Journal of Pharmaceutical Research International

33(31B): 194-202, 2021; Article no.JPRI.69655
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Overweight and Obesity Prevalence and Predictors in People Living in Karachi

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i31B31708
Editor(s):
(1) Dr. Ana Cláudia Coelho, University of Trás-os-Montes, Portugal.
Reviewers:
(1) Monica Tarcea, University of Medicine, Romania.
(2) Hamat Hamdi, National University of Malaysia (UKM), Malaysia.
Complete Peer review History: http://www.sdiarticle4.com/review-history/69655

Original Research Article

Received 02 April 2021
Accepted 12 June 2021
Published 15 June 2021

ABSTRACT

Objective: This study was aimed to establish the prevalence of overweight, obesity and related its factors among the citizens of Karachi.
Methodology: From Jan 2018 to August 2018. This cross-sectional analysis was conducted to obtain information from 772 persons using a validated questionnaire and traditional height and weight evaluation methods have been used. Overweight and obesity were described by South Asian cut-off points as 23 ≥ BMI (Normal), 25.0 - 29.9 BMI (Overweight) and 30 ≤ BMI (Obese) respectively. For data processing, version 21.0 of SPSS was used.

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Results: In this sample study men was 44.5% and women was 55.5%.Age group 20-39 was the most numerous group which was 55.70%. Among Overweight and obesity were found to be higher in men than in women. About 23.3% of the people were smokers, 1.42% was alcohol consumer, while 20.3% had vegetarian diet, 55.8% had semi-vegetarian diet, and 23.8% had non-vegetarian diet. The prevalence of overweight and obesity among individuals with co-morbidities is 33.96 %, p=0.000. There were 38.5% of people who performed physical activity for at least 30 minutes every day.

Conclusion: Overweight and obesity prevalence was found to be high among Karachi individuals, particularly in men than in women. The predictors of obesity were sedentary lifestyle, including diet and lack of physical exercise, smoking, alcohol intake, and presence of co-morbidities. Preventive steps to avoid overweight and obesity may be recommended for people.

Keywords: Overweight; obesity; body mass index; sedentary lifestyle; co-morbidities.

1. INTRODUCTION

An emerging public health crisis (overweight and obesity) in developing countries has correlated with the westernization of culture and associated lifestyle changes [1]. Many developed countries are facing a food transition [2,3] in which the level of under nutrition in the face of emerging overweight and obesity is consistently high[2,3]. The prevalence of childhood overweight and obesity in Nigeria and in other Africa countries varied between 0% - 26.7% across the age ranges, based on the measurement approaches used [4-13]. Different methodologies examples are BMI measurement [4,6,7] versus bio-electrical impedance [5] versus waist circumference [8], and differences in definition by WHO 2007 [4,6] versus International Obesity Task Force (IOTF) [7] versus National Centre for Health Statistics (NCHS) [4].

During infancy and adolescence complications from overweight and obesity may continue into adulthood and the risk of morbidity and mortality may be increased later in life [14,15]. This involves the occurrence of high blood pressure and the resulting risk of cardiovascular morbidity and early death [16,17]. The prevention and treatment of childhood overweight and obesity has been a significant focal point of pediatric science and clinical care because of these complications [15].

The prevalence of overweight and obesity was influenced by environmental and genetic factors [15,18,19] although some impact in consistencies were found [20]. In developed countries particularly, children who are born into a high-income household, higher levels of maternal schooling, inadequate physical activity, female gender and race are the main risk factors [21,22]. Prenatal factors such as motherly gestational diabetes and foetal nutrition are significant, however [15] Physical activity, TV watching and socioeconomic family status may have interdependent trends but few research in Nigeria explored the effect of television involvement or absence in the individual's sleeping area and the amount of hours spent on the screen are the prevalence of overweight and obesity. Moreover, there were contradictory consequences with such risk factors such as family socioeconomic status and race [22–24].

Early detection of childhood risk factors might provide an incentive action for action to minimize the prevalence of overweight and obesity [25]. Overweight and obesity are best matched to early life counseling and early intervention, which could mitigate both the short- and long-term impacts of overweight and obesity and crack the juvenile and adult care monitoring system [26]. The purpose of this study was to examine overweight and obesity threats among Individuals living in Karachi, the City of lights, Pakistan, and the study possibly influence factors based on a broad epidemiology survey carried out in Karachi, which will lead to policy making in Karachi's population over the management of obesity.

2. METHODOLOGY

2.1 Sample

This cross-sectional study was performed from January 2018 to August 2018 in Karachi, Pakistan using sample size of 743 healthy individuals of both sexes aged 20-90.

2.2 Ethics and Consent

The research was carried out with the approval from Baqai Institute of Pharmaceutical Sciences

Ethical Board. In this study, the conditions for individuals informed consent is waived because there was no prior contact with the subject.

2.3 Study Plan and Methodology

During the study there was no participation of any therapy or treatment, so participants of the test were not harmed. The subject ID number has been used to identify the subject and the subject ID has been kept confidential and has not been published in a particular manner either before or after that analysis of the database. The data on the subject were also kept secret.

Those men and women who spontaneously agreed to take BMI steps for general medical examinations during the time of their hospital visits were analysed in the course of this research by a total of 743 (age range 20-90). In order to capture the data using a consecutive process, sampling was done.

2.4 Exclusion Criteria

The portion of this research is not required to include an individual who are under 20 and above 90 years age and/or who take any drug for obesity, or on hormone replacement therapy. Anyone with history of cancers, liver and renal disorders or an illness involving parathyroid have also been removed. Study also declined to consider mothers who were pregnant or lactating.

2.5 Data Collection

Depending on gender, age and height, weight, BMI status and food intake (Vegetarian, Semi-vegetarian, non vegetarian diet), data have been recorded. Data were also focused on the use of alcohol and smoking, activity levels, and other current co-morbidities.

The height and weight anthropometric data are measured by Floor type weighing machine. The measured height with standiometer, with precision of 1 mm and by the use of Weight Balance with the consistency of 0.05 kg “weighing machine " The body mass Index is dependent on weight and height. The formula for BMI was calculated as: weight (kg) / height (m^2).

2.6 Entering and Processing Results

Microsoft Excel® and the Social Science Processing Package 21 have been used for data entering and processing (SPSS Inc., Chicago, IL, USA). Variables were grouped according to gender, age, dietary status lifestyle and BMI status, to promote study. Age of an individuals were categorized into four sub groups (Group 1: 20-39 years, Group 2: 40-59 years Group 3: 60-79 years, Group 4: 80 and above years). The Life style status contains multiple variables including dietary status which was classificated in the vegetarian, semi-vegetarian and non-vegetarian category. Physical activity status, smoking or alcohol consumption status. Presence or absence of co morbidities factor were also assessed with respect to BMI. In all statistical analyses, the statistical significance was calculated at the basis of p-value.

2.7 Categories of Body Mass Index

Weight, height and BMI were collected on site during the hospital visit. Individuals is categorized as meeting the conditions specified by the WHO:

Underweight (<18.5 kg/m^2),
Healthy weight (18.5 – 24.9 kg/m^2),
Overweight (25.0–29.9 kg/m^2), and
Obese (30.0 kg/m^2–above) [27-29].

3. RESULTS

The number and proportion of individuals in various age groups were presented according to gender in the Table 1. Individuals aged 20-39 were the most numerous group (55.70%), led by individuals 40-59, 60-79, and ≥80 years age group. There is the least number of individuals in group ≥ 80. Individuals were on average 54.24 ± 33.75 years old. The survey contained 46.76% females of average aged 52.19 ± 32.49 and 53.23% male of average aged 54.09 ± 33.97.

Individual’s classification by BMI provides varying outcomes for different reference values. The findings reveal that the study of 772 individuals was divided into four groups dependent on the BMI status. For the WHO classification the obese figure is 23.83%, the overweight ratio is 29.53%, and the under weight ratio is 19.43% (Table 2).

More females (84) were substantially underweight than men (66). In 56.19% of men and 43.81% of females healthy weight was observed, while for males the overweight and obese ratio was 55.10% and for females it was 44.90%. Men are more vulnerable to overweight and females are more susceptible to

underweight. The prevalence ratio definition and logistical regression models have shown that females are less likely to suffer obese and overweight. The healthy weight ratio of the females was lower than of men (25.48% compared with 28.71%) but considerably higher (56% vs. 44%) in case of underweight category (Table 2, Fig.1).

Table 1. Total frequencies and ratios of individuals split down by age and sex

		Age ⟶	20-39	40-59	60-79	≥80	Total
Gender	Male	Count (n)	220	77	87	27	411
		Percentage (%)	51.16%	52.38%	61.26%	50.94%	53.23%
	Female	Count (n)	210	70	55	26	361
		Percentage (%)	48.84%	47.62%	38.73%	49.06%	46.76%
Total		Count (n)	430	147	142	53	772
		Percentage (%)	55.70%	19.04%	18.40%	6.86%	

Table 2. Prevalence between persons with underweight, over weighted or obese depending on WHO standards

WHO BMI Standards ⟶			Under Weight n	Healthy Weight n	Over Weight n	Obese n	Total n	p-value
Gender	Male	Count	66	118	122	105	411	0.073
		Expected Count	79.9	111.8	121.4	98	411	
	Female	Count	84	92	106	79	361	
		Expected Count	70.1	98.2	106.6	86	361	
Total		Count	150	210	228	184	772	
		Expected Count	150	210	228	184	772	

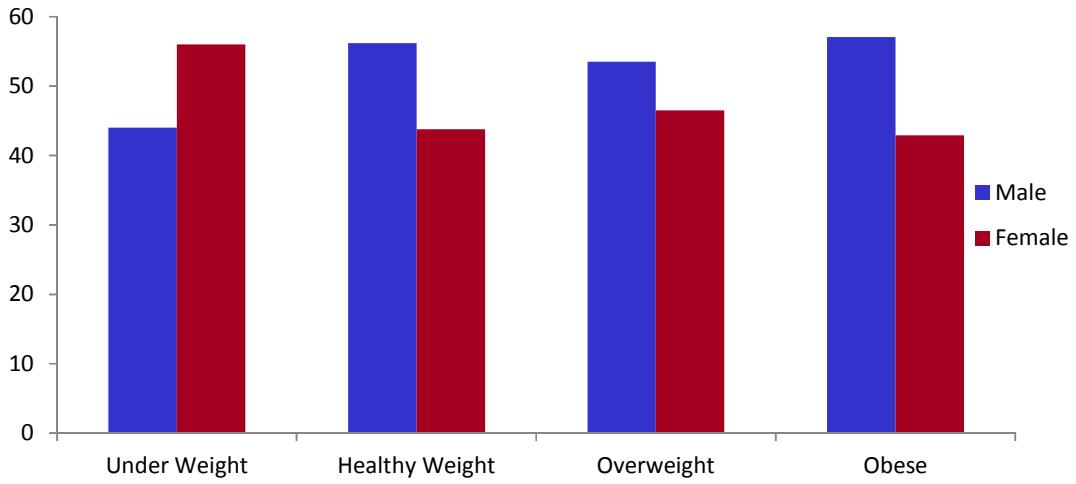

Fig. 1. Gender specified BMI (Kg/m^2)

Baseline feature in Table 3, demonstrates the trends of the gender-stratified population of the study. Alcohol intake and smoking were both significantly higher in men as compared to women. Physical activity registered to women was significantly lower than to men. Intakes of non-vegetarian food and semi-vegetarian food were found to be higher in men than in women, indicated that the vegetarian diet was higher in women. Presence of co morbidities revealed that men suffer the most with co morbidities than females.

The relationship between overweight and obesity prevalence and the chosen socio-demographic variables for the individuals is seen in Table 4. Overweight and obesity for age group ≥80 (p = 0.000) and individuals who smoked (p <0.001) and drink alcohol (p = 0.328) is substantially higher. The prevalence of overweight and obesity among the individuals with a semi vegetarian diet was also substantially higher (p = 0.000). There was no big disparity, however (Vegetarian to non vegetarian) or exercise (p=0.161), between overweight and obesity and the healthy and underweight individuals. The prevalence of overweight and obesity among the individuals with co morbidities is (33.96%, *p*= 0.000).

Table 3. Base line characteristics (Life Style Characteristics) of Participants

Life style characteristics	Total population n (%)	Females n (%)	Males n (%)	P-value
Non- Smokers	592 (76.68)	329 (55.57)	263 (34.06)	0.000
Smokers	180 (23.32)	32 (17.77)	148 (82.22)	
No Alcohol consumption	761 (98.75)	359 (47.17)	402 (52.83)	0.005
Alcohol consumption	11 (1.42)	02 (18.18)	09 (81.81)	
No Exercise	297 (38.57)	237 (79.80)	238 (80.13)	0.016
Exercise Present	475 (61.53)	124 (26.11)	173 (36.42)	
Vegetarian Diet	169 (21.89)	85 (50.30)	84 (49.70)	0.072
Semi-Vegetarian Diet	431 (55.83)	210 (48.72)	221 (51.28)	
Non-Vegetarian Diet	172 (22.28)	66 (38.37)	106 (61.63)	
Co morbidities	288 (37.30)	122 (42.36)	166 (57.64)	0.042
No Co morbidities	484 (62.69)	239 (49.38)	245 (50.62)	

Table 4. Association with the prevalence of overweight and obesity between the chosen variables

BMI →		Under Weight n (%)	Healthy Weight n (%)	Over Weight n (%)	Obese n (%)	Total	p-Value
Age	20-39	98 (22.8)	128 (29.8)	124 (28.8)	80 (18.6)	430	0.000
(Years)	40-59	25 (17.0)	43 (29.2)	43 (29.2)	36 (24.9)	147	
	60-79	21 (15.0)	33 (23.2)	43 (30.3)	45 (31.7)	142	
	≥80	06 (11.3)	06 (11.3)	18 (34.0)	23 (43.4)	53	
Smoker	Yes	20 (11.1)	26 (14.4)	71 (39.4)	63 (35.0)	180	0.000
	No	130 (22.0)	184 (31.0)	157 (26.5)	121 (20.4)	592	
Alcohol	Yes	01 (9.1)	01 (9.1)	05 (45.5)	04 (36.4)	11	0.328
	No	149 (19.6)	209 (27.5)	223 (29.3)	180 (23.6)	761	
Diet	Vegetarian	44 (28.0)	47 (29.9)	40 (25.5)	26 (16.6)	157	0.000
	Semi-Vegetarian	64 (14.8)	91 (21.1)	151 (35.0)	125 (29.0)	431	
	Non-Vegetarian	42 (22.8)	72 (39.1)	37 (20.1)	(33 17.9)	184	0.000
Exercise	Yes	65 (21.9)	88 (29.6)	83 (27.9)	61 (20.5)	297	0.161
	No	85 (17.9)	122 (25.7)	145 (30.0)	123 (25.9)	475	
Co	Yes	55 (21)	31 (11.9)	88 (33.7)	87 (33.3)	261	
morbidities	No	95 (18.6)	179 (35)	140 (27.4)	97 (19)	511	0.000

4. DISCUSSION

Overweight AND Obesity, which ranges from 15% to 60% for adults, is considered to be a problem in wellbeing around the globe. [27-28] Asian development countries have been highly vulnerable to this severe public health threat over the past two decades. While updated population-based data are required on adult obesity prevalence in Pakistan, there have been few regional studies with adults which suggest that overweight and obesity are growing [30-34].

Our results on overweight (29.5%) and obesity (23.9%) are higher to previous studies on the populations of China. [35-37] Studies in Canada, [38] USA, [39] Greece, [40] Korea, [41] Turkey [42] and England, [43] showed that the prevalence rates are lower which confirms that the burden of obesity differs between countries due to socioeconomic and environmental shifts (e.g., climate, diet, physical activity, etc.). In an urban Karachi survey, 28% of overweight/obesity were seen, mean while with the BMI being held as a cutoff point at 25.0 kg/m^2 [34]. A further research by Khan et al. reported 4.8% obesity prevalence in Balochistani adults; [30] 8.0% obesity rate in Peshawari adults, [31] and overall 25.0% of adults reported overweight or obese in Pakistan [44]. However, the cut-off point for an irregular BMI was used in this analysis is 23.0 kg/m^2. Some of the regional difference was also seen in Pakistani adults about the prevalence of overweight (29.0%–46%) and obesity (20.8%–27.85%) [32-33]. The variation in race, age and use of BMI cut-off points suggested for the Asia-Pacific region by the WHO can explain this difference in contrast with the international cutoff for obesity definition.

Overweight and obesity in adults of the age group ≥80 (i.e. aged 80–90) were both greater and lesser in the youngest Pakistani adults (i.e. ages from 30–39). The percentages in women were significantly lower than in men in all ages. In a preliminary analysis in Pakistan, different trends were observed [44]. Some surveys showed the lowest obesity rates in Turks, [45] Iranians, [46] and Omani [47] for those under the age of 30 and the lowest obesity for aged between 30 and 60. The difference in findings also emerged from an analysis of the Saudi adult population [48] in line with previous research. [35,40,45,46,47,48] Pakistani men had a mean BMI higher than women and more obese than women (e.g., in the overall sample, obesity rates were 25.54% in men vs. 21.88% in women which is different from the study conducted in Libya in which women were slightly more likely to be overweight or obese than men [49-50]. This may be because men in Pakistan always live in a sedentary way of life. Being limited in activites after desk job and doing less physical exercise may also be the key cause for a weight increase. The significance of the consequences for overweight and obesity according to their age and gender has been demonstrated by different literature [30,44,46]. Parallel to this, the logistical return analysis demonstrates that adults ((≥80 years old) are at greater risk of overweight than their peers.

The WHO has proposed the use of cutoff points for the determination of overweight and obese for the adult population, 85th and 95th percentile, equivalent to BMI 25 kg/m^2 and 30 kg/m^2, respectively. By considering the overall data in our study, a BMI of 25 kg/m^2 also correspond to be high in both sex, and a BMI corresponds of 30 kg/m^2 to be higher in men, while level was low among women.BMI is used for obesity but cannot provide body fat statistics, so overweight/obesity were not categorized as metric with body fat percentage.

In the population of Pakistan's adults, there is a high incidence of overweight and obesity. Overweight and obesity are most likely for elderly (≥80 years) persons in this group. In particular, Pakistani citizen are in trouble, which are smoker individuals and having co morbidities. These results indicate that harmful practices, such as excess food and an imbalance diet, sedentary behavior, and smoking, [51] must be avoided in order to improve the wellbeing of adults. Global promotions should also be introduced to reduce potential obesity epidemics and obesity-related chronic diseases.

5. CONCLUSION

Overweight and obesity prevalence was found to be linked with age, alcohol, co morbidity, and dietary status among people in Karachi. Therefore, it is recommended for people, specifically men age group ≥ 80, to use preventive programs for the prevention of overweight and obesity.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely

no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Musa DI, Toriola AL, Monyeki MA, Lawal B. Prevalence of childhood and adolescent overweight and obesity in Benue State, Nigeria. Tropical Medicine and International Health. 2012;17:1369–75.
2. Jafar TH, Qadri Z, Islam M, Hatcher J, Bhutta ZA, Chaturvedi N. Rise in childhood obesity with persistently high rates of undernutrition among urban school-aged Indo-Asian children. Arch Dis Child. 2008;93:373–8.
3. Kapoor SK, Anand K. Nutritional transition: A public health challenge in developing countries. J Epidemiol Community Health. 2002;56:804–805.
4. Ayoola O, Ebersole K, Omotade OO, Tayo BO, Brieger WR, Salami K, et al. Relative height and weight among children and adolescents of rural southwestern Nigeria. Ann Hum Biol. 2009;36:388–99.
5. Owa JA, Adejuyigbe O. Fat mass, fat mass percentage, body mass index, and mid-upper arm circumference in a healthy population of Nigeria children. J Trop Pediatr. 1997;43:13–19.
6. Fetuga MB, Ogunlesi TA, Adekanmbi AF, Alabi AD. Nutritional status of semi-urban Nigerian school children using the 2007 WHO reference population. West Afr J Med. 2011;30:331–6.
7. Adegoke SA, Olowu WA, Adeodu OO, Elusiyan JBE, Dedeke IOF. Prevalence of overweight and obesity among children in Ile-Ife, South-Western Nigeria. West Afr J Med. 2009;28:216–21.
8. Senbanjo IO, Njokanma OF, Oshikoya KA. Waist circumference values of Nigerian children and adolescents. Ann Nutr Metab. 2009;54:145–50.
9. Armstrong MEG, Lambert MI, Lambert EV. Secular trends in the prevalence of stunting, overweight and obesity among South African children (1994–2004). Eur J Clin Nutr. 2011;65:835–40.
10. Intiful FZ, Ogyiri L, Asante M, Mensah AA, Steele-Dsdzie RK, Boateng L. Nutritional status of boarding and non-boarding children in selected schools in the Accra metropolis. Journal of Biology, Agriculture and Healthcare. 2013;3:156–162.
11. Mohammed H, Vuvor F. Prevalence of childhood overweight/obesity in basic school in Accra. Ghana Medical Journal. 2012;46:124–127.
12. Wamba PCF, Oben JE, Cianflone K. Prevalence of overweight, obesity, and thinness in Cameroon urban children and adolescents. J Obes. 2013;2013:737592.
13. Moselakgomo VK, Toriola AL, Shaw BS, Goon DT, Akinyemi O. Body mass index, overweight, and blood pressure among adolescents schoolchildren in Limpopo province, South Africa. Rev Paul Pediatr. 2012;30:562–9.
14. George AB. Obesity: special features. Medical consequences of obesity. J Clin Endocrinol Metab. 2004;89:2583–9.
15. Gahagan S. Overweight and Obesity. In: Kliegman RM, Stanton BF, Geme JW, Schor NF, Behrman RE, editors. Nelson Textbook of Paediatrics.19th edition. Philadephia, Saunders. 2011;179–87.
16. The Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure (The JNC7 Report). JAMA. 2003;289:2560–2572.
17. Ejike CE, Ugwu C. Hyperbolic relationship between blood pressure and body mass index in a Nigerian adolescent population; 2010.
Available:http://www.webmedcentral.com.
Accessed on 24th Dec, 2011.
18. Sidik S.M, Ahmad R. Childhood obesity: Contributing factors, consequences and intervention. Mal J Nutr. 2004;10: 13–22.
19. Onyemelukwe GC. Trend of communicable diseases in Nigeria.
Available:http: // int. search.tb .ask. com/ search/GGmain.jhtml.
Accessed 26/10/15.

20. Chen J, Weiss S, Heyman M.B, Lustig R. Risk factors for obesity and high blood pressure in Chinese American children: Maternal acculturation and children's food choices. J Immigrant Minority Health. 2011;13:268–275.
21. Crispim PAA, Peixoto MRG, Jardim PCBV. Risk factors associated with high blood pressure in two- to five-year-old children; 2014.
22. Ogden CL, Carroll MD, Curtin LR, et al. Prevalence of overweight and obesity in the United States 1999–2004. JAMA. 2006;295:1549–1555.
23. Sobal J, Stunkard AJ. Socioeconomic status and obesity: A review of the literature 1989. Psychol Bull. 1989;105:260–275.
24. Strauss RS, Pollack HA. Epidemic increase in childhood overweight, 1986–1998. JAMA. 2001;286:2845–2848. pmid:11735760
25. Janjua N.Z, Mahmood B, M. Islam A, Goldenberg R.L. Maternal and early childhood risk factors for overweight and obesity among low-income predominantly black children at age five years: A prospective cohort study. Journal of Obesity; 2012.
Available:http://dx.doi.org/10.1155/2012/457173
26. Dehghan M, Akhtar-Danesh N, Merchant AT. Childhood obesity, prevalence and prevention. Nutrition Journal. 2005;4:24.
27. James PT, Leach R, Kalamara E, Shayeghi M. The worldwide obesity epidemic. Obes Res. 2001;9(Suppl 4):228S–233S.
DOI: 10.1038/oby.2001.123
28. World Health Organization. Controlling the global obesity epidemic: the challenge [Internet] World Health Organization; Geneva; 2008.
[Cited 2019 Nov 20].
29. Asif M, Aslam M, Altaf S, Atif S, Majid A. Prevalence and sociodemographic factors of overweight and obesity among pakistani adults. J Obes Metab Syndr. 2020;29(1):58–66.
30. Khan I, Ul-Haq Z, Taj AS, Iqbal AZ, Basharat S, Shah BH. Prevalence and association of obesity with self-reported comorbidity: a cross-sectional study of 1321 adult participants in Lasbela, Balochistan. Biomed Res Int. 2017;2017:1076923.
31. Khan A, Afridi AK, Safdar M. Prevalence of obesity in the employees of universities, health and research institutions of Peshawar. Pak J Nutr. 2003;2:182–88.
32. Amin F, Fatima SS, Islam N, Gilani AH. Prevalence of obesity and overweight, its clinical markers and associated factors in a high risk South-Asian population. BMC Obes. 2015;2:16.
33. Aslam M, Saeed A, Pasha, GR, Altaf S. Gender differences of body mass index in adults of Pakistan: A case study of Multan city. Pak J Nutr. 2010;9:162–66.
34. Khan FS, Lotia-Farrukh I, Khan AJ, Siddiqui ST, Sajun SZ, Malik AA, et al. The burden of non-communicable disease in transition communities in an Asian megacity: baseline findings from a cohort study in Karachi, Pakistan. PLoS One. 2013;8:e56008.
35. Jia WP, Xiang KS, Chen L, Lu JX, Wu YM. Epidemiological study on obesity and its comorbidities in urban Chinese older than 20 years of age in Shanghai, China. Obes Rev. 2002;3:157–65.
36. Hou X, Jia W, Bao Y, Lu H, Jiang S, Zuo Y, et al. Risk factors for overweight and obesity, and changes in body mass index of Chinese adults in Shanghai. BMC Public Health. 2008;8:389.
37. Wang W, Wang K, Li T. A study on the epidemiological characteristics of obesity in Chinese Adults. Zhonghua Liu Xing Bing Xue Za Zhi. 2001;22:129–32.
38. Bélanger-Ducharme F,Tremblay A. Prevalence of obesity in Canada.Obes Rev. 2005;6:183–6.
39. Befort CA, Nazir N, Perri MG. Prevalence of obesity among adults from rural and urban areas of the United States: Findings from NHANES (2005-2008) J Rural Health. 2012;28:392–7.
40. Manios Y, Panagiotakos DB, Pitsavos C, Polychronopoulos E, Stefanadis C. Implication of socio-economic status on the prevalence of overweight and obesity in Greek adults: The ATTICA study. Health Policy. 2005;74:224–32.
41. Kim DM, Ahn CW, Nam SY. Prevalence of obesity in Korea. Obes Rev. 2005;6:117–21.
42. Yabanci N, Gocgeldi E, Simsek I, Kilic S. Prevalence of obesity, abdominal obesity and the associated factors among a group of Turkish adults. Pak J Med Sci. 2010;26:21–5.

43. Rennie KL, Jebb SA. Prevalence of obesity in Great Britain. Obes Rev. 2005;6:11–2.
44. Jafar TH, Chaturvedi N, Pappas G. Prevalence of overweight and obesity and their association with hypertension and diabetes mellitus in an Indo-Asian population. CMAJ. 2006;175:1071–7.
45. Yabanci N, Gocgeldi E, Simsek I, Kilic S. Prevalence of obesity, abdominal obesity and the associated factors among a group of Turkish adults. Pak J Med Sci. 2010;26:21–5.
46. Hajian-Tilaki KO, Heidari B. Prevalence of obesity, central obesity and the associated factors in urban population aged 20-70 years, in the north of Iran: A population-based study and regression approach. Obes Rev. 2007;8:3–10.
47. Al-Riyami AA, Afifi MM. Prevalence and correlates of obesity and central obesity among Omani adults. Saudi Med J. 2003;24:641–6.
48. Alsaif MA, Hakim IA, Harris RB, Alduwaihy M, Al-Rubeaan K, Al-Nuaim AR, et al. Prevalence and risk factors of obesity and overweight in adult Saudi population. Nutr Res. 2002;22:1243–52.
49. Lemamsha H, Randhawa G, Papadopoulos C. Prevalence of overweight and obesity among libyan men and women. Biomed Res Int. 2019;2019:8531360.
50. Shiwen Yu, Liying Xing, Zhi Du, Yuanmeng Tian, Li Jing, Han Yan, Min Lin, Boqiang Zhang, Shuang Liu, Yaping Pan, Chen Li. Prevalence of obesity and associated risk factors and cardiometabolic comorbidities in rural Northeast China. Biomed Res Int. 2019;2019:6509083.
51. Reem Baalbaki, Leila Itani , Lara El Kebbi , Rawan Dehni , Nermine Abbas , Razan Farsakouri, Dana Awad, Hana Tannir, Dima Kreidieh, Dana El Masri , Marwan El Ghoch. Association between smoking hookahs (shishas) and higher risk of obesity: A systematic review of population-based studies. J Cardiovasc Dev Dis. 2019;6(2):23.

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