Obesity Prevalence, Associated Factors and Complications among Adult Population Attending Family Medicine Clinic in Hatta Hospital, United Arab Emirates

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Abstract

Background: The United Arab Emirates (UAE) has experienced rapid economic growth in the last few decades, resulting in swift urbanization and an influx of foreign labor. This has facilitated an advanced, yet sedentary lifestyle characterized by increased reliance on technology, unhealthy dietary habits, and a reduction in physical activity levels. These factors significantly contributed to the rise in the prevalence of obesity.

Objective: To determine the prevalence of obesity, it's associated factors, and complications among adults presenting to the primary care clinic at Hatta Hospital, located in the Hatta area UAE.

Materials and Methods: This cross-sectional study enrolled adult Emirati patients aged between 18-55 year. The study duration was from January 2022 to August 2022 Body Mass Index (BMI) was categorized based on the World Health Organization's threshold. Patients' socio-demographic and clinical data was obtained and recorded.

Results: A total of 600 Emirati patients were included in this study, with a median age of 33 (IQR=25-45) years. Gender distribution was kept almost equal with 50.5% male and 49.5% female participants. The median BMI among the participants was 28.2 (IQR=24.3-32.5) kg/m^2. The prevalence of underweight, normal weight, overweight, and obesity was found as 4.3%, 23.5%, 33.7% and 38.5% respectively. After adjusting the co-variants in the multivariable model, lower education levels were found to be significantly associated with higher odds of obesity. Conversely, being single and adhering to a healthy lifestyle was associated with lower odds of obesity in the multivariable model.

Conclusion: The present study identified that 38.5% of the adult population attending Hatta Hospital family medicine clinics were obese and 33.7% were overweight. Conclusively, 72.2% of the adult population of the Hatta area have a BMI above normal, indicating a very high prevalence of obesity and overweight cases. Furthermore, a significant association of obesity was found with lower education levels, being married, having unhealthy dietary habits, and insufficient physical activity.

Keywords: *Body mass index (BMI), obesity, adult population, outpatient clinics.*

INTRODUCTION

The World Health Organization (WHO) defines overweight and obesity as abnormal and excessive amounts of fat accumulation in the body, resulting in significant health risks [1]. It is directly connected to an imbalance between energy intake and expenditure, which is further influenced by a variety of modifiable and non-modifiable risk factors [2]. This inequality in caloric balance results in excessive storage of energy and fat in the body, which ultimately leads to an oversized physique.

The global prevalence of obesity is rising at an alarming rate and the current data shows that 39 million children, 340 million adolescents, and 650 million adults are obese worldwide. The prevalence is estimated to rise and according to WHO, it is predicted that 167 million more adults and children will face significant health risks because of being overweight or obese by the year 2025 [3]. Based on this fact, the American Medical Association identified obesity as an illness in 2013 to call doctors' attention to the problem [4].

Obesity is considered a leading cause of morbidity and mortality due to its strong association with certain neurological, gastrointestinal, respiratory, and cardiovascular conditions [5]. Noncommunicable diseases (NCDs) like type 2 diabetes, ischemic heart disease (IHD), cerebrovascular accident (CVA), and many psychological disorders are significantly influenced by obesity [5]. The rising trend of overweight and obesity has hazardous effects on global health, leading to increased death and disability-adjusted life years (DALYs) [6, 7]. Furthermore, being overweight or obese is associated with a dysfunctional immune system, which not only makes a person more vulnerable to contracting infections but can also lead to the development of certain cancers [8]. Research estimated that elevated BMI is linked to 4.7 million deaths and 147.7 million DALYs from NCDs in 2017. By 2025, that number is expected to rise to 5.5 million deaths and 176.9 million DALYs [9].

Obesity is a complex medical disorder that negatively influences health by various mechanisms [10]. Few of these include biological [11], psychological [12],

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Received: January 01, 2024; Revised: March 11, 2024; Accepted: March 12, 2024
DOI: https://doi.org/10.37184/lnjpc.2707-3521.6.38

socioeconomic [13], and environmental components [14], though these represent only a minor portion of its characteristics. In addition to factors such as sleep deprivation, obesity may also be influenced by psychological factors, stress, imbalance of the gut microbiota (dysbiosis), genetical influence, and certain medical disorders like thyroid dysfunction, Cushing syndrome, and polycystic ovarian disease [15, 16]. Body mass index (BMI), which is determined by dividing weight in kilograms by height in meters square (kg/m^2), is a widely used and approved metric for estimating the prevalence of obesity. Even though BMI is not considered as a reliable indicator of obesity, it remains a convenient tool for epidemiological studies and health screening [17].

The Gulf region specifically the UAE has undergone a rapid socioeconomic advancement, attributed to the discovery of oil reserves. This has been followed by accelerated urbanization and the influx of foreign labor. Therefore, a lavish, technologically advanced but sedentary lifestyle has emerged, which led to reduced physical activity across the workplace, domestic, and leisure settings. Furthermore, there is prevalent consumption of processed, prepackaged foods with low nutritional value and high sugar, trans-fat, and calorie content [18, 19].

Hatta, situated as an exclave of Dubai, is approximately 134 kilometers to the east. It has a population of 14,985 as per the Dubai Statistics Center Population Bulletin 2021. Hatta Hospital is a secondary care multidisciplinary facility, located at the center of Hatta city. It primarily serves patients from Hatta and nearby areas of the UAE and Oman, providing healthcare to a population of around 50,000 residents. There are several previous research studies on the prevalence of obesity in the UAE, mostly focusing on cities like Dubai, Abu Dhabi, and Ras Al Khaimah, revealing an alarming trend of obesity. However, there is a notable lack of research specifically addressing the prevalence of obesity in the Hatta area of UAE.

This study aims to address this gap, and the results will provide valuable insight into obesity prevalence in the Hatta area and serve as a basis for implementing early intervention and developing strategies to deal with this growing problem in the UAE.

MATERIALS AND METHODS

This cross-sectional study was performed in Hatta Hospital from January 2022 to August 2022, after acquiring ethical approval from the Dubai Scientific Research Ethics Committee (DSCRE) (IRB# DSREC-09/2021_09). According to The Surveys system calculator, the sample size should be 593 with a confidence level of 95% and a confidence interval of 4. This study included 600 Emirati patients in the age range of 18-55 years, with no significant medical conditions or diseases that could develop obesity. The ratio of male and female participants was kept equal. Patients with any major disease such as cancer, liver diseases, kidney diseases, endocrinology issues, and those who have undergone bariatric surgery were not included.

BMI was calculated by dividing the patient's body weight in kg by the square of their height in meters (kg/m^2). BMI was categorized according to WHO as underweight (<18.5 kg/m^2), normal weight (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2) and obese (≥30 kg/m^2) [20]. Body weight was measured using an electronic weighing machine in light clothes and without shoes. Height was measured using a stadiometer without shoes. Non-communicable diseases were determined based on the patient's previous medical record or evidence of medication to manage the disease.

The demographic data of the participants including age, gender, education, occupation, marital status, physical activity, type of diet intake (healthy/unhealthy), and smoking status were documented. In this study, an unhealthy diet is classified as the consumption of junk foods including packaged or canned foods, foods with high trans-fat, sugar, or calories, and/or soft drinks based on the patient's self-reporting. The patients who reported consuming junk foods at least three times per week or more were classified as having an unhealthy diet.

SPSS was used for statistical analysis of collected data. Categorical variables were expressed as frequency and percentage. Numerical variables were presented as median with inter-quartile range (IQR) as they were non-normally distributed which was confirmed through applying the normality assumption test, and the Shapiro-wilk test. Patients' features were compared among different categories of BMI using a chi-square test. Ordinal logistic regression was applied to determine the association of patients' features with obesity. Variables with p-values <0.25 in univariates were put up in a final regression model. A P-value less than or equal to 0.05 was considered statistically significant in the final regression model.

RESULTS

Summary of Socio-Demographic Profile

A total of 600 Emirati patients were included in the study. Median age was 33 (IQR=25-45) years with a range of 18-55 years. Gender distribution was almost equal with 50.5% males and 49.5% female participation. Table **1** presents the socio-demographic characteristics of the study participants categorized based on male and female gender.

Table 1: Summary statistics for patients' demographic features.

Variables	Total n(%)	Male n(%)	Female n(%)
Age groups			
18-30 years	275(45.8)	142(46.9)	133(44.8)
31-49 years	233(38.8)	108(35.6)	125(42.1)
50-55 years	92(15.3)	53(17.5)	39(13.1)

Variables	Total n(%)	Male n(%)	Female n(%)
Education			
Illiterate	42(7)	2(0.7)	40(13.5)
Middle school	11(1.8)	1(0.3)	10(3.4)
High school	220(36.7)	118(38.9)	102(34.3)
College	295(49.2)	173(57.1)	122(41.1)
University	32(5.3)	9(3)	23(7.7)
Occupation			
Employed	332(55.3)	9(3)	167(56.2)
Unemployed	176(29.3)	255(84.2)	77(25.9)
Student	92(15.3)	39(12.9)	53(17.8)
Marital status			
Single	171(28.5)	87(28.7)	84(28.3)
Married/divorced/widow	429(71.5)	216(71.3)	213(71.7)
Type of Diet Intake			
Healthy	376(62.7)	187(61.7)	189(63.6)
Unhealthy	224(37.3)	116(38.3)	108(36.4)
Smoking Status			
Smoker	103(17.2)	103(34)	0(0)
Never smoked	497(82.8)	200(66)	297(100)
Physical activity			
None	302(50.3)	119(39.3)	183(61.6)
<30 minutes per day	161(26.8)	104(34.3)	57(19.2)
≥30 minutes per day	137(22.8)	80(26.4)	57(19.2)

Obesity Prevalence and Comparison of Participants' Features, among Different Body Mass Index Categories

Median BMI levels among patients were 28.2 (IQR=24.3-32.5) kg/m^2. BMI range was 14.1-56.9 Kg/m^2. The percentage of underweight, normal, overweight, and obese participants was found to be 4.3%, 23.5%, 33.7%, and 38.5% respectively. Table **2** displays a comparison of participants' characteristics across different BMI categories. This study found that the prevalence of obesity was significantly lower among younger participants of the age group 18-30 years. Gender, education level, occupation, marital status, type of diet, and physical activity were found significantly different among obese and non-obese groups as shown in Table **2**.

Univariate and Multivariable Association of Participants' Features with Obesity Prevalence

The univariate analysis reveals that younger patients are at a lower risk of obesity. The odds of obesity were significantly higher with the patients who have lower education levels compared to those who have university levels of education. Obesity risk was higher among both unemployed and employed individuals in contrast to the students. Furthermore, being single and consuming a healthy diet were related to a reduced risk of obesity whereas smokers and individuals who do not engage in physical activity regularly or allocate <30 minutes/day for physical activity had higher obesity odds. The multivariable regression model when adjusted with other covariates suggested that lower education levels are significantly associated with higher odds of obesity. In contrast, being unmarried and adhering to a healthy diet were identified as factors significantly associated with lower odds of obesity (**Table 3**).

Table 2: Comparison of participant's characteristics across various body mass index (BMI) classes.

Variables	Groups	Body Mass Index				p-value
		Underweight n(%)	Normal n(%)	Overweight n(%)	Obese n(%)	
Age	18-30 years	25(9.1)	86(31.3)	83(30.2)	81(29.5)	*<0.001
	31-49 years	1(0.4)	41(17.6)	77(33)	114(48.9)	
	50 years and above	0(0)	14(15.2)	42(45.7)	36(39.1)	
Gender	Male	3(1)	75(24.8)	124(40.9)	101(33.3)	0.941
	Female	23(7.7)	66(22.2)	78(26.3)	130(43.8)	
Education	Illiterate	0(0)	2(4.8)	14(33.3)	26(61.9)	*<0.001
	Middle school	0(0)	0(0)	1(9.1)	10(90.9)	
	High school	6(2.7)	47(21.4)	72(32.7)	95(43.2)	
	College	12(4.1)	82(27.8)	106(35.9)	95(32.2)	
	University	8(25)	10(31.3)	9(28.1)	5(15.6)	
Occupation	Unemployed	7(4)	29(16.5)	45(25.6)	95(54)	*<0.001
	Employed	7(2.1)	77(23.2)	132(39.8)	116(34.9)	
	Students	12(13)	35(38)	25(27.2)	20(21.7)	
Marital status	Single	16(9.4)	65(38)	47(27.5)	43(25.1)	*<0.001
	Married	10(2.3)	76(17.7)	155(36.1)	188(43.8)	
Diet	Healthy	19(5.1)	110(29.3)	138(36.7)	109(29)	*<0.001
	unhealthy	7(3.1)	31(13.8)	64(28.6)	122(54.5)	
Smoking status	Never	25(5)	113(22.7)	164(33)	195(39.2)	0.949
	Smoker	1(1)	28(27.2)	38(36.9)	36(35)	
Physical activity	None	18(6)	54(17.9)	88(29.1)	142(47)	*<0.001
	<30 minutes per day	4(2.5)	34(21.1)	69(42.9)	54(33.5)	
	≥30 minutes per day	4(2.9)	53(38.7)	45(32.8)	35(25.5)	

*Significant at p<0.05.

Table 3: Univariate and multivariable association of patients' features with obesity.

Variables	Groups	OR (95% CI)	p-value	aOR (95% CI)	p-value
Age	18-30 years	0.4 (0.3-0.7)	<0.001	0.8 (0.5-1.4)	0.503
	31-49 years	1.2 (0.8-1.9)	0.363	1.5 (0.9-2.4)	0.126
	50 years and above	Reference category		-	-
Gender	Male	0.9 (0.7-1.2)	0.464	-	-
	Female	Reference category		-	-
Education	Illiterate	13.7 (5.5-33.8)	*<0.001	5.4 (1.9-15.3)	*0.002
	Middle school	77.2 (8.7-682)	*<0.001	77.2 (3.9-383.4)	*0.002
	High school	5.6 (2.8-11.2)	*<0.001	5.6 (1.4-6.1)	*0.005
	College	3.6 (1.8-7.1)	*<0.001	2.7 (1.3-5.5)	*0.002
	University	Reference category		Reference category	
Occupation	Unemployed	4.9 (3.1-8)	*<0.001	1.5 (0.8-2.9)	0.189
	Employed	2.7 (1.8-4.2)	*<0.001	1.2 (0.7-2)	0.571
	Students	Reference category		Reference category	
Marital status	Single	0.3 (0.2-0.5)	*<0.001	0.6 (0.3-0.9)	*0.011
	Married	Reference category		Reference category	
Diet	Healthy	0.4 (0.3-0.5)	*<0.001	0.4 (0.3-0.5)	*<0.001
	Unhealthy	Reference category		Reference category	
Smoking status	Never	1.1 (0.7-1.6)	0.721	-	-
	Smoker	Reference category		-	-
Physical activity per day	None	2.3 (1.6-3.4)	<0.001	1.3(0.9-2)	0.200
	<30 minutes	1.7 (1.1-2.6)	0.012	1.4(0.9-2.2)	0.124
	≥30 minutes	Reference category		Reference category	

CI: Confidence interval, OR= Odds ratio, aOR= Adjusted Odds ratio, *Significant at p<0.05.

Burden of Non-Communicable Diseases among Study Subjects

Fig. **(1)** displays the prevalence of non-communicable diseases among patients with BMI <25 Kg/m² and ≥25 Kg/m². Frequency of dyslipidemia (p<0.001), type 2 diabetes (p<0.001), hypertension (p<0.001), and cardiac problems (p<0.001) were significantly higher among patients with BMI ≥25 Kg/m². Other complications including impaired fasting glucose, hyperuricemia, asthma, and hypothyroid were not significantly different among patients with a BMI of <25 Kg/m² and ≥25 Kg/m².

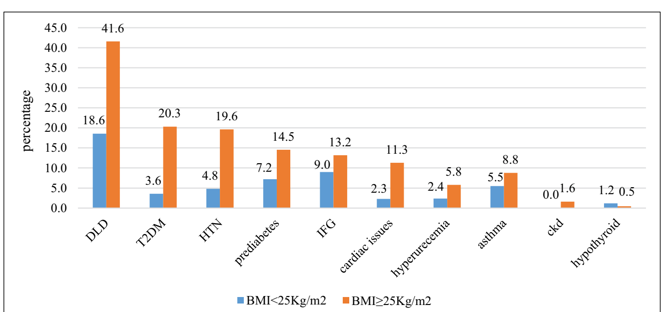

Fig. (1): Complications of obesity among patients with BMI <25 Kg/m² and ≥25 Kg/m².
DLD: Dyslipidemia, T2DM: Type 2 diabetes, HTN: Hypertension: IFG: Impaired fasting glucose, CKD: Chronic kidney disease

DISCUSSION

The present study found that 33.7% of participants were overweight and 38.5% were obese. In other words, 72.2% of the adult population attending Hatta Hospital is either obese or overweight. A similar study conducted in UAE and including a larger sample of expatriates reported the percentage of overweight and obese as 43% and 32.3% respectively [21]. On the other hand, in 2019, data collected from a community-based study in the UAE reported a lower obesity prevalence of 17.8%, using a BMI threshold >30 kg/m² [22]. Several previous studies conducted among Gulf countries reported a higher obesity prevalence. According to WHO, overweight and obesity prevalence in Saudi Arabia is 68.2% and 33.7% respectively [23]. Data from Kuwait shows the prevalence of obesity was 42.1% [24]. Studies revealed that Oman's predicament of overweight and obesity is comparable to that of the Eastern Mediterranean Region as a whole, where 49% of adults are classified as overweight or obese [25]. Another similar study conducted by Bahrain primary care clinics reported the obesity prevalence as 42% [26].

The elevated prevalence of obesity in this study may be due to the conduction timing, as the data was collected shortly after the release of lockdown measures for the COVID-19 pandemic, when a significant number of people spent time in quarantine leading to increased BMI levels. Pellegrini *et al.*, [27] also reported a noticeable rise in weight gain among individuals who were in quarantine lasting longer than a month. The World Obesity Atlas 2023 report also validates this fact, highlighting that in many countries during the lockdown period from 2020 to 2022, there was an elevated risk of weight gain due to restricted movements outside the home. This exacerbated unhealthy dietary and sedentary behaviors associated with weight gain and significantly reduced access to care [28].

The present study demonstrated higher obesity prevalence among the female participants than males (43.8% *versus* 33.3%), although this difference is not statistically significant as shown in Table **2**. Similar previous surveys conducted in the UAE reported that females were more likely to be obese than males [21, 29, 30]. Sulaiman *et al.*, [21] carried out a larger study on 3064 subjects and analyzed that based on BMI, females tend to be obese than males (OR =1.24, 95% CI 1.01–1.53). Another similar larger survey from UAE reported that female gender was significantly associated with higher odds of obesity (aOR=1.62, 95% CI: 1.10-2.39) [22]. The pattern of higher obesity rate among females than males was also seen in previous studies from Gulf countries [29, 30].

The present study did not demonstrate a significant association between age and obesity in multivariable regression analysis. Although, the univariate analysis found younger people are at lower risk of obesity. Again, the larger surveys performed in the UAE reported an association between increasing age and a high risk of obesity [21].

Our study demonstrated a reduced risk of obesity among individuals with higher education levels. This could be attributed to the fact that highly educated participants usually have greater access to knowledge regarding healthy lifestyles and available healthcare services. Consequently, they are more aware of the factors that can contribute to obesity and associated health risks. This observation is evident in our study which found a higher risk of obesity among those with lower education levels compared to individuals who have university-level education. A meta-analysis reported an association of higher obesity risk with lower education levels among women but this association was weak in males [31]. Similarly, a study conducted in America reported that among women there was an inverse relationship between obesity and educational status and also for males living in highly developed cities, higher education was found a protective factor against obesity [32]. In contrast to our findings, Mamdouh *et al.*, [22] did not find a significant association between education and obesity. Other comparable studies from Egypt and Ethiopia were also unable to find an association between education and obesity [33, 34].

The present study revealed a significant link between occupation and obesity. Similarly, prior research has consistently shown a direct relation between occupation with obesity. For instance, Mamdouh *et al.*, [22] analyzed that after adjusting for age and sex, individuals in clerical and unskilled professions face a high risk of obesity. However, contrasting findings emerged from a larger-scale study that did not identify a significant association between occupation and obesity [24]. Similarly, Sulaiman *et al.*, [21] were unable to establish occupation as a contributing factor for obesity.

Occupational physical activity is recognized as a significant factor in estimating the daily energy expenditure, while the availability of type of food in the workplace can impact daily caloric intake. Consequently, analyzing occupation as a precise factor of obesity in such surveys may not provide an accurate insight into its role in obesity and overweight. There is a need for in-depth research to uncover the complex relationship between obesity and workplace variables, including working hours, occupation demand, physical activity, and available food options.

This study estimated that unmarried individuals exhibit a lower risk of obesity compared to married, divorced, or widowed individuals. Similarly, Sulaiman *et al.*, [21] reported a considerable association of marital status with obesity, where married individuals (aOR=2.40, 95% CI: 1.87-3.08) and divorced/widowed individuals (aOR=1.40, 95% CI: 0.64-3.11) had significantly increased obesity risk compared to those who were single. However, in contrast to our study, another similar study reported that being single, divorced, or separated had higher odds of abdominal and general obesity [35]. One possible explanation for contrasting findings among different studies could be due to differences in population anthropometry. The explanation for higher odds of obesity in our region may be that single individuals may prioritize their body weight and fitness more, as they want to attract an appealing partner to marry. However, once married, their focus may shift towards earning income and fulfilling other responsibilities, potentially leading to a change in lifestyle behavior that contributes to obesity.

Obesity was indeed found to be significantly associated with diet and physical activity in the current study. The individuals who managed to adhere to a healthy lifestyle were found to have lower obesity risk compared to those who did not engage in regular exercise. These findings align with other similar studies [21, 22], and emphasize the well-established association between unhealthy lifestyles and obesity.

Interestingly, this study did not find any significant link between smoking and obesity even though smoking is routinely claimed to be one of the drivers of obesity [26, 30]. The lack of association observed in this study could be attributed to several factors, such as limited sample size or the predominance of non-smokers, particularly among females, which may influence the detection of this association.

The present study found that NCDs including hypertension, type 2 diabetes mellitus (T2DM), dyslipidemia, and cardiac problems were significantly more prevalent among the overweight or obese participants, consistent with the prior research [7, 9, 17]. However, other NCDs such as chronic kidney disease (CKD), asthma, hyperuricemia, prediabetes, and impaired fasting glucose did not exhibit significant differences between the participants with BMI <25 Kg/m^2 and ≥25 Kg/m^2. Diseases such as asthma, CKD, and hyperuricemia might impact the lean participants for several reasons. Nevertheless, it is surprising to find that the prevalence of prediabetes did not differ significantly among lean and obese participants. This lack of significant association could be due to the small sample size.

STRENGTH AND LIMITATIONS

The present study shed light on the prevalence of overweight and obesity among the patients visiting the primary care clinic at Hatta Hospital in the Hatta area. Understanding the existing load of obesity will be beneficial in establishing public health strategies to address this issue at the governmental level and recognizing the role of physicians in lowering the elevated BMI burden. However, there are some limitations to consider, as this study solely analyzed the data from a single center. Additionally, the sample size was small, body anthropometry measures other than BMI, such as waist and neck circumference and hip-to-waist ratio were not assessed. Furthermore, NCDs were not classified based on updated laboratory investigations. These limitations restrict to generalize of the findings of the current study.

CONCLUSION

The preset study discovered a higher obesity prevalence among the patients attending the family medicine clinic at Hatta Hospital, with associations observed between obesity and lower education levels, marital status, unhealthy diet, and insufficient physical activity.

ETHICAL APPROVAL

Ethical approval was obtained from the Dubai Scientific Research Ethics Committee (DSREC), Dubai Health Authority, Dubai, UAE (REF letter No.: DSREC-09/2021_09). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/ or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

AVAILABILITY OF DATA

The data set may be acquired from the corresponding author upon a reasonable request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

AUTHORS' CONTRIBUTION

AR conceptualized the study. AR & UF performed literature search and designed the study protocol. AR, ZNQ and ME collected data and entered in spreadsheets. AR and UF analyzed the data and prepared initial manuscript draft. AR critically revised the initial draft. All authors read and approved the manuscript.

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