Prevalence and associated risk factors of abdominal obesity among civil servant women in Addis Ababa, Ethiopia, 2021: institutional based cross- sectional study

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Abstract

Background: Abdominal obesity remains to be a major public health problem connected to an increased risk of disease, disability, poor quality of life, and increased health-care costs. It has been also related to metabolic syndrome, like hypertension, cardiovascular disease, diabetes, and other non-communicable diseases. Therefore, the goal of this study was to determine the prevalence of abdominal obesity and associated risk factors among female civil servants in Addis Ababa, Ethiopia, 2021.

Method and materials: An institutional based cross-sectional study was undertaken from 31th of March to 15th of April, 2021.A two stage random sampling techniquewas employed to select 451 study participants. Data was edited, coded and entered into Epi data version 3.1 and then exported to SPSS version 21 for analysis. Descriptive data analysis was used to present the distribution of study variable.Bivariable and multivariable analysis were used to assess the relationship between independent variables and abdominal obesity. The level of statistical significance was declared at p-value less than 0.05.

Result: The prevalence of abdominal obesity by waist circumference was found to be 29.5 %

(95% CI: 25.39-33.6%). In multivariable logistic regression model age group 29-37 years [AOR= 2.553, 95% CI: (1.237-5.271)], age group 38-46 years [AOR=4.027, 95% CI: (1.360-11.925)], age group 47-55 [AOR=7.008, 95% CI: (1.463-33.578)], being married [AOR= 4.736, 95% CI: (2.290-9.798)] consumption of meat 1-4 times per week[AOR=2.341, 95% CI: (1.215-4.509)], consumption of meat >=5 per week [AOR= 5.257, 95% CI: (2.068-13.364)], and having lunch daily[AOR= 0.331, 95% CI: (0.136-0.804)] were significantly associated with abdomial obesity.

Conclusion: Prevalence of abdominal by waist circumference was 29.5%..Age, being married, high consumption of meat, having lunch daily were identified as a risk factors for abdominal obesity. So, awareness creation about age induced abdominal obesity for older and middle age group is needed. Likewise, promotion to use diversified food rather than consuming meat based diet can reduce the risk of abdominal obesity in combination with other nutrition intervention methods.

Background

Obesity is defined as a condition of energy metabolism characterized by irregular fat accumulation and excessive visceral fat deposition which is an independent risk factor for cardiovascular illnesses (1). It is a major public health problem in both developed and developing countries affecting all ages, genders, and being linked to a number of chronic diseases like type 2 diabetes, hypertension, coronary artery disease, and cancer(2-4).

Obesity in the abdomen is linked to higher risk of morbidity, disability, poor quality of life, mortality, and higher health-care expenses (5-8).The prevalence of elevated WC(waist circumference) in adults has been demonstrated to be independently risk factors for metabolic syndrome, like hypertension, cardiovascular

disease, diabetes mellitus, and other non-communicable diseases. In adults, studies have reported a higher association between waist circumference and these anomalies than with BMI (Body Mass Index) (9)

In 2016, more than 1.9 billion adults aged 18 and above were overweight and over 650 million of them were fat. Furthermore, 39% of adults aged 18 and above were overweight, with 13% being obese (10).

To evaluate body fatness, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), skin fold thickness, and bio-impedance were used to classify obesity as overweight, general obesity, abdominal obesity (AO), visceral fat obesity (VFO), and other forms. The most common variables used to identify these were BMI and waist circumference (WC) (11). In comparison to other anthropometric indicators, abdominal fat assessment is one of the best predictors of visceral fat, which is significantly linked with most metabolic risk factors(12).

The waist circumference (WC) measurement has been described as a better tool for assessing body fat distribution, especially abdominal visceral adiposity, which has been linked to a variety of non-communicable diseases.In a clinical or epidemiological setting, measuring WC is also a faster and less expensive way to determine visceral fat than other gold standard methods like computed tomography and magnetic resonance imaging(9).

Despite the fact that studies on central obesity in Africa are few, recent research has revealed an unprecedented rise in central obesity prevalence(3).According to the estimate of WHO, in 2014 1.2% ofmen and 6.0% of females were either overweight or obese in Ethiopia. Between 1997 and 2016, the combined prevalence in the country grew considerably from2.6 to 6.9% in females and, from 0.6 to 1.9% in males(13).

Similarly, in Ethiopia study done in 2015 reported that the prevalence of overweight and obese people in urban areas was 12.1% and 2.8 percent, respectively (5).The prevalence of central obesity among women was found to be 27.9% and 86.9%, respectively, in a recent study conducted in woldia and urban areas of Northwest Ethiopia(14, 15). So this study aimed to assess the prevalence and associated risk factors of abdominal obesity among women civil servant in Addis Ababa, Ethiopia.

From the data of 2018 World Health Organization, the NCDs Country Profiles of Ethiopia was estimated that the deaths from CVDs, cancers, diabetes, others NCDs were 16%, 7%, 2%, 12% respectively and the total estimated deaths from NCDs was 39% of all deaths (16). The incidence of obesity and central obesity is rising in Ethiopia, as shown here, and the percentage of deaths from non-communicable disease is also rising. These deaths, as reported in few studies were may be an indicator of central obesity in Ethiopia at present.

According EDHS 2016 the proportion of women who were overweight or obese had increased from 3% in 2000 to 8% in 2016 and the proportion of men who were obese were found to be 3% (17).Even thought there are no well documented national data and studies on central obesity, there are few studies done on

central obesity in different part of Ethiopia, which revealed that the prevalence of central obesity is currently increasing. For instance, according to study done in Dilla, Gonder, Diredawa, urban areas of Northwest Ethiopia, the prevalence of central obesity found to be 24.4%, 33.6%, 46.6%, 37.6%, respectively(15, 18-20).

However evidences are not available particularly for civil servant women in Ethiopia. Therefore,the aim of this study was to assess the prevalence and associated risk factors of abdominal obesity among civil servant women in Addis Ababa, Ethiopia, 2021.

Methods

Study area, Study design and Study period

An institutional based cross-sectional study was conducted to assess the prevalence and associated risk factors of abdominal obesity among civil servant women in Addis Ababa city, the capital of Ethiopia from June 3rd to 23th June, 2021. There were 11 sub cities and 117 district level administration offices, within which a total of 38, 649 working adults were reported. Regarding to health institution the city had a total of 13 public and 22 private hospitals, as well as 96 health centers.

Study participants

Women working as civil servant in Addis Ababa city administration at different district and willing to participate in the study were included. Women who have deformity around hip and abdominal area and who were not permanent were excluded.

Sample size determination

Sample size was calculated by using a single population proportion formula

$$[\ n = \frac{Z_{\frac{\alpha}{2}}^{2} P(1-P)}{MOE^2} * \ Deff\ ]$$

considering 95% confidence level, 5% margin of error (MOE) and proportion of central obesity from study done in dilla 27.3% (18). Adding a 5% non respondent rate and 1.5% of design effect [Deff], the final sample size was 478.

Sampling technique and procedure

A simple random sampling method was applied to select the study area and participants. First as a primary sampling unit the three sub cities namely Kerkos, Yeka and Bole were selected randomly which were covered 30% of the total sub cities of Addis Ababa. Then, a representative three district's (woreda's)

from each selected sub cities were taken randomly as a secondary sampling unit. Finally, the calculated samples were allocated using population propositional to size to each woreda based on their total number of civil servants. The list of civil servant workers (sampling frame) obtained from each selected woreda administration and the participants were selected from it randomly.

Data collection tools and procedures

Structured interviewer administered questionnaire was adapted from WHO-STEP wise structured questionnaire for chronic non-communicable disease having components of socio-demographic information, dietary intakes, physical activity and health risky behavior questions and anthropometric measurement used.

Participants/ study subjects/ was interviewed for their socio-demographic information, dietary intakes, physical activity and health risky behavior. Anthropometric measurement was taken at the end of theinterview.Food consumption habit of the participants was investigated by semi-quantitative food frequency questionnaire (FFQ) by FAO and Food frequency questionnaire (FFQ) modified from WHO-STEP wise approach consisting of foods commonly consumed by the study population.Participants were asked to report their frequency of consumption number of times consumed weekly (21, 22).

Global physical activity questionnaire (GPAQ) developed by WHO for physical activity surveillance was used to assess the physical activity pattern among selected individuals in three domains including activity at work, travel to and from places and recreational activities and sedentary behavior through face-to-face interview of the respondent in the study area. The activity level of the study participants was evaluated according to the standard WHO total physical activity calculation guide and the level of total physical activity was categorized as physicallyactive met(>600 EM) and physically in-active(<600 EM) (23).

Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch-resistant tape that provides a constant 100 g tension. The measurements of WC, the subject were stand with feet close together, arms at the side and body weight evenly distributed, and should wear little clothing. The subject should be relaxed, and the measurements should be taken at the end of a normal expiration. The measurements were repeated twice; if the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements were be repeated. Measurement was taken before meal or three hours after meal. The measurement was also taken when the participant is at the end of the gentle expiration, after taking a deep inhalation with the tape snug but ensuring it is not compressing the skin(24).

Data Quality Management

The research instrument which was used to measure the abdominal obesity and associated risk factors as properly calibrated by defining each concept and assess for content validity, in which the instrument

items are adapted from WHO-STEP wise approach questionnaire found online by Google search and other standard questionnaire from FAO. To assess whether the instrument covered all dimensions of the construct, literature and experts in the field was properly consulted. On the other hand to maximize the data quality, data collectors was selected carefully based on their educational status. The training was also given on the nature and reason of the research and objective of the study.

Data processing and analysis

After checking completeness and consistency manually data was edited, coded and entered on to Epi-data version 3.1, and then it was exported to SPSS version 21 for further analysis. Descriptive data analysis was taken primarily to summarize the study variables. Then, a binary logistic regression model was fitted to assess any relationship between each independent variable (socio-demographic characteristics, behavioral factors, dietary factors and physical activity) and outcome variable (Abdominal obesity). It was conducted under two stages. First, bi-variable analysis was carried out to show any associations between the dependent and each independent variable. Then, variables with p-value less than 0.25 were included in a multi-variable analysis and it was used to show a combined effect of independent variables on dependent variable. Statistical significances were declared at P value less than 0.05. Finally, the results were presented in statistical tables, chart, and graph.

Results

Socio demographic characteristics

From a total of 478 study particpiants a compelete infromation were obtained from 451 working civil servants women wich gave a response rate of 94.4%. The mean and the standard deviation of the respondent age were 30.11 (±6.86) years, of which the 55% respondentswere between age group 20-28 years. Among the study participants 48.3% and 48.6% were single and married respectively. More than half (68.1%) of the study participants were degree holder. Only 6% of the study participants were with educational level of masters and above.

Of the participants' orthodox tewahido(81.6%) religion followers were the highest followed by Protestants (12%) and Muslims (4.4%). The mean (SD) of the respondents salary was 5459.92(±2021.16) Ethiopian birr. 23.1% of the respondents got monthly salary less than 3934 Ethiopian birr. The mean of family size of the respondent was 3.57, of which 56.8 % of the respondents had family size four and above (Table 1).

Table **1**

Socio-demographic characteristics of the civil servant women in Addis Ababa city, Ethiopia, 2021(n=451)

Variable	Frequency	Percent
Age		
20-28	248	55.0
29-37	140	31.0
38-46	48	10.6
47-55	15	3.3
Marital status		
Single	218	48.3
Married	219	48.6
Divorced	14	3.1
level of education		
college diploma	117	25.9
Degree	307	68.1
masters and above	27	6
Religion		
Orthodox tewahido	368	81.6
Protestant	54	12.0
Muslim	20	4.4
Catholics9	2	
Salary		
<3934	104	23.1
3934-7070	192	42.6
>=7071	155	34.4
Family size		
<=3	195	43.2
>=4	256	56.8
Age		
20-28	248	55.0
29-37	140	31.0

38-46	48	10.6
47-55153.3		

Food consumption Frequency factors

According to the data obtained from food frequency, of the total respondent, 44.6 % consumed fruit three or less times per month and 41.7% consumed within a week. 53.2% study participants were consumed vegetable 1-4 times per week. Regarding the consumption of bread and cereals, 41.5% consumed daily and 58.5% consumed not daily. According to this data cereals were the common source of food group among respondents. More than half of the respondents (61.2%, 58.1%, 53.7, 69.2%, and 66.5%) consumed meat, legumes, milk products, fast food, and sweetened beverages three or less times in a month respectively (Table 2).

Table **2**

Food consumption frequency among civil servant women in Addis Ababa city, Ethiopia, 2021(n=451).

Variable	frequency	Percent
Fruit		
three or less times monthly	201	44.6
1-4 per week	188	41.7
>=5 times per week	62	13.7
Vegetables		
three or less times monthly	112	24.8
1-4 times per week	247	54.8
>=5 times per week	92	20.4
Bread and creals		
not daily	264	58.5
Daily	187	41.5
Egg		
less than once in a month	48	10.6
1-3 times monthly	140	31.0
>=1 per week	263	58.3
Meat		
three or less times monthly	276	61.2
1-4 times per week	117	25.9
>=5 times per week	58	12.9
Legumes		
three or less times monthly	262	58.1
1-4 per week	135	29.9
>=5 times per week	54	12.0
Milk, cheese, yogurt		
three or less times monthly	242	53.7
1-4 times per week	155	34.4
>=5 times per week	54	12.0

Sweets		
three or less times monthly	209	46.3
1-4 times per week	129	28.6
>=5 times per week	113	25.1
Fast food		
three or less times monthly	312	69.2
1-4 times per week	108	23.9
>=5 times per week	31	6.9
sweetened beverages		
three or less times monthly	300	66.5
1-4 times per week	106	23.5
>=5 times per week	45	10.0

Dietary habit factor

Of the total respondents, 88.9 % had three and more meals per day and only 11.1% had less than three meals per day. Nearly three fourth (70.1%)of the study participantsreported that they didn't consume breakfast on a daily basis. Only 29.9% of the respondents were consumed breakfast on a daily basis.The majority of the respondents (88%,86.7%) were consumed lunch and dinner on a daily basis respectively. More than two third(63.6%) of respondents were commonly used seed oil (sunflower) for household food preparation,followed byPalm oil(28.4%) and butter(8%).Of the total study participants, 80.1% of the respondents reported that they were used meal prepared at home on daily basis (Table 3).

Table **3**

dietary habit among civil servant women in Addis Ababa city, Ethiopia 2021(n=451)

Variable	frequency	Percent
Number of meals per day		
<3 meal per day	50	11.1
>=3 meal per day	401	88.9
Breakfast		
not daily	54	70.1
Daily	397	29.9
Lunch		
not daily	54	12.0
Daily	397	88.0
Snack		
No	311	69.0
Yes	140	31.0
Number of snack		
No	311	69
<=2 per day	101	22.4
>=3 per day	39	8.6
Dinner		
not daily	60	13.3
Daily	391	86.7
Eat during bed times		
not daily	407	90.2
Daily	44	9.8
meal out of home		
Never	88	19.5
not daily	329	72.9
Daily	34	7.5
meal prepared at home		
not daily	87	19.3

Daily	364	80.7
Oil most used		
seed oil	287	63.6
palm oil	128	28.4
Butter368.0		

Beahavioral factor

Of the total study participants, 98.7% were non-smoker. Nearly three fourth (73.2) of the respondents were not ever consumed alcohol. About 96.2 % of the respondents never chewed khat throughout their lifetime. Study participants who meet the WHO recommendation of total physical activity level were 5.8% and the rest (38.8%) didn't meet the WHO recommendation. Resondents who were not participatein any physical activity were 55.4% (Table 4).

Table **4**

behavioral factor of civil servant women in Addis Ababa city, Ethiopia, 2021(n=451)

Variable	Frequency	Percent
Ever smoked tobacco		
No	445	98.7
Yes	6	1.3
current smoker		
No	447	99.1
Yes	4	0.9
No of cigarette sticks smoke in a day		
No smokein a day	445	98.7
< =5 sticks	5	1.1
>= 6 sticks	1	0.2
Ever alcohol consumption		
No	330	73.2
Yes	121	26.8
number of standard drinks		
No drink	332	73.6
< 2 standard drinking	40	8.9
>=2 standard drinking	79	17.5
Frequency of alcohol drink		
No drink	330	73.2
Daily	11	2.4
>=1 per week	77	17.1
<1 in a month	33	7.3
khat chewing		
No	434	96.2
Yes	17	3.8
Total physical activity level		
no physical activity	250	55.4
< 600MET(un meet)	175	38.8

>=600(meet)	26	5.8
time spend sitting or reclining		
< 5 hour	142	31.5
5-8 hour	309	68.5

Prevalence of abdominal obesity

The prevalence of abdominal obesity among civil servant women working in Addis Ababa by waist circumference(WC) and waist-hip ratio (WHR) were 29.5% (95% CI:25.39% -33.61%) and 32.8% (95%CI:28.57%-37.03%) respectively. The prevalence of abdominal obesity was highest among the age groups of 27-38 by both waist circumference (12.4%) and waist-hip ratio (13.3%) respectively. The prevalence was lowest among the age group 47-55 years, by both WC (2.3%) and WHR (1.3%) (Table 5, figure 1).

Table **5**

pervalence of abdominal obesity among civil servant women in Addis Ababa, Ethiopia, 2021(n=451)

Variable	frequency	Percent	95%CI
Abdominal obesity by waist circumference (WC)			
No	318	70.5	70.5 (66.3-74.7)
Yes	133	29.5	29.5 (25.3-33.7)
Abdominal obesity by waist to hip ratio(WHR)			
No	303	67.2	67.2 (62.7-71.6)
Yes	148	32.8	32.8 (37.3-37.3)

The mean (SD) of waist circumferenceamong civil servant women working in Addis Ababa were 79.40(11.28) cm. Both mean of waist circumference and waist hip ratio among civil servant women was slightly lower than the WHO cut-off points.

Factors associated with abdominal obesity

In multi-viariable logistic regression analysis variables with p-value less than 0.25 from bi-variable analysis were included. As a result, age, marital status, consumption of meat, consumption of snack and having lunch daily were statistically significant associated with abdominal obesity at p-value less than 0.05. Age group 29-37 years, 38-46 years and 47-55 years were 2.451[(AOR=2.451, 95% CI: (1.199-

5.013),3.807(AOR=3.807,95%CI:(1.328-10.914), and 6.489(AOR=6.489, 95%CI: (1.367-30.805) times more likely to develop abdominal obesity than age group 20-28 years respectively.

Being married was 4.762 times more likely to develop abdominal obesity [AOR=4.762;95% CI:(2.321-9.771)] thanunmarriedwomen.Respondents who consumedmeat greater or equal to five times per week were found to be 4.764 times to develop abdominal obesity[AOR=4.764; 95% CI= (1.939-11.711)] as compared to those who consumed meat three or less times monthly.Having lunch daily was 61.2% lower to develop abdominal obesity as compared tothe counterparts [AOR=0.388, 95% CI: (0.166-0.910)]. Respondents who consumed snack were 4.163 times more likely to be abdominally obese than who did not consume snack[AOR= 4.163 ; 95% CI:(1.503-11.534)(Table 6).

Table 6

Multi logistic regression of factors associated with abdominal obesity by waist circumference among civil servant women in Addis Ababa, 2021(n=451)

	abdominal obesity by WC		Odd ratio(CI 95%)	
Variable	Yes(obese)	No(normal)	COR	AOR
Age				
20-28	39	209	1	**1**
29-37	56	84	3.57(2.20-5.77)*	2.451(1.199-5.013)*
38-46	28	20	7.50(3.8-14.63)*	3.807(1.328-10.914)*
47-55	10	5	10.718(3.474-33.68)*	6.489(1.367-30.805)*
Marital status				
Single	28	190	1	**1**
Married	101	118	5.808(3.603-9.363)*	4.762(2.321-9.771)*
Divorced	4	10	2.714(0.797-9.245)	0.686(0.139-3.394)
Religion				
Orthodox tewahido	108	260	1	1
Protestant	19	35	1.30(0.716-2.386)	1.893(0.822-4.362)
Muslim	3	17	0.425(0.122-1.479)	.610(0.126-2.961)
Catholics	3	3	2.407(0.478-12.116)	5.070(0.460-55.941)
Salary				
<3934	19	85	1	**1**
3934-7070	48	144	1.49(0.822-2.704)	1.093(0.497-2.404)
>=7071	66	89	3.318(1.83-5.98)*	1.192(0.500-2.844)
Family size				
<=3	39	156	0.431(0.279-0.664)*	0.959(0.531-1.732)
>=4	94	162	1	1
Bread and cereals				

not daily	71	193	1	1
once or more times per day	62	125	1.348(0.896-2.028)	1.031(0.582-1.825)
Fruit				
three or less times monthly	49	152	0.677(0.363-1.261)	0.994(0.405-2.439)
1-4 per week	64	124	1.084(0.588-1.99)	1.221(0.510-2.921)
>=5 times per week	20	42	1	1
Meat				
three or less times monthly	56	220	1	**1**
1-4 times per week	47	70	2.638(1.646-4.228)*	2.287(1.209-4.325)*
>=5 times per week	30	28	4.209(2.327-7.614)*	4.764(1.939-11.711)*
Legumes				
three or less times monthly	68	194	1	1
1-4 per week	47	88	1.524(0.972-2.388)	.890(0.312-1.654)
>=5 times per week	18	36	1.426(0.76-2.677)	.885(0.362-2.163)
Milk, cheese, yogurt				
three or less times monthly	64	178	1	1
1-4 times per week	47	108	1.210(0.775-1.891)	.607(0.312-1.181)
>=5 times per week	22	32	1.912(1.035-3.531)*	.768(0.308-1.915)
Sweets				
three or less times monthly	48	161	1	1
1-4 times per week	51	78	2.193(1.360-3.537)*	1.937(0.987-3.802)
>=5 times per week	34	79	1.444(0.862-2.417)	1.923(0.888-3.940)
sweetened beverages				
three or less times monthly	82	218	1	**1**

1-4 times per week	30	76	1.049(0.641-1.718)	.751(0.357-1.578)
>=5 times per week	21	24	2.326(1.229-4.404)*	1.844(0.712-4.776)
Number of meal per day				
<3 meal per day	10	40	1	1
>=3 meal per day	123	278	1.770(0.857-3.653)	1.137(0.451-2.866)
Lunch				
not daily	21	33	1	1
Daily	112	112	0.618(0.343-1.113)	0.388(0.166-0.910)*
meal prepared at home				
not daily	19	68	0.613(0.352-1.062)	0.837(0.375-1.867)
Daily	114	250	1	
Snack				
No	81	230	1	1
Yes	52	88	1.678(1.096-2.570)*	4.163(1.503-11.534)*
Frequency of alcohol drink				
No drink	75	255	1	1
Daily	5	6	1.414(0.404-4.940)	0.923(0.152-5.602)
>=1 per week	42	35	2.539(1.530-4.212)*	2.426(0.768-7.663)
<1 in a month	11	22	1.076(0.493-2.346)	NA
time spend sitting or reclining				
< 5 hour	29	113	1	1
5-8 hour	104	205	1.977(1.234-3.167)*	1.087(0.580-2.039)

*Significantly associated variables at p-value <0.05, 1—Reference group.

Abbreviations: AOR—Adjusted odds ratio, COR, crude odd ratio

Discussion

This study was aimed to determine the prevalence and associated risk factors of abdominal obesity among civil servant women in Addis Ababa. The overall magnitude of abdominal obesity defined by waist circumference and waist hip ratio among civil servant women were found to be 29.5% and 32.8% respectively. This result was slightly greater than the study done in dilla based on WC (27.3%)(18), woldia town based on both by WC and WHR (24.3%, 27.9%)(14) and also higher than the study in Addis Ababa among working adultsbased on WC(19.6%) (25). The possible explanation for the differencecould be the fact that a difference in study place and setting, study period, variation in WC and WHR cut off points and sociodemographic disparities. The prevalence of abdominal obesity could be high in Addis Ababa when compared to findings from dilla and woldia this might be due to the life style changes in Addis Ababa, sedentary behavior of civil servants and nutrition transition adopted from westerns.

A study conducted in Ghana among female teachers revealed that the prevalence of abdominal obesity defined by WHR and WC was found to be 17.8%(lower) and 59%(higher)(26), respectively, which was not consistent with the current study prevalence of abdominal obesity defined by WHR (32.8%) and WC (29.5%).The difference in these results might be due to the study period and WHR and WC cut-off points. Study done in Ghana considered WC >=80 cm, while this study considered WC >88cm.The study conducted in Ghana considered WHR > 0.85, but this study considered abdominal obesity >= 0.85. The other possible explanation for the difference could be sociodemographic factors and dietary patterns.

The prevalence of abdominal obesity (85.9 %) defined by WC in northwesturban areas of Ethiopia(15)among womenwas high when compared to the current study(29.5%). Likewise, the current finding was higher than the study conducted in Nigeria among civil servants23.1% (27) and lower than the study done in Russia 44%(28) among bank employees. The difference could be study period, WHO cut-off point variation, socioeconomic difference, socio-demographic factorsand dietary intake pattern.

The prevalence of abdominal obesity by WC in Gaza strip-Palestine was 82.2% which was very high when compared to the current study of abdominal obesity by WC. The difference might be due to WHO cut off pointsand socio-cultural and economic differences(29). The study findings of Gaza strip-Palestine considered WC >=80 cm but the current study considerswaist circumference(WC) greater than 88 cm. The other possible explanation for the difference might be the type of food consumed, socio-economic status, age of the study participants; the current study considered age from 20 and the study in Palestine starts from greater or equal to 26 years.

Likewise, a study done in Panama among women showed the highest prevalence of abdominal obesity which was reported by WC (97.9%) that was three times of the current study (30). This might be because Panamanian women consume beverages or sugar-rich foods and socio-demographic characteristics. Consumption of beverages/foods rich in sugar was statistically significant with abdominal obesity among Panamanian women.Similarly, the prevalence of abdominal study conducted in Indonesia (68.3%) among adult female employees was higher than the current study but a study conducted in Iran (34.6%) among adult females was almost consistent with this study (31, 32)

This study revealed thatas age increased the odds of being abdominally obese also increased by WC.The age groups 29-37, 38-46, and 47-55 years were 2.553, 4.027 and 7.008 times to develop abdominal obesity respectively as compared to the age group 20-29. This result was consistent with a study conducted in Nigeria among civilservants and southern America (33, 34). This might be due to sex hormone changes anda decrease in physical activity levels as age increases.The finding of this studyalso revealed thatthe age group 29-37 and 38-46 years were significantly associated with AO defined by WHR, but the age group 47-55 years was not associated with AO unlike that of WC.Thus , this finding was inconsistent with the finding from Ghana(26).

Marital status was one of the predictors of abdominal obesity among civil servant women in this study.This result was consistent with studies conductedin Greek, Nigeria, and Iran (35-37). This can be explained by the fact that women after marriage may have less physical activity, change dietary patterns, pregnancy induced social support. Married womenhave more social support than those who are not married. This marital support can lead to obesity through food, activity and social values. Some people control their weight to attract mate, and once they get married weight control may be less valued so that diet/exercise behaviors for slimness may be neglected or they may not give attention for attractiveness once they have got their own(37).

The findings of this study revealed that consumption of meat 1-4 and >=5 times perweek were associated with abdominal obesity by WC. It revealed that the more you consume meatThe odds to develop abdominal obesity who ate meat 1-4 perweek and was 2.342 times as compared to those who ate meat three or less times in a month. Likewise, using meat products greater than or equal to five times perweek increasedthe chance of getting abdominal obesity by 5.257 times greater than those who consumed three or less times in amonth.This happen because meats have high energy and high fat content that might be associated with higher risk of, overweight, general and central obesity(38).This result was similar with study done in USA ,Woldia and Hawassa (13, 14, 39).

Having lunch daily was significantly associated with abdominal obesity in this study.Consequently, the odds of abdominal obesity was 61.2% lower in those who had lunch daily than the counterpart. Findings from china also showed that skipping lunch was positively associated with obesity in women(40). In general, findings from various studies have confirmed that meals skipping are associated with overweight, obesity and abdominal obesity (9, 41, 42).It might be due to decreased thermic effect of food after an irregular meal pattern when compared with individuals with a regular meal pattern. The reduced thermic effect with the irregular meal frequency may lead to weight gain in the long term(43).

This study revealed thatconsumption of snack 4.163 and 3.270 times more likely to develop abdominal obesity measured by WC and WHR than those who didn’t consume snack respectively. Even though the relationship between snacking and obesity or abdominal obesity is not clear, some studies have found that the increased consumption of energy-dense, high-sugar, high-fat meals, snacking has been regarded one of the key factors to obesity(44). Other studies failed to establish the relationship between snacking and obesity or abdominal obesity(45). This is because the type of snack practicedmatters. Those who ate

energy-dense and sugary snacks may susceptible to abdominal obesity and those who ate healthy snack intake may not develop abdominal obesity.This result is supported by study conducted in Association south east Asian Nation countries and northeast Ethiopia(46, 47).

Limitation

This study could have some limitations which affect the result directly or indirectly. Some of the limitations emanate from the nature of the cross-sectional study since the outcome (abdominal obesity) and predictors variables relationship were temporal and examined at the same time, therefore no causal deduction can be made.This study was not included other measurement like skin fold thickness. The portion size of food consumed by respondents was not assessed. Type snack they were practicing were not identified. On the other hand, there might be over and underestimations of food frequency and meal habit, alcohol consumption, physical exercise, time spend sitting and reclining due to recall bias.

Conclusion

A high prevalence of abdominal obesity was found among civil servant women in Addis Ababa city. This study showed that as age increased, the risk to develop abdominal obesity was increased. Likewise, respondents who consumed more meat based diet had increased the risk to develop abdominal obesity. In this study, being married, age, consumption of meat and having lunch daily were among predictors that were significantly associated with abdominal obesity. Addis Ababa city administration health office should give special awareness creation should be given for married and older age group civil servant women in collaboration with other stake holders like city administration of women affairs and education office regarding abdominal obesity.Regular health educations have to be given for civil servant women regarding frequency of meat consumption and other junk foods (high calorie food)

Abbreviations

AO=Abdominal obesity;BMI=Body mass index;CI=Confidence Interval;CHO=Carbohydrate; CVD=Cardio vascular disease;DDS=Dietary diversity Score;FVS=Food variety scores;HEI=Health eating index;NCD=None communicable diseases;GDP=Gross domestic product;NHLBI=National Heart, Lung and Blood Institute;SPSS=Statistical Package for Social Science ;WC=Waist circumference;WHR=Waist hip ratio;WHO=World health organizationVAI=Visceral Adipose index;WHtR=Waist-to-height ratio

Declarations

Ethics approval and consent to participate

The study was carried out according to the guidelines and regulations laid down in the declaration of Helsinki. Before starting the data collection process, Kotebe Metropolitan University Menelik II Medical and Health Sciences College, Institutional Review Board (IRB) secured ethical clearance, the clear description of the study title, procedure and duration, possible risks and benefits of the study was

explained for each study participants. In addition to this, letter of permission and ethical clearance was obtained from Addis Ababa Health Bureau prior to actual data collection.

Then informed written and signed consent was taken from each study participants. Confidentiality of information was collected from each study participant was not disclosed. They were informed that they have full right to withdraw from the study at any time if they face any difficulties. The data was collected under covid-19 prevention protocols.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declared that no competing interests exist

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Authors' contributions

AW: Conceptualization and development of the proposal, data collectionand draft data analysis. SG: data analysis, editing, and develop the manuscript. GK: read and approved the final manuscript.

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Figures

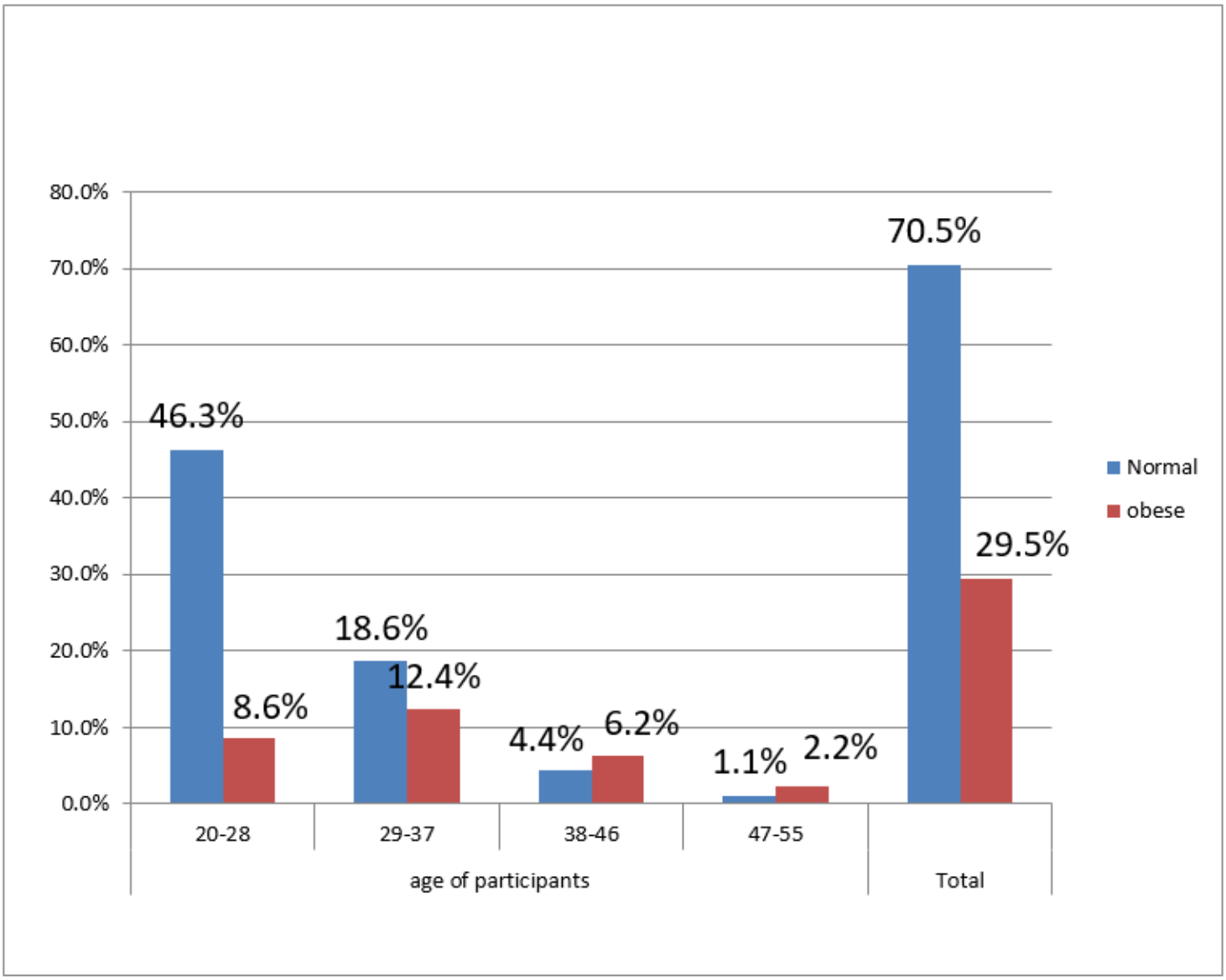

Figure 1

prevalence of abdominal obesity by waist circumference among civil servant women working in Addis Ababa by age group Ethiopia, 2021

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- RawDataApril252022.pdf