. In developed countries, one in three patients is malnourished upon hospital admission. If left untreated, two in three of those patients will experience a further decline in their nutritional status during hospital stays. Even if information on prevalence of malnutrition and associated factors among hospitalized adult patients are grossly lacking in Africa. Few published literature shows that 19%-72% of adult hospitalized patents are under nutrition at risk of malnutrition. In Ethiopia, one study shows that the prevalence of adult malnutrition among hospitalized patients were 55.6% [1].

The prevalence of under nutrition varies between different studies due to the heterogeneous nature of different study participants, socio-economic status, sample size as well as types of institutions. Furthermore, lack of a single and standardized approach regarding the diagnosis and documentation of malnutrition; as well as the controversies on the formal definition of malnutrition had created confusion and uncertainty among healthcare staffs. In addition, the subjective nature of existed definition left many patients at risk for malnutrition which are often underdiagnosed and undertreated [2].

Despite the evidence that poor nutritional status is being associated with higher risk of complications, increased morbidity and mortality, prolonged hospital stay and increased hospitalization costs, there is poor routine nutrition screening, assessment and intervention practices as the part of medical care. Moreover, it has been reported that malnutrition remains

undiagnosed in up to 70% of hospital inpatients and has often underestimated and overlooked [3].

Malnutrition in hospital inpatients is a documented and reported problem in developed nation and limited literatures have been found in developing country especially in sub-Saharan African. Even though hospitalized patients are more prone to malnutrition, clinical nutrition and nutritional assessment are often neglected components of the health service practice [4]. Similarly, in Ethiopia, little is known about nutritional status of adult hospitalized patients, especially among medical inpatient, as most of the nutritional surveys reflected nutrition is conducted in children and specific population group in context of HIV/AIDS, Kala-azar and TB. Only in one study done in Ethiopia reported that more than half of hospitalized adult patients were found to be malnourished (55.6%). Similar to other Ethiopian region Dire Dawa and Harar hospitals did not have standardized screening tools for general admitted adult's population in public health facilities [5]. What is more, little is known about the magnitude of the problem in these settings and there is no locally generated data about possible associated factors in the locality of the study area. This study will be important to reveal the prevalence of under nutrition and the possible risk factors among medically admitted patients [6].

Materials and Methods

Study area

The study was conducted in four public hospitals from Dire Dawa city administration and Harari regional state namely Dilchora referral hospital, Sabian primery hospital, Hiwot fana referral hospital and Jegula hospital [7]. Dire Dawa is located in the eastern part of Ethiopia which is 515 Km away from Addis Ababa and it lies with a latitude and longitude of 9º36'N 41º52'E. The administration has nine urban and thirty eight rural kebeles [8]. Currently the Administration has two governmental and three private hospitals, sixteen health centers and thirty four health posts comprising more than 700 health professionals of different disciplines [9]. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Dire Dawa has a total population of 342,827, of whom 171,930 were men and 170,897 women; 232,854 or 69.92% of the population are considered urban inhabitants, with an estimated area of 1,231.20 square kilometers [10]. Harari regional state is one of the nine regional states of Ethiopia located 526 Kms east of Addis Ababa. The Harari regional state has 36 kebeles, 19 urban and 17 rural Kebele [11]. According to 2009 figures of the central statistical agency of Ethiopia, Harari regional state has an estimated total population of 209,000 which consists of 107,000 men and 102,000 women. About 37.3% of the populations are estimated to be rural residents. There are four governmental hospitals, two private hospitals and eight health centers in the region [12].

Study design and study period

A hospital based cross-sectional study was conducted to assess prevalence and associated factors of under nutrition among adult patients admitted to medical wards at public hospitals of Dire Dawa city administration and Harari regional state from April 20/2019- June 20/2019 [13].

Sample size determination

For the first specific objective: To determine the required sample size, a single population proportion formula was used based on the following assumptions: 5% expected margin of error, 95% confidence interval and P=prevalence of adult hospital malnutrition (55.6%) from study conducted in other area in Ethiopia [14].

$$n = \frac{(Z\alpha/2)^2 * p * (1-p)}{(d)^2}$$

Where, n=the total sample size required
d=marginal error

Zα/2=critical value =1.96

q = 1-0.556= 0.444

$$n = \frac{(1.96)^2 * 0.556 * (0.444)}{(0.05)^2} = 379$$

Non-response rate of 10% (379)=38

Total sample size required for the study is 38 + 379= 417

For the specific objective two: double population formula was used, sample size and power for cross sectional study was calculated using Epi-info version 7.1.0.6; taking confidence interval (confidence level or 1-α)=95%; power (1-β)=80%; ratio (unexposed to exposed)=1:1; taking proportion of Weight loss <3 months and HIV co-infection in unexposed individuals 37.5% and 5.4%, respectively and odd ratio closest to 1=2.1 and 3.4. Accordingly, the calculated sample size was 234 and 250. Adding 10% contingency for non-response rate, the final sample size was 244 and 260, respectively. The final sample size for second objective was lower than the previous one, so 417 were finally taken [15].

Sampling procedure/technique

First, four public hospitals, two from Dire Dawa city administration (namely Dil-Chora referral hospital and Sabian primary hospital) and two from Harar (namely Hiwot fana and Jegula hospital) were included in the study. Finally, systematic random sampling technique was used to select study subjects from their admission registration book during the study period. The sampling interval (k) was obtained by dividing the source population (N) to the total sample size of the study (n); i.e. k=N/n; k= 618/417; k=1.48 ~ 2. Lottery method was used to select the first kth individual from the registration and subsequently every other patient was included until the final sample size [16].

Data collection methods

A face to face interview of the study participants using pre-tested structured questionnaires were employed to collect

primary data. The questionnaire was adapted from previous similar studies and it was further modified based on the specific objectives of this study. The questionnaire was translated first into the local language and back translated to English to ensure its consistency. Four medical intern doctors were assigned as an interviewer. After written consents obtained from the participants, relevant information was collected from April 20 to June 20/2019 [17].

Data collection tool

Socio demographic, disease related factors and dietary intake were collected through interviewer guided questionnaires and other relevant secondary data such as, diagnosis of patient, comorbidity and length of hospital stay was extracted by reviewing patients' medical card. Furthermore the dietary intake of the participants was assessed by FAO standardized individual dietary diversity tool and WFP Food consumption scores. The weight of participants was taken using standard beam balance and the scale will be checked at zero before and after each measurement. Participants' weight was measured after removing heavy clothes and recorded to the nearest 0.1 kg. Height measurement of participants was taken using the standard stadiometer and height was recorded to the nearest 0.1 cm. To determine under nutrition status, BMI was calculated. The standard cut-offs used: <18.5 kg/m^2 was under nourished [18].

Data quality control

The principal investigator was given three days training for the data collectors. During the training the aim of the study was briefly explained and the contents of the questionnaire and data collection techniques were also clearly explained. Intra and inter observer Technical Error of Measurement (TEM) for weight and height was calculated and TEM was in the acceptable range. Data collection tool and technique was pre-tested on 5% of the study participants before the start of actual data collection. The principal investigators were performing the supervision of data collection procedures on daily basis and onsite assistance was also given to data collectors. The collected data was submitted on daily basis, checked for completeness at the end of data collection day. Double data entry was carried out by two data clerks [19].

Data processing and analysis

All the collected data was coded entered and cleaned using Epi-Data version 3.02. Statistical analysis was conducted using SPSS version 24. Body mass index was used to categorize patients as normal and malnourished. Descriptive statics such as frequency, percentage and cross tabulation as well as logistic regression was used to present the finding. Bivariate analysis were used to select candidate variables for multivariate analysis ($p<0.25$).Variables found to have association was entered into multiple logistic regression models for controlling the possible effect of confounders and finally the variables which had significant association was identified on the basis of OR, with 95% CI and P-value <0.05 [20].

Ethical considerations

Institutional ethical clearance was first sought from Haramaya University, collage of Health and Medical Science office of the Institutional Health Research Ethics Review Committee (IHRERC). Data was collected after informed, voluntary, written and signed consent from head of institution and participants. Letter of permission were further sought from Dire Dawa and hareri Regional Health Bureau. During data collection each participant was informed about the aim of the study and confidentiality of the information was maintained throughout the study. Participants was informed that they have full right to refuse or discontinue participating in the research [21]

Results

Socio-demographic characteristics of study participants

A total of 400 patients among four public hospitals of Dire Dawa administration and Harari regional state were included in the study with response rate of 96%. The mean age of the study participants was 36 years (36 ± 14 SD) [22]. Majority of the participants were found with in age group of 15 yrs 29 yrs and 30-39 years which account 142 (35.5%) and 126 (31.5%), respectively. About 196 (49%) of the study participants were female. Considering marital status of the respondents, most of respondents 227 (56.8%) were married and only 29 (7.3%) widowed. Concerning educational status of the study participants, 173 (43.3%) were unable to write and read and only 49 (12.3%) attend college and above. About 204 (51%) of the study participants were from urban area, 112 (28%) and 105 (26.3%) were farmers and housewife, respectively. One hundred sixty two (40.5%) of the study participants had no monthly income and 263(65.8%) of the participants were live in the family size of 5 (Table 1) [23].

Table 1. Socio demographic characteristics of hospital inpatients at public hospitals of Dire Dawa and Harari regional state, Eastern Ethiopia (n= 400), 2019.

Variables	Frequency	Percentage
Age in years 18-29 years	142	35.5
30-39 years	126	31.5
40-49 years	59	14.8
>50 years	73	18.3
Gender		
Male	204	51

Female	196	49
Marital status		
Single	106	26.5
Married	227	56.8
Divorce/separated	38	9.5
Widowed	29	7.3
Ethnicity oromo	273	68.3
Amara	74	18.5
Harari	7	1.8
Somalie	25	6.3
Guragie	11	2.8
Tigre	5	1.3
Others	5	1.3
Religion orthodox christian	96	24
Muslim	267	66.8
Protestant	32	8
Catholic	5	1.3
Education status unable to read and write	173	43.3
Read and write only	50	12.5
Primary school (1-8 grade)	64	16
Junior secondary school	38	9.5
Preparatory school	26	6.5
Collage and above	49	12.3
Residence urban	204	51
Rural	196	49
Occupation Farmer	112	28
Private organization	31	7.8
Government employee	39	9.8
NGO employee	3	0.8
Businessman/women	18	4.5
Daily laborer	24	6
Unemployed	37	9.3
Student	31	7.8
Housewife	105	26.3
Do you have monthly income? Yes	162	40.5
No	238	59.5
If “yes” what is your average monthly income? < 2000 ET birr	58	36
2000-4000 ET birr	75	46.6
>4000 ET birr	28	17.4
Household members <5 member	263	65.8
≥ 5 members	137	34.3

Prevalence of under nutrition

As indicated in (figure-1) below the prevalence of under-nutrition in the study were 201 (50.4%) of the study participants [24].

Figure 1: The percentage of patients who repatriated from UNISFAII hospital to AFRTH from June, 2011to August 2020. Note: Undernourished, 50,40%, Normal, 49.60%.

Clinical and health related characteristics of the study participants

The mean duration of hospital stay in this study was 6 days (6 days ± 4 SD). As displaced in the below, majority 81 (20.3%) and 80 (20%) of patients were primarily admitted with cardiovascular disease and gastroenterology problem, while 70 (17.5%) and 56 (14%) of the study participants were admitted for respiratory disease (mainly pneumonia, asthma, COPD) and tuberculosis (disseminated) respectively. Regarding comorbid condition of the study participants more than three-fourth 312 (78%) of the study subject had at least one form of comorbidity. the most common comorbid condition were secondary infection 120 (30%), followed by HIV co-infection 38 (9.5%), Peripheral vascular disease 37 (9.3%), Anemia 32 (8%) and 20 (5%) had Diabetes mellitus (Table 2) [25].

Table 2. *Clinical characteristics of the study participants at public hospitals of eastern Ethiopia (n=400).*

Variables	Frequency	Percentage%
Duration of hospital stay(days)	Mean =6 days (6 ± 4 SD)	
Primary diagnosis reason for admission		
Cardiology	81	20.3
Gastroenterology	80	20
Respiratory	70	17.5
Nephrology	33	8.3
Tuberculosis	56	14
HIV/AIDS	10	2.5
Endocrine/Diabetes	34	8.5
Infection/AFI	11	2.8
Anemia	22	5.5
Malignancy	3	0.8
Comorbid(condition concurrent on admission)		
None	88	22
Cardiac problem	18	4.5
Peripheral vascular disease	37	9.3
Anemia	32	8
Chronic liver disease	25	6.3
Chronic kidney disease	10	2.5
HIV	38	9.5
Diabetes	20	5
Tuberculosis	12	3
Infection	120	30
Hospital admission condition?		
Scheduled	63	15.8
Emergency	337	84.3
Previous ICU admission during hospital stays?		
Yes	61	15.3
No	339	84.8
Number of oral medication taking in hospital?		
None	60	15
1-2 oral medication	247	61.8
3-5 oral medication	89	22.3
More than 5 oral medication	4	1

Considering the presence of gastrointestinal symptoms, around three-fourth 296 (74%) of the study participants had experienced gastrointestinal symptoms with in the previous one to two weeks. Regarding functional status of the respondents majority 331 (81.3%) of the study participants were able to walk without help. concerning history of previous admission nearly one-third 125 (31.2%) of the study participants were at least once admitted in hospital with in the last year and 265 (68.8%) were not previously admitted. On the other hands, one hundred twenty one (30.3%) of the study participants were at least taking 1-2 medication prior to hospital admission and few 3 (0.3%) were poly-pharmacy (taking >5 medication).

Respondent's significant weight loss was determined by whether clothes or jewellery had become looser fitting or by calculating the actual percentage weight loss.

In this study more than half 232 (58.1%) of the study participants had reported unintentional weight loss with in the last 3 months. Out of the 194 (49.5%) of the study subjects who remember their usual body weight 114 (58.8%) of the study participants had percentage of weight loss ≥ 5% in the last 3 month. (Table 3) [26]

Table 3. *Clinical and health related characteristics of the study participants among patients admitted in medical wards of eastern Ethopia (n=400).*

Variables	Frequency	Percentage%
Presence of gastrointestinal symptoms		
Yes	296	74
No	104	26
Are you able to walk without help?		
Yes	331	82.8
No	69	17.3
Admission status in the last 12 months?		
No previous admission	275	0.688
Pervious admission	125	0.312
Number of Pervious admission(mean ± SD)	Mean=1.3 ± 0.4 SD	
Number of drugs taken prior to hospitalization?		
None	254	63.7
1-2 medication	121	30.3
3-5 medication	21	5.3
More than 5 medication	3	0.8
Usual weight in kilogram with in the last 3 months?		
Remember	194	48.5

Not remember	206	51.5
PWL in the last 3 month		
PWL<5%	80	0.412
PWL ≥ 5%	114	58.8
Have you lost weight with in the last 3 months?		
Yes, intentionally	6	1.5
Yes, unintentionally	232	58.1
No, my weight stayed the same	132	33.1
No, I gained weight	29	7.3

Organizational and nutritional characteristics of the study participants

Regarding anthropometric evaluation of the study participants at admission only 54 (13%) of the participants were measure their weight and height at admission. As indicated below, majority 87% of patients were admitted and left the hospital without diagnosis of malnutrition. Similarly few 25 (6.3%) of the study participants were diagnosed with malnutrition during their hospital stays. Concerning nutritional support and counseling in the hospital, majority 268 (58%) of the study subject were taking hospital food regularly and few 137 (34.3%) of the study participants were informed about their nutritional status [27]. On the other hands more than one-third 145 (36.3%) of the respondents were informed about their nutrition care option. From the total study participants, 123 (30.8%) were received hospital special nutrition care. Regarding type of nutrition care they received, majority 67(16.8%) were on salt free diet, 34 (8.5%) were on diabetic diet and 21(5.3%) were provide protein energy supplement (RUFF) during their hospital stays.

Considering dietary intake change of the study participants more than half 227 (56.9%) of the study subject had dietary intake change before hospital admission. Out of which majority 143 (63%) had dietary intake change that last more than 2 weeks and 84 (37%) had less than 2 weeks. The most common dietary intake change from the usual before admission were suboptimal liquid diet 113 (49.8%) followed by full liquid diet 49 (21.6%) and starvation 41 (18.1%) of the study subject.

Regarding the level of satisfaction with the food at the hospital, majority 124 (31.1%) of the study subject reported that they were satisfied with the hospital food, 112 (28.1%) were neutral and 112 (28.1%) were dissatisfied by the food that provide by the hospital. Concerning food intake change after hospital admission more than one -third 156 (39.1%) of the study participants were increased in appetite and food intake, 157 (39.3%) were stayed the same and 86 (21.6%) were reported decreased food intake after hospital admission (Table 4) [28].

Table 4. *Clinical and health related characteristics of the study participants among patients admitted in medical wards of eastern Ethiopia (n=400).*

Variables	**Frequency**	**Percentage%**
Is your weight and height was taken at admission?		
Yes	52	13
No	347	87
Was the patient identified as malnourished?		
Yes	25	6.3
No	374	93.7
Are you taking regular hospital food?		
Yes	232	58.1
No	167	41.9
Are you informed about your nutritional status?		
Yes	137	34.3
No	262	65.7
Are you were informed about the nutrition care option?		
Yes	145	36.3
No	254	63.7
Are you received special nutrition care?		
Yes	123	30.8
No	276	69.2
If yes, what types of nutritional care do you received?		

Diabetic diet	34	8.5
Salt free diet/hypertension	67	16.8
Protein energy supplements (plummy nut)	21	5.3
Others	1	0.3
Dietary intake change from the usual before admission?		
Change	227	56.9
No change	172	43.1
Duration of change in weeks?		
<2 weeks	84	37
≥ 2 weeks	143	63
Type of change		
Suboptimal liquid diet	113	49.8
Full liquid diet	49	21.6
Hypo caloric liquid diet	24	10.6
Starvation	41	18.1
How satisfied are you with the food at the hospital?		
Very satisfied	36	9
Somewhat satisfied	124	31.1
Neutral	112	28.1
Dissatisfied	112	28.1
Very dissatisfied	15	3.8
Food intake change since hospital admission?		
Increased	156	39.1
Decreased	86	21.6
Stayed the same	157	39.3

Dietary characteristics of study participants

Individual dietary diversity score: Dietary diversity of the respondents assessed using modified FAO guidelines for measuring household and individual dietary diversity questionnaire. The questions specifically covered food consumed both from hospital or home during the past 24 hour's period. The mean (SD) dietary diversity score in the study group was 5.8 (5.8 ± 1.6). In this study more than half 238 (59.6%) of patients were consumed diversified food (IDDS>5.8) while one hundred sixty one (40.4%) of patients had scored less than 5.8 (not consumed diversified food).

Food consumption score

Food consumption scores of the study participants was calculated using the frequency of consumption of different food groups consumed by the individual 7 days before admission and each food group will be multiplied by a specific weight. As shown in table-below majority, one hundred seventy five (43.9%) of the study participants had "borderline" food consumption score, 135 (33.8%) had "acceptable" and few 89 (22.3%) of the study participants had "poor" food consumption score. Furthermore about two third 264 (66.2%) of the study participants were food insecure before hospital admission (Table 5) [29].

Table 5. *Individual dietary diversity measurements, Food consumption score and food security status of hospitalized patients at public hospitals of eastern Ethiopia (n=400).*

Variables	Frequency	Percentage%
IDDS		
IDDS(not consumed diversified food) <5.8	161	40.4
IDDS(consumed diversified food) ≥ 5.8	238	59.6
Food consumption group		
Poor	89	22.3
Boarder-line	175	43.9
Acceptable	135	33.8
Food security status		
Food secure	135	33.8
Food insecure	264	66.2

Bivariate and multivariate analysis

On bivariate analysis of the dependent and independent variables, patients' age, residence, educational status, family size, HIV co-infection, diagnosed TB, length of hospital stays, gastro-intestinal symptoms, history of hospital admission, weight and height evaluation at admission and individual dietary diversity score showed significant association with malnutrition ($p \leq 0.05$). When these variables are adjusted on multivariate analysis, age group of 40 yrs-49 yrs and >50 years, being illiterate, having gastrointestinal disturbance, diagnosed with TB and longer time of hospital stay were found to be independent predictors of under-nutrition among patients admitted in medical ward of the study area.

Accordingly, patients with age groups of 40-49 {AOR=2.17, 95% CI (1.010, 4.70), p-value (0.047)} and ≥ 50 years {AOR=4.93, 95% CI (2.288, 10.65), p-value (0.000)} were 2.1 times and 4.9 times more likely to be undernourished compared to patients 18-29 years old. Similarly, patients who are illiterate were 2.3 times more likely to be undernourished than patients who are literate {AOR=2.36, 95% CI (1.32, 4.22), p-value (0.004)}. Likewise, patients diagnosed with TB had 2.7 higher risk of under-nutrition than those without TB {AOR=2.75, 95% CI (1.248, 6.081), p-value (0.012)}. Hospitalized patients who stayed for more than 7 days were 2.2 times more likely to be undernourished [AOR=3.4; 95%CI=2.173-5.20; p<0.0001)] as compared to those stayed for <7days. Patients with gastro-intestinal symptoms had 2.5 times more likely to be undernourished than those without gastro-intestinal symptoms AOR=2.54, 95% CI (1.455, 4.436), p-value (0.001) (Table 6) [30].

Table 6. *Bivariate and multivariate analysis of factors associated with under nutrition among patient admitted in medical ward, at public hospitals of eastern Ethiopia (n=400).*

Variables	Under-nutrition		COR (95%CI)	AOR(95%CI)	P-value
	Yes	No			
	Age				
18-29 years	70 (49.6%)	71 (50.4%)	1		
30-39 years	74 (58.7%)	52 (41.3%)	0.69 (.427, 1.125)	1.42 (.765, 2.633)	0.267
40-49 years	33 (55.9%)	26 (44.1%)	0.78 (.422 , 1.431)	2.17 (1.010, 4.70)	0.047
>50 years	24 (32.9%)	49 (67.1%)	2.01 (1.116 , 3.629)	4.93 (2.288, 10.65)	0
	Residence				
Rural	120 (61.5%)	75 (38.5%)	2.43 (1.625 , 3.633)	2.01 (.114, 3.555)	0.06
Urban	81 (39.7%)	123 (60.3%)	1		
	Educational status				
Illiterate	111 (64.2%)	62 (35.8%)	2.71 (1.797 , 4.074)	2.36 (1.32, 4.22)	0.004
Literate	90 (39.8%)	136 (60.2%)	1		
	Family size				
>5	80 (58.8%)	56 (41.2%)	1.68 (1.103, 2.549)	1.36 (.793, 2.35)	0.262
≤ 5	121 (46.0%)	142 (54.0%)	1		
	HIV co infection				
Yes	36 (75.0%)	12 (25.0%)	3.38 (1.703, 6.716)	2.20 (.936, 5.627)	0.069
No	165 (47.0%)	186 (53.0%)	1		
	TB diagnosis				
Yes	57 (83.8%)	11 (16.2%)	6.71 (3.406, 13.297)	2.75 (1.248, 6.081)	0.012
No	144 (43.5%)	187 (56.5%)	1		
Length of hospital stay					
≥ 7 days	97 (69.3%)	43 (30.7%)	3.42 (2.173, 5.203)	2.24 (1.31, 3.83)	0.003
<7 days	104 (40.2%)	155 (59.8%)	1		
	Gastro-intestinal symptoms				
Yes	172 (58.1%)	124 (41.9%)	3.54 (2.174, 5.763)	2.54 (1.455, 4.436)	0.001
No	29 (28.2%)	74 (71.8%)			
Hx of hospital admission					

Yes	76 (61.3%)	48 (38.7%)	1.93 (1.23, 2.928)	2.34 (.312, 4.189)	0.054
No	125 (45.5%)	150 (54.5%)	1		
Weight/height measurement at admission					
Yes	42 (80.8%)	10 (19.2%)	4.96 (2.414, 10.215)	2.48 (1.00, 6.147)	0.05
No	159 (45.8%)	188 (54.2%)	1		
Individual dietary diversity score					
Diversified	104 (43.7%)	134 (56.3%)	0.51 (0.341,0.769)	0.78 (.475, 1.282)	0.328
Not diversified	97 (60.2%)	64 (39.8%)	1		

Discussion

The finding of this study indicated that the prevalence of under-nutrition among medically admitted adult patients was 50.4%. Furthermore, age group of 40 yrs-49 yrs and >50 years, being illiterate, having gastrointestinal disturbance, diagnosed with TB and longer time of hospital stay found to be independent predictors of under-nutrition among patients admitted in medical ward of the study area [31].

The current prevalence observed in this study is comparable with the study conducted in Ethiopia 55.6% and other countries such as Spain 47.3%, Iran 40% and in Egypt 50.6%. However, it was higher compared with study carried out in Cameron 19.34%, in China 29.6% and in Korea 22.0%. The observed discrepancies might be due to the hetrogenousity nature of study participants, different socio-economic status, geographical variation and different criteria used for diagnosis of malnutrition [32].

In order to improve clinical outcomes, screening patients for malnutrition on admission to the hospital is now a standard of care but is neglected among medical field and some health professionals seldom assess the nutritional status of hospitalized patients. This study revealed that 87% of patients were admitted but left the hospital undiagnosed for malnutrition (without measured their weight and height) and this was similar with other study findings where 70% of hospital patients were undiagnosed to malnutrition.

Hospital malnutrition has multifactorial causes and frequently associated with negative clinical and economic outcomes. Thus, it important to identify factors that possibly contributes to under-nutrition in hospital setting. This study revealed that age of the patients was significantly associated with under-nutrition. Accordingly, patients who found in age groups of 40-49 and older patients whose age ≥ 50 years were 2.1 times and 4.9 times more likely to be undernourished compared to patients 18 yrs-29 yrs old [95% CI (1.010, 4.70)] and [95% CI (2.288, 10.65)] respectively. This finding is in agreement with other studies conducted in Spain [OR= 2.10; CI 95% 1.19-3.93 p=(0.011)], Korea [AOR= 2.4, 95% CI, 1.01-4.56; p=(0.05)] and Brasil [OR=2.24; 95% CI=1.2-4.16; p<0.0105)]. This could be because people in older age will experience physiolog -ical and metabolic changes that can affect their nutritional status.

Change in gastro-intestinal tract, decreased smell and tastes, reduced hunger and early satiety were some of the conditions that lead to reduced dietary intake. In addition, hospitalized elderly patients have higher chance of being under-nutrition due to their catabolic state, decreased immune system and manifestations of other underling disease. These factors can increase the nutritional requirements of an individuals and consumption of the nutritional reserves which ultimately leads to under-nutrition [33].

In this study gastrointestinal symptoms was reported by 85% of undernourished patients and they had 2.5 times more likely to be undernourished than those without gastrointestinal symptoms did [95%CI (1.455, 4.436)]. This finding is in agreement with similar studies that reported significant association of under-nutrition with GI symptoms [AOR=13.28; 95% CI=3.86-45.68] [AOR=2.16, 95% CI (1.31, 3.58)]. The justification could be the fact that patients who had gastrointestinal disturbance will have impaired function of stomach and intestine that often leads to diarrhea, vomiting and loss of appetite; which in turn result in reduced food intake, malabsorption and increased risk of nutrient loss. Furthermore, increased metabolic demand by underlying illness and interference in nutritional intake by GID can lead to under-nutrition among hospitalized patients.

Another factor found to be associated with hospital under-nutrition in the current study is educational level. Consequently, patients who are illiterate were 2.3 times more likely to be undernourished than patients who are literate [95% CI (1.32, 4.22)]. This finding is also supported by similar study conducted in Amhara regional state where illiterate patients were 2.0 times more likely to be malnourished as compared to literates [AOR 2.046, 95% CI (1.261, 3.321)] The possible explanation could be those who had formal education (literate) may have better awareness about their health, better health seeking behaviors and more likely to inclined to balanced diet as compared to patients who are illiterate[34].

The mean hospital stay in this study was slightly higher among patients with under-nutrition (7 ± 4.3 days) *Vs*. (5 ± 3.1 days) as compared to non-malnourished group. Consequently, hospitalized patients who stayed for more than 7 days were 2.2 times more likely to be undernourished [95% CI (1.31, 3.83)] as compared to well-nourished individuals. The possible

explanation for the observed association might be that most admitted patients were taking only hospital served foods regularly and one third of them responded never received special nutritional care since they had admitted. Therefore, staying for longer without getting special nutritional care likely put them into under-nutrition. Likewise, patients diagnosed with TB were 2.7 times more likely to be undernourished than those without TB [95% CI (1.248, 6.081)]. This can be justified by the fact that most chronic diseases including TB likely put an individual to under-nutrition as evidenced by weight loss being the symptom complex of TB, which in turn leads to under-nutrition.

Although the present study revealed that 40% of patients scored below the mean <5.8 (consumed not diversified food) and 66.8% were food unsecured, both individual dietary diversity score and food insecurity were not significantly associated with under nutrition when adjusted on multivariate analysis. This might be due to possible effect of recall bias and/or social desirability bias that may have encountered while assessing the food consumption score one week before admission and individual dietary diversity that affect the nutritional status of hospitalized patients [35].

Conclusion

The prevalence of under-nutrition among medically admitted patients is comparably higher in public hospitals of eastern Ethiopia. Under-nutrition was over-looked by most of the heath care workers as evidenced by the small percentage of patient diagnosed with malnutrition. Being older age, unable to read and write, having gastrointestinal disturbance, diagnosed with TB, and longtime of hospital stay were found to be independent predictors of under-nutrition among patients admitted in medical ward of the study area.

Recommendation

For HCW

HCW should make early screening of patients who are at risk of under-nutrition, thereby strengthening and providing early diagnosis and timely intervention to their patients.

Asking symptoms of gastrointestinal disturbance, advanced age, educational status and TB co-morbidity at admission should be considered while screening and counseling patients in the study area

For health facility

Since the prevalence of hospital admitted adult under-nutrition was higher in this study area, hospital managers should establish a strong hospital nutritional steering committee and multidisciplinary nutritional support teams who will follow and evaluate nutritional supports provided by the hospital in daily clinical practice.

For FMoH

Since comparably higher prevalence of malnutrition in hospitalized patients was noticed in some parts of the country, it is therefore mandatory to recommends FMOH to avail appropriate nutritional screening tool for hospital use and attention should be given to clinical malnutrition so as to develop nutritional support plan in order to improve outcome of medically admitted patients

Acknowledgement

The authors are grateful to the study participants, data collectors and health facility authorities.

Authors' Contributions

HY was major contributor designed the study, participated in the data collection, analysis, interpretation and write-up and drafted the manuscript. KT and MD participated in the study and supervised the development of this paper from the beginning up to the end. All authors read and approved the final manuscript

Conflict of Interest

All authors declare no conflict of interest.

References

1. Alzahrani SH, Alamri SH. Prevalence of malnutrition and associated factors among hospitalized elderly patients in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. Geriatrics. 2017;17(1):1-7.
2. Amaral TF, Matos LC, Teixeira MA, et al. Undernutrition and associated factors among hospitalized patients. Clin Nutrition. 2010;29(5):580-5.
3. Badr S. Hospital Readmission, Malnutrition and Associated Factors among Elderly Hospitalized Patients in Internal Medicine Wards, Menoufia University Hospitals. Egyptian J Com Med. 2017;35(1).
4. Cederholm T, Bosaeus I, Barazzoni R, et al. Diagnostic criteria for malnutrition–an ESPEN consensus statement. Clin Nutr. 2015;34(3):335-40.
5. Statistical C. Population and housing census of ethiopia administrative report Central Statistical Authority Addis Ababa. 2012.
6. Correia MI, Perman MI, Waitzberg DL. Hospital malnutrition in Latin America: A systematic review. Clin nutrition. 2017;36(4):958-67.
7. Dominguez RJ. Burden of malnutrition in a tertiary care hospital in Baguio City. Sage Open. 2013;3(3): 2158244013504936.
8. Fragas RF, Oliveira MC. Risk factors associated with malnutrition in hospitalized patients. Revista de Nutrição. 2016;29:329-36.

9. Haile A, Tesfaye MH. Prevalence and associated factors of malnutrition among adult hospitalized patients at Amhara National Regional State Referral Hospitals, Ethiopia.
10. Harith S, Shahar S, Yusoff NA, et al. The magnitude of malnutrition among hospitalized elderly patients in university Malaya medical centre. Health Environ J. 2010;1(2):64-72.
11. Isaura ER, Chen YC, Yang SH. Pathways from food consumption score to cardiovascular disease: A seven-year follow-up study of indonesian adults. Int J Envi Res Pub Health. 2018;15(8):1567.
12. Jacobsen EL, Brovold T, Bergland A, et al. Prevalence of factors associated with malnutrition among acute geriatric patients in Norway: A cross-sectional study. 2016;6(9):e011512.
13. Jeejeebhoy KN, Keller H, Gramlich L, et al. Nutritional assessment: comparison of clinical assessment and objective variables for the prediction of length of hospital stay and readmission. Am J Clin Nutrition. 2015;101(5): 956-65.
14. Olivares J, Ayala L, Salas-Salvadó J, et al. Assessment of risk factors and test performance on malnutrition prevalence at admission using four different screening tools. Nutricion Hospitalaria. 2014;29(3):674-80.
15. Kang MC, Kim JH, Ryu SW, et al. Prevalence of malnutrition in hospitalized patients: a multicenter cross-sectional study. J Korean Med Sci. 2018;33(2).
16. Kennedy G, Ballard T, Dop MC. Guidelines for measuring household and individual dietary diversity. Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations. Accessed on 2016. 2011.
17. Lee HK, Choi HS, Son EJ, et al. Analysis of the prevalence and risk factors of malnutrition among hospitalized patients in Busan. Preventive nutrition and food science. 2013;18(2):117.
18. Luma HN, Eloumou SA, Mboligong FN, et al. Malnutrition in patients admitted to the medical wards of the Douala General Hospital: A cross-sectional study. Res Notes. 2017;10(1):1-6.
19. Morris N, Stewart S, Riley M, et al. Differential impact of malnutrition on health outcomes among indigenous and non-indigenous adults admitted to hospital in regional australia-A prospective cohort study. Nutrients. 2018;10(5): 644.
20. Morris NF, Stewart S, Riley MD, et al. The burden and nature of malnutrition among patients in regional hospital settings: A cross-sectional survey. Clin Nutrition ESPEN. 2018;23:1-9.
21. Mulu H, Hamza L, Alemseged F. Prevalence of malnutrition and associated factors among hospitalized patients with acquired immunodeficiency syndrome in Jimma University Specialized Hospital, Ethiopia. Ethiopian J Health Sci. 2016;26:217-26.
22. Smith S, Chamblee TB, Falder-Saeed K, et al. Malnutrition in hospitalized adult patients. National Association of Clinical Nurse Specialists (NACNS). 2017.
23. Nigatie A, Belay W, Nega G. Nutritional Status and Associated Factors among Adult Chronic Osteomyelitis Patients in Felege Hiwot Referral Hospital, Bahir Dar, North West Ethiopia. J Food Nutr Popul Health. 2017;1(3): 29.
24. Orlandoni P, Venturini C, Jukic Peladic N, et al. Malnutrition upon hospital admission in geriatric patients: why assess it? Frontiers Nutrition. 2017;4:50.
25. Pathirana AK, Lokunarangoda N, Ranathunga I, et al. Prevalence of hospital malnutrition among cardiac patients: Results from six nutrition screening tools. Springerplus. 2014;3(1):1-7.
26. Roganović B, Perić S, Janković SR. The impact of in-hospital nutritional status deterioration on treatment outcome of adult gastroenterological patients. Vojnosanitetski pregled. 2016;73(6):764-9.
27. Silva FR, de Oliveira MG, Souza AS, et al. Factors associated with malnutrition in hospitalized cancer patients: A croos-sectional study. Nutrition J. 2015;14(1):1-8.
28. Sun H, Zhang L, Zhang P, et al. A comprehensive nutritional survey of hospitalized patients: Results from nutritionDay 2016 in China. PloS one. 2018;13(3):e0194312.
29. Elia M. Development and use of the 'Malnutrition Universal Screening Tool'('MUST') for adults. British Association for Parenteral and Enteral Nutrition (BAPEN). 2003.
30. Tignanelli CJ, Cherry–Bukowiec J. Hospital based nutrition support: a review of the latest evidence. J Clin Nutr Diet. 2017;3:1-3.
31. Van Tonder E, Gardner L, Cressey S. Adult malnutrition: Prevalence and use of nutrition-related quality indicators in South African public-sector hospitals. South Afr J Clin Nut. 2018.
32. Weiss AJ, Fingar KR, Barrett ML, et al. Characteristics of hospital stays involving malnutrition, 2013: Statistical brief 210.
33. Weldeabezgi AH, Mulugetan A, Haileslassie K, et al. Nutritional status of adult Kala-azar patients and associated factors in north west, Ethiopia. J Nutr Food Sci. 2017;7(04).
34. White J, Guenter P. and Jensen G. Consensus statement: Academy of nutrition and dietetics and American society for parenteral and enteral nutrition: Characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). J Parenteral Enteral Nutr. 2017;41:520.
35. Status WP. The use and interpretation of anthropometry. WHO Technical Report Series. 1995;854.

*Correspondence to

Dr. Henok Yoseph

Department of Multidrug-resistant TB

Dil-Chora Referral Hospital

Dire Dawa

Ethiopia

E-mail: henokyoseph16@gmail.com