



PREVALENCE AND ASSOCIATED FACTORS OF OVERWEIGHT AND OBESITY AMONG ADULT GOVERNMENT EMPLOYEES AT BOLE SUBCITY IN ADDIS ABABA; ETHIOPIA

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Abstract

Background: Overweight and Obesity are now a days so common that it is replacing the more traditional public health concerns, including under nutrition and infectious diseases and the most significant contributors to ill health and considered to a multivariate syndrome which can negatively affect the whole body functioning. The Ethiopian government revealed that being overweight and obesity is emerging fast as a non-communicable public health concern and the objective of this study was to assess the prevalence of overweight and obesity among government employee at bole sub city in Addis Ababa.

Methods; Institutional based cross-sectional study was conducted to assess the prevalence of overweight and obesity and the study participants were selected using multistage cluster sampling technique. The Sample size was determined using a single population formula with the assumption of the prevalence of overweight and obesity was 40.7% from the study done in Wolaita Sodo Town. 95% confidence interval (CI), 5% marginal error, and 5% contingency for non-response rate and 1.5 design effect. Data was collected by trained data collectors and supervisors using structured and pretested questionnaire. The recorded parameter of Height and weight were measured by well calibrated portable prestige Seca weight scale measurement and using studio meters and weight and Height was measured while participants were bare footed, wearing light clothes and heavy material and hair ornaments were removed and the reading was taken to the nearest to 0.1 kg.

RESULT The overall prevalence of overweight and obesity was found to be 191 (34.8%) out of which, 82 (15.0%) were male and 109 (19.8%) were female. factors associated with the prevalence of overweight and obesity was increased with age (AOR=5.221, 95%CI: (2.129, 12.801) as age increase the likelihood of overweight and obesity is increase. Sex is another risk factor in which females sex were 2.322 times more

likely being overweight and obese than male (AOR=2.322, 95%CI: (1.45, 3.719) marital status and alcohol consumption were another risk factor (AOR=0.826, 95%CI: (0.522, 1.308) and (AOR=3.91, 95%CI: 2.63, 5.81,) respectively.

Conclusion; The prevalence of overweight and obesity in this study was unexpectedly higher than previous studies conducted in Ethiopia. Overweight and obesity are clearly a more serious problem among government employees which is cause for the obesity epidemic.

Keywords; associated factors; government employees; overweight, obesity

Introduction

1.1. Background

Overweight and obesity can be defined as excessive and abnormal fat depositions in our body and the major risk factors for several diet-linked non-communicable diseases. Overweight and Obesity are now a days so common that it is replacing the more traditional public health concerns, including under nutrition and infectious diseases. Overweight and obesity is the most significant contributors to ill health and considered to a multivariate syndrome which can negatively affect the whole body functioning (1).

The Body Mass Index (BMI) is most commonly widely used screening tool for diagnoses of overweight and obesity. But now a day's waist circumference (WC) and waist to hip ratio (WHR) are additionally used as a tool for diagnosing excess fat accumulation recommended by World Health Organization. Overweight and obesity seems unusual concern in Ethiopia's public health, however, the Ethiopian government revealed that being overweight and obesity is emerging fast as a non-communicable public health concern. Addis Ababa is the capital and largest urban area of Ethiopia, and an ideal setting to describe the co-existing rates of under and over nutrition. However, today NCD such as cardiovascular diseases and diabetes are the leading causes of death among adults about 31% of deaths reported from hospitals in Addis Ababa city (2) (3, 4).

In developing world which was previously unaffected countries the prevalence of overweight and obesity and related diseases has increased due to incomes rise and populations become more urban. However, diets with high in complex carbohydrates, varied diets with a higher proportion of saturated fats and sugars are that affects the physical and social functioning and quality of life. Furthermore, less physically-demanding work, increasing use of automated transport, use of technology at home, and more passive leisure pursuits have been another risk factor observed worldwide. The numbers of people with overweight and obesity are increasing by adopting a modern lifestyle with less physical activity and excess consumption of energy-dense foods along with economic development which leads to nutrition transition (5) (6).

4. Method and Material

4.1. Study Area

Bole sub city was selected for study area and one of the ten sub cities under Addis Ababa city Administration which is located in east part of Addis Ababa. The sub city is bordered with akaki sub city to the south, kirkos sub city to the west, nifas silk to the north and yeka sub city to east. The sub city covers 122.08 sq.km and divided in to 15 Woreda. According to the 2007/8 census report the total population of sub city is 308, 714, from which 145,057(47%) are males and 163,657(53%) are females. According to the sub city office of public service and human resource development the total number of government employee working in the sub city accounts 5002 employees of these male accounts (2231) 44.6 % and female accounts (2771) 56.4%

4.2. Study Design and Period

Institutional based cross-sectional study was conducted to assess the prevalence of overweight and obesity and its associated factors among government employee at Bole Sub City in Addis Ababa Ethiopia. The study was done from June to December 2019.

4.3. Source Population

All government employees at Bole Sub City during the study period

4.4. Study Population

All sampled government employees at selected woreda during the time of data collection at Bole Sub City.

4.5. Study Unit

Employees in selected woreda are selected through simple random sampling technique.

4.8. Operational Definition

Anthropometric measurements

- ✓ **Weight:** Weight was measured in the upright position to the nearest 0.1 kg using calibrated weighing scale (29).
- ✓ **Height:** Height was measured without shoes to the nearest 0.1cm using calibrated studio meter (30).
- ✓ **Body mass index (BMI):** Body mass index was calculated by dividing observed weight by height squared (kg/m^2)(20)

- ✓ **Obesity:** “Obese”: BMI ≥ 30 kg/m²(7)
- ✓ **Overweight:** defined as having a BMI between 25.0 and 29.9 kg/m² (8)
- ✓ **Waist Circumference:** defined as WC ≥ 90 cm for men and WC ≥ 80 cm for women.(8)
- ✓ **WHR** define as WHR ≥ 0.90 cm for men and WHR ≥ 0.85 cm for women(8)
- ✓ **BMI classification:** Subjects were classified using WHO classification BMI. Categories as per WHO classification are <18.5 kg/m² as underweight, 18.5-24.99 kg/m² as normal, 25.0-29.99 kg/m² as overweight and ≥ 30.0 kg/m² as obese(30).
- ✓ **Physical activity:** Person doing mild physical activity like walking, yoga etc. for at least 10 minutes continuously per day. (30)

5. RESULT

1. Socio demographic Characteristics of Respondents

The total number of participants was 548 with a response rate of (100%) participant were included in the study with mean age of \pm SD (34.65, 11.025) years. The socio-demographic characteristics female sex respondents were 284 (51.8%) and male sex respondents were 264 (48.2 %) The majorities of 232 (42.3%) respondents were included in age group of 25-34 years. Regarding of the religion status majority of 323 (58.9%) of respondents were orthodox religion and 127(23.2%) were protestant. The educational status of the respondents show that the majority of 442 (80.7%) of the respondent were completed tertiary or higher education and 63(11.5%) were secondary education and 43 (7.8%) were completed primary education. About marital status of the respondent majority of 258 (47.1%) of the respondent were single and 251(45.8%) were married and with regards to income status majority of 267 (48.7%) of the respondent were received income medium between 3201-7800 Ethiopian birr per month and 221(38.5%) were received < 3200 Ethiopian birr per month and the rest 70(12.8%) were received >7801 birr (Table2).

Table 2 Socio Demographic characteristics of respondent Among Government employee, at Bole Sub city in Addis Ababa Ethiopia, 2019 N=548

Variables		Frequency	Percent
Age	18-24	83	15.2
	25-34	232	42.3
	35-44	133	24.3
	45-54	55	10.0
	55-64	45	8.2
Sex	Male	264	48.2
	Female	284	51.8
Religion	Orthodox	323	58.9
	Muslim	52	9.5
	Protestant	127	23.2
	Catholic	37	6.8
	Others	9	1.6
	Education	Primary	43
	Secondary	63	11.5
	Tertiary	442	80.7
Marital Status	Single	258	47.1
	Married	251	45.8
	Divorced	21	3.8
	Widowed	18	3.3
Family size	< 4	381	69.5
	>4	167	30.5
Income	Low <3200birr	211	38.5
	Medium 3201-7800	267	48.7
	High >78001birr	70	12.8

2. Dietary habits of the respondent

Dietary habit of the participants showed that majority of 444 (81.0%) of the respondents consume grain, while 104 (19.0%) did not consume grains. The majority of 378 (69.0%) of respondent consumed vitamins, while 170 (31.0%) never consumed vitamins and majority of 420 (76.6%) of the participant had consumed fruit while

128 (23.4%) never consumed fruit. Similarly, 402 (73.4%) 313 (57.1%) 290 (52.9%) 394 (71.9%) 280 (51.1%) 354 (64.6 %) of the participants responded that they consume vegetables, meat, egg, legumes, milk and miscellaneous respectively while 146 (26.6%), 235 (42.9%), 258 (47.1 %), 154 (28.1%), 268 (48.9%),194 (35.4 %) never consume vegetables, meat ,egg, legumes, milk and miscellaneous respectively (Table3)

Table.3 Dietary habit of respondent of Among Government employee at Bole Sub city in Addis Ababa Ethiopia, 2019

Variables		Frequency	Percent
Grains	No	104	19.0
	yes	444	81.0
fruit	No	128	23.4
	yes	420	76.6
vegetables	No	146	26.6
	yes	402	73.4
meat	No	235	42.9
	yes	313	57.1
egg	No	258	47.1
	yes	290	52.9
legumes	No	154	28.1
	yes	394	71.9
milk	No	268	48.9
	yes	280	51.1
vitamins	No	170	31.0
	yes	378	69.0
Miscellaneous	No	194	35.4
	yes	354	64.6

6. Prevalence of Overweight and Obesity among government employee

The prevalence of overweight and obesity was determined by the WHO definition of by measuring BMI of an individual .The overall prevalence of overweight and obesity was found to be 191 (34.8%) out of these 82 (15.0%) were male and 109 (19.8%) were female. According to the WHO definition of abdominal obesity is by measuring waist circumference (WC). The overall prevalence of waist circumference was found to be

311 (56.8%) of these 142 (26.0%) of the respondent were male and 169 (30.8%) of the respondent were female on the other hand the overall prevalence of waist to hip ratio (WHR) was found to be 287 (52.2%) of these 110 (20.0%) of the respondent were males and 177 (32.2%) of the respondent were females. The participant body mass index BMI category results showed that 100 (18.2%) of the respondent categorized as underweight, 257 (46.9%) of the respondent were normal, 136 (24.8%) were overweight and 55(10.0%) were obese and the pooled prevalence of overweight and obesity found tube 191(34.8%)(Table7)

Table: 7 Distribution of the BMI category among Government employee, at Bole Sub city Addis in Ababa Ethiopia, 2019

Characteristics		Male n=264	Female n=284	Total n=548
BMI	Underweight <18.5	44 (8.0%)	56 (10.2%)	100 (18.2%)
	Normal 18.5-24.9	138 (25.1%)	119 (21.8%)	257 (46.9%)
	Overweight 25-29.9	63 (11.5%)	73(13.3%)	136 (24.8%)
	Obese≥30	19 (3.4%)	36 (6.6%)	55 (10.0%)
	Overweight and Obese≥25	82 (15.0%)	109 (19.8%)	191 (34.8%)
WC	≥94cm (M) &≥80cm (F)	142 (26.0%)	169 (30.8%)	311(56.8%)
WHR	≥0.85cm(M)&≥0.90cm (F)	110 (20.0%)	177(32.2%)	287(52.2%)

Table 8. Binary logistic regression model predicting the likelihood of overweight and obesity Among Government employee at Bole Sub city in Addis Ababa Ethiopia, 2019

Variables		Overweight and Obesity		COR (95% CI)	P-value
		No, n (%)	Yes, n (%)		
Age	18-24	66 (12%)	17 (3.1%)	1	0.00*
	25-34	166 (30.3%)	66 (12%)	1.54 (0.84,2.87)	
	35-44	76 (13.9%)	57 (10.4%)	2.91 (1.54,5.49)	
	45-54	32 (5.8%)	23 (4.2%)	2.79 (1.31, 5.94)	
	55-64	18 (3.3%)	27 (5.0%)	5.82 (2.61, 12.96)	
Sex	Male	183 (33.4%)	81 (14.7%)	1	0.002*
	Female	175 (32%)	109 (19.9%)	1.49 (1.04, 2.13)	
Religion	Orthodox	210(38.3%)	113(20.6%)	1.07(264, 4.384)	0.068
	Muslim	33(6.0%)	19(3.5%)	1.152(2.58,5.142)	
	Protestant	92(16.8%)	35(6.5%)	0.76 (0.180, 3.21)	
	Catholic	17(3.1%)	20(3.6%)	2.35(5.10, 10.85)	
	Others	6(1.1%)	3(0.5%)	1	
Education	Primary	25(4.6%)	18(3.3%)	1.36(0.719, 2.571)	0.463
	Secondary	44(8.0%)	19(3.5%)	0.81(0.46, 1.446)	
	Tertiary	289(52.7%)	153(27.9%)	1	

On analysis of Binary logistic regression model there is a significant association between age with overweight and obesity at (p-value =0.000) when compared to age range of 18-24 years of age and 55 years and above those age of 55 years and above had 5.82 times higher chance of being overweight and obese (COR, 5.82 (2.61, 12.96). Similarly Sex of the respondent was significantly associated with overweight and

obesity at (P-value = <0.002) and females sex were 1.49 times more likely being overweight and obese than male sex (COR=1.49, 95%CI: 1.04, 2.13).

Table.11 Multivariable logistic regression model predicting the likelihood overweight and obesity among government employee at Bole sub city in Addis Ababa Ethiopia 2019

Variable		B	COR (95% CI)	AOR (95% CI)	P-value
Age	18-24 Yrs		1	1	0.003*
	25-34 Yrs	0.351	1.54 (0.84, 2.87)	1.420 (0.746, 2.702)	
	35-44 Yrs	0.798	2.91 (1.54, 5.49)	2.221 (1.098, 4.491)	
	45-54 Yrs	0.760	2.79 (1.31, 5.94)	2.137 (0.924, 4.945)	
	55-64 Yrs	1.653	5.82 (2.61, 12.96)	5.221 (2.129, 12.801)	
sex	male		1	1	0.000*
	Female	0.399	1.49 (1.04, 2.13)	2.322(1.45, 3.719)	
Marital status	Single		1	1	0.000*
	Married	-618	5.39(3.73,7.80)	0.826(0.522,1.308)	
	Divorced	-147	0.228(0.65,0.793)	0.115(0.03, 0.441)	
	Widowed	-176	0.171(0.38,0.759)	0.07(0.013, 0.382)	
Income	Low	-0.263	1	1	0.080
	Medium	-0.624	4.71(2.71, 8.19)	0.769 (0.405, 1.45)	
	High	3.480	5.47(3.21, 9.33)	0.536 (0.292, 0.983)	
Alcohol Use	No		1	1	0.000*
	Yes	-0.939	2.799(1.94, 4.02)	3.91 (0.263, 0.581)	
Time spent on sitting	< 5hrs a day		0.69(0.48, 0.98)	0.685 (0.460, 1.021)	0.063
	6-10Hrs a day	-0.378	1	1	
Transportation to work	On foot		1	1	0.005*
	Bicycle	-1.027	0.595(0.12, 2.82)	0.358(0.070 ,1.823)	
	car	1.884	2.122(1.368, 3.29)	1.884 (1.174, 3.024)	

*Significantly associated at P-value<0.05

Maximum Standard err=.168

6. DISCUSSION

The study showed that the prevalence of overweight and obesity was determined by the WHO definition of overweight and obesity by measuring BMI of an individual. The overall prevalence of overweight and obesity was found to be (34.8%) of which 24.8% were overweight and 10.0% were obese.

The finding of our study is higher than reported in northwestern region of Ethiopia 11.3% reported from hawassa city 28.2% (95% CI: 24.2–32.2) and reported from northeast Ethiopia 28.5% (95% CI: 25.3, 31.9) and reported from Addis Ababa (9.8%) also higher than the pooled prevalence of Demographic Health Survey data of 32 sub-Saharan African countries yielding 15.9% and the region studies done in Malawi (28.1%) Benin (19.2%) Nigeria (20.8%).The discrepancy might be due to the disparities in socio-demographic characteristics and dietary habits of the study participant and increased consumption of energy-dense foods in the study population (23, 33).

The prevalence of overweight and obesity in our study was lower than study reported from among working adult in wolaita sodo town, Southern Ethiopia (40.7%) also lower than the prevalence of overweight and obesity combined was 48 %, 75 %, 68 % and 85 % in Uganda, Tanzania, Nigeria and South Africa respectively. The high prevalence of overweight and obesity reported for these countries differences have been attributed to nutritional transition whereby dietary shift from traditional diets to processed energy-rich food, fat, animal-source foods, sugar and sweetened beverages. This dietary shift may be more pronounced among urban compared to rural dwellers because of higher incomes and more availability of processed foods. We also believe that this difference could be related to the level of economic development and level of urbanization of the respective countries (34).

Furthermore, the prevalence of overweight and obesity in our study was lower than reported in studies from developed countries such as USA, Canada, Greece, and Italy. This might be adults in developed countries may consume energy-dense foods more frequently than adults living in developing countries. In addition, consumptions of mainly cereal-based repetitive diet and having a low household income to buy food commodities, may contribute to the lower prevalence of overweight and obesity in the study area. In addition, cultural restriction of some animal food items in the fasting period may contribute to the lower consumption of energy-dense food.

The difference could be due to the change in to sedentary lifestyle, risky behavioral activities, cultural factor and nutritional transition in which the food choice changes within and between the study participants. Our finding also consistent with other studies, done in Canada 33.6%, Tanzania 32.54% (8) (32).

The study identified multiple factors that are significantly associated with overweight and obesity .Age, sex, marital status, alcohol drinking, and mode of transportation to work were the main contributory factors of overweight and obesity in the study and no association with variable like income and time spent on sitting.

The finding of this study is higher odd of being overweight and obese was noted between in the age categories. Respondents who were age 45 years and above was 5.221 times increased odds of overweight and obesity compared to 18-24years of age (AOR=5.221, 95%CI: (2.129, 12.801) (P<0.003).This might be due to the fact that as age increases the likelihood of sedentary life style would also increase (23).

Our finding is consistent with the prevalence of overweight and obesity reported from Ethiopian demographic health survey (EDHS) with similar pattern of association, both among men and women as compared to adults 20–29 years of age the prevalence of overweight and obesity was almost double among those 40–49 years of age. Many studies conducted in developed and developing countries indicated that mean body weight and BMI gradually increase during late adulthood life. The association is likely to be due to natural changes in body composition and decreasing rate of metabolism late adult hood (14).

Age was found to be associated with overweight and obesity reported from study conduct in many Africa countries has been observed that the prevalence of overweight and obesity was highest in the age group 45–54 years and above has been confirmed else-where in Africa continents (35).

The finding of our study was a slightly Sex differences on status of overweight and obesity across the study area and male accounts (15%) and female accounts (19.8%).The recent Ethiopian demographic health survey conducted in 2016 similar reports show that the urban areas of Ethiopia was 21% of women and 12% of men were overweight and obese respectively and Study done in Addis Ababa city 30% of women and 20% of men either overweight or obese.

The finding of our study lower than compared to the study reported from in South African women 61 % and Ugandan 69.3 % respectively. This corroborates past studies show that more women to have overweight and obese compared to men.

Sexual variability, genetic makeup and hormonal change have been attributed to overweight and obesity However, apart from these, behavioral and cultural factors could be responsible. Being under nourished in childhood and in higher wealth category have been for possible chance of obesity in females and women engage in less physical activity than men in some cultures and Some study show that in African cultures factors such as related to body image and men' preferences for 'fat' women who are thought tube more beautiful and the belief that being fat is a sign of affluence to encourage overweight and obesity in females (34).

Studies conducted in many developing countries concluded that the observed difference between the two genders can be due to both biological and social factors. In developing countries males are more frequently engage in physically demanding activities than women hence; they may have reduced risk of overweight and obesity. Furthermore, some studies suggested females hormones have a great impact on deposition of fat and the risk factor for overweight and obesity (14).

In our fining the odds of overweight and obesity was higher among adults who reported consumption of alcohol as compared to those who did not drink alcohol yet, those who reported alcohol intake demonstrated increased odds overweight and obesity. The recent systematic review concluded that light to moderate alcohol intake is not as associated with overweight and obesity while heavy drinking is more consistently related to weight gain. A secondary analysis of data from the third National Health and Nutrition Examination Survey of the United States also observed more or less similar pattern of association and Alcohol is an important source of condensed calorie and positive energy balance(14).

There are several sources of evidence suggest that alcohol intake is the potential influence on weight gain and when a person consumes alcohol the caloric intake increases and it causes weight gain and this relationship between alcohol intake and weight gain is probably due to the relatively high energy content of ethanol compared to other macronutrients. Pure ethanol has an energy density of 7.1 kcal/g, while the energy density of lipids (fat) is 9 kcal/g; proteins and carbohydrates has an energy density of 4 kcal/g and excessive consumption of ethanol may result in a positive energy balance which may over time result in being overweight or obese(11).

In Our finding marital status is also an important determinant of overweight and obesity being married is increase the likely hood of overweight and obesity than Single in study done in African continent. In study done

among Ghanaian medical students found that individuals who were married were nearly six times more likely to be overweight or obese compared to those who were never married and other Ghanaian studies found that married women were more likely to be obese compared to unmarried women(36).

The result of our finding shows that government employee both shift into marriage and away from marriage are risk factors for becoming overweight and obese. But the exact mechanisms not clear further research is needed to illustrate apparent association with marriage status.

In our study marriage was found to be associated positively with overweight and obesity and marital status to be a predictor of overweight and obesity whereby those married/living together were more likely to be overweight and obesity than never married. Marriage and Over nutrition has been two sided. On one hand marriage was demonstrated to be protective with the argument that promotes better health and increases longevity. On the other hand entry into marriage has been demonstrated to be a risk factor for overweight/ obesity and married couples may no longer pay attention to their weight they often eat to gather ordered fast foods, spend much time watching television together and exercise less and child bearing is another risk factor in females and never married need to keep their weight under check to remain attractive for potential suitors and this may also be true for those divorced especially females to enhance their prospects in the marriage market (34).

The finding of this study show that the observed prevalence of overweight and obesity with sedentary lifestyle and mode of transportation to work showed that those who were using car as transportation system were high chance of being overweight and obesity Compared to those who were walking by foot (19, 37).

9. Conclusion

This study provides valuable information concerning overweight and obesity in a government employee. The prevalence of overweight and obesity in this study was unexpectedly higher than previous studies conducted in Ethiopia. Overweight and obesity are clearly a more serious problem among government employee and causes for the obesity epidemic and may lead to an unexpected increase in heart disease, diabetes and even cancers over the next decade. This finding provide useful information for developing interventions to prevent overweight and obesity .Being physically inactive, consumption of alcohol, being married and female sex, in addition to old age is increase the risk of overweight and obesity.

10. Recommendations

Interventions such as sports, keep fit clubs, gym membership, aimed at promoting physical activity must be implemented among sedentary workers. These activities could be run through the management of institution such as government civil servant commission in addition local and international health organizations must intensify their advocacy for healthy diet, physical activity, especially in the work place as well as to the general population. Further assessment need to be conducted to explore more determinants of overweight and obesity.

Abbreviations

AOR , Adjusted Odds Ratio **WHR.** Waist to hip ratio **WC** .Waist circumference **W.H.O**, World Health Organization **SSA** Sub-Saharan African **SES** socioeconomic status, **NCD.** Non communicable Disease **COR.** Crude Odds Ratio **BMI**, Body Mass Index **FFQ** Food frequency questionnaire **FANTA**, Food and nutrition technical assistant **EDHS**, Ethiopian Demographic and Health Survey **GPAQ.** Global Physical Activity Questionnaire

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Author's contribution

1. **Abiyot Bekele** (MPH) contributed for the conception and design of the study. Principal investigator, data analysis, manuscript writing. The authors have read and approved the final document
2. **Samson Zegeye** (MPH)) (co. author) reviewed and revised subsequent drafts of the manuscript for important intellectual content
3. **Shikur Mohammed** (ASS.PROF (proposal writing) reviewed and revised subsequent drafts of the manuscript for important intellectual content

Declarations

Ethics approval and consent to participate Ethical clearance was obtained from ethical review board of SPMMC department of public health before data collection. Official letter was written to bole sub city administration office and particular woreda. After verbal and written consent were obtained from each employee the purpose of study, assurance of confidentiality and significance of the study were explained to individuals

Consent for publication Not applicable.

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