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Research Article

Diagnosing Chronic Energy Deficiency Using Anthropometric Variables among Middle Age Nekemte Populations, East Wollega Zone, West Oromia.

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Abstract

Background: Chronic energy deficiency (Under-nutrition) is an indicator of inadequate household food supply and a coexisting malnutrition in developing countries. Under-nutrition continues to be health significance especially in Ethiopia. Malnutrition during middle age is risky for onset of metabolic diseases and its complication in elders' health; however early diagnosing at community setting was not practiced.

Objective: To investigate chronic energy deficiency using anthropometric variables.

Methods: Primary data was collected using simplest assessment tool (anthropometric variables) for nutritional status at community setting. Data were collected from 266 adults living in Nekemte town. The prevalence of under-nutrition was measured with independent methods of body mass index and Waist circumference. The association between dependent and independent variables were considered at p-valueless than0.05.

Result: The percentage of under-nutrition was 6.77 percentage and 28.59 percentage as of body mass index and waist circumference category respectively. More than 81.58 percentage of the study samples were had meal frequency less than 3times daily (eat none, once or twice a day). Being low (body mass index, waist circumference, hip circumference, and waist-to-hip ratio) were associated with chronic energy deficiency in the bi-variable analysis. On multivariable analysis only MBI ≤18.49Kg/m^2 (aOR=2.47, 95 percentage CI: 1.81-5.33; pless than0.001) and waist circumferenceless than94cm for male and 80cm for female (aOR=1.96, 95 percentageCI: 1.14, 3.53) were associated to under-nutrition.

In conclusion: Diagnosing under-nutrition targeting middle age is neglected in Nekemte town. The magnitude of chronic energy deficiency was relatively had low public health significance, but it is high in projection because the selected participants were from healthier that do not visit health institute or yet not under medication.

Keywords: chronic energy malnutrition; anthropometric measurements; independent method

Introduction

Early diagnosing both the risk factors (under and over-nutrition) of degenerative diseases were crucial to improving community health. Under-nutrition (Chronic energy deficiency) is defined as a steady-state at which a person is in energy balance, although at a "cost" either in terms of health risks or as impairment of functions and health [5]. According to world health organization [6], under-nutrition can also be defined as body mass index (BMI) less than18.5 kg/m2 for adults.

The magnitude of under-nutrition was community health concern throughout under developing world [12]; this is especially in Ethiopia. For example, study conducted in University Referral Hospital finds the overall prevalence of chronic energy deficiency was 18.3 percentage (95 percentageCI: 14.5 percentage–22.7 percentage) among HIV/AIDS adults patients in Gondar [13]. Similar study in Gondar showed the prevalence of chronic energy deficiency among populations aged≥ 65 years was 17.6 percentage [14]. And the prevalence of under-nutrition among adults aged between 18-59 years was 28.7 percentage [15].

From the pooled data of Ethiopia Demographic Health Survey (9), the prevalence of male adult thinness was 28.9 percentage. Of these, 21.4 percentage was mild underweight and 7.3 percentage was moderate to severe underweight [22]. The prevalence of chronic energy deficiency was highest in the Somali region (62.0 percentage) and lowest in Addis Ababa (22.0 percentage) [22]. In Ethiopia, the prevalence of male adult

chronic energy deficiency increased from 10.8 percentage in 2003 to 25.3 percentage in 2011 [22].

Ethiopia is among agriculture-industrializing country. The country is in under developing, food in secured and impoverished nation. To overcome these challenging, the government has developed various development plans and strategies to increase food security, improve nutrition and reduce poverty [2,3]. Despite some studies propagate prosperity; still Ethiopia is suffering with double burden of malnutrition. Undernourishment or malnutrition repeatedly refers to under-nutrition and its impediments [10]. All food, nutrition and health sectors in Ethiopia give priority to under-nutrition focusing targeting vulnerable groups (like children, adolescents, pregnant, lactating and elderly). However, early diagnosing under-nutrition among mid- adulthood is a neglected public health concern in urban and rural area of Oromia. Thus, the study designed to investigate the prevalence of under-nutrition (chronic energy deficiency) using anthropometric measurements in Nekemte town.

Material and Methods

Study design, setting and period

A community based cross-sectional study conducted in accordance with approaches of [11] from 08/11/2020 to15/12/ 2020. We selected Nekemte town purposively, since it is midpoint for four corners of western towns. It is found in west Oromia, has six kebeles, has one public university (Wollega) and the distance between Addis Ababa and Wallaga University was 328km.

Study population

Data was collected from 266 selected participants' among adults aged between 41-64years. The study was approved by the Ethical Committee of wollega University and prior to study performed written informed consent from the participants.

Sample size determination

Study participants calculated by considering with the following assumptions: margin of error of 5 percentage, confidence level of 95 percentage, 80 percentage power, 10 percentagenon-response rate and central obesity (19.6 percentage) the most common prevalent metabolic syndrome component Ethiopian adults [9]. Finally, 266 samples were recruited.

Sampling Techniques

Two communes were selected from six kebeles (small administrative unit) of Nekemte city. Of this one commune was selected by lottery system and the other was purposively allocated with buffering zone through natural geography. The study units were selected randomly.

Anthropometric Variables

Anthropometric measurements were obtained according based on different literatures [1]. Length of height (SHt.) was measured nearest to (0.1 cm) by Martin's anthropometric rod (GPM, Switzerland). Weight (Wt.) was measured (0.1 kg) with an electronic scale (Omron HBF-375 Karada Scan, Japan). Waist circumference (WC) and hip circumference (HC) were measured by using measuring tape.

Data processing

The data was coded, checked and entered into Epi Info Version seven and exported to SPSS version 24. Statistical results were analyzed and the findings were reported using tables. Variables with p *less than* 0.20 on bivariate logistic regression were geared to multivariable logistic regression to adjust for potential confounders to identify the determinants of chronic energy deficiency among none pregnant and none lactating women. In the final model, variables with P-value *less than* 0.05 were considered as statistically significant and aOR of 95 percentage CI was used to see the strength of association. Using multiple linear regressions, no evidence of multi-collinearity was found between the independent variables and using Hosmer& Lemshow model fitness was checked.

Results

Descriptions of mid-adulthoods

Finally two hundred sixty six healthier adults with age of 41-64 years participated in the study; of this 62.78 percentage of them were females. Adults age between 41-48 years accounted for 54.5 percentage and more than half (54.9 percentage) of the participants were poor in their living standard (less than1.25dollar/day/person). Concerning the religious, about 63.9 percentage of the study units were protestant Christians and followed with orthodox (33.1 percentage). Regarding their marital status, more than two third of them was married. Other social determinants show, 32.3 percentage (nearly about one third) of the study participants was illiterate (unable to read and write). Concerning the meal frequency, majority (81.58 percentage) of the respondents consume less than three times a day (Table 1).

Variables		Frequency	Percentage (%)
Sex	Male	99	37.22
	Female	167	62.78
Range of age in years	41-48	145	54.5
	49-56	77	28.9
	57-64	44	16.5
Educational background	Illiterate	86	32.3
	Some school	119	44.7
	Diploma/certificate	33	12.4
	Degree and above	28	10.5
Marital status	Single	13	4.9
	Married	178	66.9
	Widowed	56	21.1
	Divorced	19	7.1
Religious	Protestant	160	63.9
	Orthodox	88	33.1
	Muslim	6	2.2
	Wakefata	1	0.4
	Others	1	0.4
Income	<(1.25dollar/day/person)	146	54.9
	≥(1.25dollar/day/person)	120	45.1
Urban home gardening	Yes	7	2.6
	No	246	92.5
Meal frequency	<3times per day	217	81.58
	3-5 times per day	38	14.28
	≥5 times per day	11	4.14

Table 1: *Descriptions of mid-adulthood in Nekemte town, 2019 (n=266).*

Incidence of chronic energy deficiency

The status of under-nutrition is shown in table 2. From the total samples selected mid-adulthood Nekemte populations, 6.77 percentage of them had Body mass index ≤18.49 kg/m^2. Relatively this magnitude is low because the sample was collected from healthier population that cannot visit health institutions or under treatment for any diseases.

BMI	Variable categories	Frequency	Percentage (%)
≤18.49kg/m^2	Chronic energy deficiency	18	6.77
≥18.5 to <24.9 kg/m^2	Normal	131	49.25
≥25Kg/m^2	Obese	117	44.01
Note: Chronic energy deficiency mean BMI<18.5Kg/m^2, BMI=body mass index			

Table 2: *Classification of nutritional status using body mass index among Nekemte , 2019.*

The incidence of under-nutrition among male participants was 11.11 percentage. From the total adults who had under-nutrition, the percentage of undernourishment was high in age group range from 41- 48 which was (8.85 percentage) followed by age group 57-64 accounted (4.55 percentage) (table 3).

Variables		Chronic energy deficiency	
		Yes (%)	No (%)
Gender	Male	11(11.11)	88(88.89)
	Female	7(4.19)	160(95.81)
Range of age in years	41-48	13(8.85)	132(91.15)
	49-56	3(3.90)	74(96.10)
	57-64	2(4.55)	42(95.45)

Table 3: *Nutritional status of adults living in Nekemte by sex and age, 2019 (n=266)*

Association of anthropometric variables and chronic energy deficiency

From the total of 110(41.4 percentage) adults who had low waist circumference, 76(28.58 percentage) of them where with chronic energy deficiency. New thing about BMI is that, adults in normal cutoff points with BMI=18.5-24.99Kg/m^2, 2(1.37 percentage) of them were found with chronic energy malnutrition.

Being low (Body Mass Index, waist circumference, hip circumference, and waist to hip ratio) were associated with under-nutrition in the bi-variable analysis. On multivariable logistic regression only BMI and waist circumference were showed association with chronic energy deficiency. Being having MBI ≤18.49Kg/m^2 increased the risk of developing chronic energy deficiency by more than two fold (aOR =2.47, 95 percentageCI: 1.81-5.33; pless than0.001). Waist circumference and chronic energy deficiency show significant association; the odds of chronic energy deficiency was nearly twice (1.96) times more among those had low waist circumference (aOR =1.96, 95 percentageCI: 1.14, 3.53) as compared to those having high waist circumference.

Variable	Categories	Under-nutrition		cOR; 95%CI	aOR ;95% CI	P-value
		Yes	No			
Body Mass index	≤ 18.49kg/m^2	18(6.77%)	0	3.34(1.14,6.47)	2.47(1.81,5.33)	0.001*
	≥18.5-<24.99 kg/m^2	2(1.37%)	144(54.14)	1.4(1.04,3.47)	2.87(1.21,4.65)	0.065
	≥25Kg/m^2			1	1	
Waist Circ	<94cm/80cm(M/F)	76(28.59%)	34 (12.78)	1.15(0.24,2.67)	1.96 (1.14,3.53)	0.002
	≥94cm/80cm(M/F)			1	1	
Notes: aOR= Adjusted odd ratio; cOR= crude odd ratio; Circ= circumference						

Table 4: *Multivariable analysis to evaluate relation of anthropometric variables and chronic energy deficiency, 2019 (n=266)*

Discussion

Malnutrition during middle age is indicator for poor health of late adults and elderly. The study revealed the prevalence of under-nutrition was 6.77 percentage based on Body Mass Index. According to Nutrition Landscape Information System (NLIS) cutoff values [11], the magnitude of chronic energy malnutrition (5-9 percentage) was founds to be in low burden of public health significance. This figure is warning sign for stakeholders and need holistic monitoring, because the study units were selected from healthier and/or not under medication for any of nutrition related chronic diseases.

To compare the statistical differences of under-nutrition, we couldn't get a research conducted at community setting with a representative sample of Ethiopian adults aged 41-64 years. In contrary to our study, different studies targeting different age groups shows, the prevalence of under nutrition or thinness among adults in Ethiopia was high.

The prevalence of chronic energy deficiency from current finding was lower than study performed in Ethiopia Gondar zone (18.3 percentage) [13], Amhara region (28.7 percentage) [15], in Somali region (62.0 percentage) and Addis Ababa (22.0 percentage) [17]. Likewise, study conducted in Uganda (22.3 percentage) [19], India (19.5 percentage) [20], and Botswana (19.5 percentage) [21] were higher than our study.

Regarding sex, male adults are highly affected by chronic energy deficiency. Similar to our study, male adults from Ethiopia Tigray region state (AOR = 2.23, 95 percentage CI: 1.61, 3.09) was associated to chronic energy deficiency [22].

This study is the first study to diagnosis chronic energy deficiency targeting middle aged adults in western Ethiopia. Study had limitations due to nature of cross-sectional design. Other thing is the intention of the questions the relationship between under-nutrition and anthropometric variables there will be some cofounder that may increase or under estimate the prevalence of chronic energy deficiency.

In conclusion

Under-nutrition is neglected public health concern targeting middle age. The identified chronic energy deficiency using anthropometric variables was relatively low public health significance, however it is high because the selected participants were from healthier that do not visit health institute or yet not under medication.

Ethical consent

Institute of Health Science Review Board of Wollega University declared the study, ethical clearance obtained from the college of medical and health sciences. Written informed consent was collected from participants prior to the study.

Authors Contributions

All authors equally credited from conceptualization, construction, data collection, interpretation, draft of manuscript writing to reviewing.

Disclosure

The authors declare that they have no conflicts of interest.

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