Original article

Influence of education in the prevalence of obesity in Iranian northern adults

Gholamreza Veghari [a,*], Mehdi Sedaghat [b], Siavash Maghsodlo [b], Samieh Banihashem [b], Pooneh Moharloei [b], Abdolhamid Angizeh [b], Ebrahim Tazik [b], Abbas Moghaddami [b]

[a] Department of Biochemistry and Nutrition, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran
[b] Deputy of Health, Golestan University of Medical Sciences, Gorgan, Iran

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ABSTRACT

Background: The main aim of this study was to evaluate whether prevalence of obesity in educational levels is different and some related factors in Iranian northern adults.
Materials and methods: This was a cross-sectional descriptive study based on population and 2452 cases (1224 men and 1228 women) aged 15–65 years were chosen by cluster and stratify sampling. Subjects were randomly chosen from 125 clusters and each cluster included 20 cases. Interviewers recorded the data using a multidimensional questionnaire including socio-demographic indexes.
Results: As a whole, the prevalence of obesity was seen in 24% of subjects (15.5% in male and 32.5% in female) and significantly was seen in 3.1% and 14.1% of uneducated people more than in 1–9 year schooling and in high school or college-educated people, respectively ($P = 0.001$). The risk of obesity was 2.294 ($P = 0.001$) in uneducated compared to high school or college-educated people, 1.668 ($P = 0.001$) in urban area compared to rural area, 2.619 ($P = 0.001$) in 40–65 year people compared to 15–40 year people, and 1.534 ($P = 0.003$) in good economic compared to poor economic groups. After adjusted for location area, gender, age, and economic stats, the risk of obesity was 2.044 ($P = 0.001$) in uneducated people compared to high school or college-educated subjects.
Conclusion: The obesity as a health problem in Iranian northern adults supported in this study and it was negatively associated with educational levels. Public health programs that aim to reduce obesity should primarily focus on the illiterate and low-educated people.

1. Introduction

Obesity is one of the greatest public health challenges in current century and the World Health Organization (WHO) warns the rising of it in some countries. In Eastern Mediterranean Regions (EMR), obesity becomes at an alarming level among children and adults.[1] Obesity is a major risk factor for the coronary heart disease, dislipidemia, insulin resistance, hypertension, type 2 diabetes, cancer, musculoskeletal disorders, sleep apnea, and related to some hormones dependent on arteriosclerosis.[2] The strong relationship between socio-demographic factors and obesity was seen in some regions.[3] The association between education and obesity is controversial in EMR and several confounding factors such as age, gender, residential area, and income may hold up it. However, more investigations are needed to explore the role of socio-economic status in the prevalence of obesity in the EMR countries.[4] The role of adult literacy skills as a mediating factor to the health education considered in recent study.[5] The role of educational level as a multifaceted concept well known in some of the social and cognitive skills[6] and the strong relationship between education and literacy skills with health knowledge approved in some of the studies.[7]

Data from NHANES (National Health and Nutrition Examination Survey) survey have shown a higher prevalence of obesity in low-educated men and women compared with high-educated people.[8] In WHO study, there was a significantly negative association between years of schooling and body mass index (BMI) but in the USA, there was a gap between obesity and less or better educated subjects.[9] Golestan province is in the north of Iran (south-east of Caspian Sea). Of 1.6 million populations in this area, 66.39% were 15–64 years, whereas 43.9% and 56.1% are living in urban and rural areas, respectively. Agriculture is the main occupation in rural area and different ethnic groups such as Fars (native), Turkman, and Sisstani are living in this region.[10] Due to the restriction in executing epidemiological projects, there has not been any study on the relationship between obesity and socio-demographic factors in this area up till now; therefore, it was necessary to design a

* Corresponding author. Ischemic Disorders Research Center, Golestan University of Medical Sciences, Gorgan, Iran. Tel.: +98 1714440225.
E-mail address: grveghari@yahoo.com (G. Veghari).

research project about it. The aim of this study was to evaluate whether prevalence of obesity in educational levels is different in Iranian northern adults in 2010. Some of the confounder factors such as location area, gender, age, and economic status are considered in this study.

2. Materials and methods

This is a cross-sectional descriptive study based on population and 2452 cases (1224 men and 1228 women) aged 15–65 years were chosen by cluster and stratify sampling. Subjects were randomly chosen from 125 clusters and each cluster included 20 cases. Family code of primary health center in rural areas and postal code in urban areas were used for classification with equal proportion of age and sex. From each district, one team had been trained to complete the questionnaire and measuring weight and height. Interviewers recorded the data using a multidimensional questionnaire including socio-demographic indexes. Pregnant women and unwillingness cases were excluded from this study. The reliability was assessed using Cronbach's alpha coefficient and found to be 0.83. This study approved by Ethical Research Committee in Golestan University of Medical Sciences and consent was received from all participants.

SPSS software (PASW statistics 16 version) was used for the statistical analysis and Chi-square and Pearson's tests used for comparing frequencies. Multivariate logistic regression analysis was applied to estimate the odds ratio (OR) of obesity considering the educational level at 95% significant level. The P value less than 0.05 was considered as statistical significant.

Weight was measured by removing heavy clothing and shoes. Height was measured in standing upright position. BMI was calculated as weight (kg)/height (m^2). BMI of 25.0–29.9 kg/m^2 was classified as overweight, BMI of 30.0 kg/m^2 or over was classified as obese.[11]

Educational level classified in three groups: Uneducated, 1–9 year schooling, and high school or college. Economic status, with regard to Iranian social-economic, was categorized based on the facilities of six items: Separate bathroom, separate kitchen, vacuum cleaner, computer, separate freezer, and washing machine. Each of them is one score. According to this list, the scoring of the economic status of samples in this study was as follows: Poor ≤ 2 score, moderate = 3–4 score, and good ≥ 5 score.

3. Results

Mean and standard deviation of age and BMI were 39.21 ± 14.3 years and 26.35 ± 5.7 kg/m^2, respectively. The characteristics of subjects and BMI distributions based on socio-demographic factors are shown in Table 1. Illiteracy, urbanization, and intermediate economic status were seen in 30.8%, 46.5%, and 53.7% of subjects,

Table 1
Distribution of body mass index based on educational level and some socio-demographic-related factors.

Variable		BMI (kg/m²)				
		≤18.5	18.5–25	25–30	≥30	P-Value
Educational level	Uneducated (755)	26 (3.4)	262 (34.7)	244 (32.3)	223 (29.6)	0.001
	1–9 y schooling (952)	40 (4.2)	382 (40.1)	279 (29.3)	251 (26.4)	
	High school and college (745)	51 (6.9)	344 (46.2)	235 (31.5)	115 (15.4)	
Area	Urban (1141)	39 (3.4)	402 (35.2)	369 (32.3)	331 (29.1)	0.001
	Rural (1311)	78 (5.9)	586 (44.7)	389 (29.7)	258 (19.7)	
Gender	Men (1224)	63 (5.2)	568 (46.4)	403 (32.9)	190 (15.5)	0.001
	Women (1228)	54 (4.4)	420 (34.2)	355 (28.9)	399 (32.5)	
Age (year)	15–40 (1258)	84 (6.7)	626 (49.8)	339 (26.9)	209 (16.6)	0.001
	40–65 (1194)	33 (2.8)	362 (30.3)	419 (35.1)	380 (31.8)	
Economic status	Poor (570)	32 (5.6)	242 (42.5)	173 (30.4)	123 (21.5)	0.001
	Intermediate (1316)	70 (5.3)	547 (41.6)	401 (30.5)	298 (22.6)	
	Good (566)	15 (2.6)	199 (35.2)	184 (32.5)	168 (29.7)	
Uneducated	Urban (239)	5 (2.1)	69 (28.9)	69 (28.9)	96 (40.2)	0.001
	Rural (516)	21 (4.1)	193 (37.4)	175 (33.9)	127 (24.7)	
1–9 year schooling	Urban (401)	10 (2.5)	120 (29.9)	128 (31.9)	143 (35.6)	0.001
	Rural (551)	30 (5.4)	262 (47.5)	151 (27.4)	108 (19.6)	
High school and college	Urban (501)	24 (4.8)	213 (42.5)	172 (34.3)	92 (18.4)	0.001
	Rural (244)	27 (11.1)	131 (53.7)	63 (25.8)	23 (9.4)	
Uneducated	Men (259)	9 (3.5)	126 (48.6)	87 (33.6)	37 (14.3)	0.001
	Women (496)	17 (3.4)	136 (27.4)	157 (31.7)	186 (37.5)	
1–9 year schooling	Men (500)	27 (5.4)	225 (45.0)	161 (32.2)	87 (17.4)	0.001
	Women (452)	13 (2.9)	157 (34.7)	118 (26.1)	164 (36.2)	
High school and college	Men (465)	27 (5.8)	217 (46.7)	155 (33.3)	66 (14.2)	0.226
	Women (280)	24 (8.6)	127 (45.4)	80 (28.6)	49 (17.5)	
Uneducated	15–40 Y (125)	4 (3.2)	56 (44.8)	35 (28.0)	30 (24.0)	0.137
	40–65 Y (630)	22 (3.5)	206 (32.7)	209 (33.2)	193 (30.7)	
1–9 year schooling	15–40 Y (578)	33 (5.7)	281 (48.6)	144 (24.9)	120 (20.8)	0.001
	40–65 Y (374)	7 (1.9)	101 (27.0)	135 (36.1)	131 (35.0)	
High school and college	15–40 Y (555)	47 (8.5)	289 (52.1)	160 (28.8)	59 (10.7)	0.001
	40–65 Y (190)	4 (2.1)	55 (28.9)	75 (39.5)	56 (29.5)	
Uneducated	Poor (198)	5 (2.5)	76 (38.4)	68 (34.3)	49 (24.7)	0.001
	Intermediate (433)	19 (4.4)	154 (35.6)	135 (31.2)	125 (28.9)	
	Good (124)	2 (1.6)	32 (25.8)	41 (33.1)	49 (39.5)	
1–9 year schooling	Poor (231)	15 (6.5)	102 (44.2)	63 (27.3)	51 (22.1)	0.001
	Intermediate (509)	20 (3.9)	206 (40.5)	158 (31.0)	125 (24.6)	
	Good (212)	5 (2.4)	74 (34.9)	58 (27.4)	75 (35.4)	
High school and college	Poor (141)	12 (8.5)	64 (45.4)	42 (29.8)	23 (16.3)	0.109
	Intermediate (374)	31 (8.3)	187 (50.0)	108 (28.9)	48 (12.8)	
	Good (230)	8 (3.5)	93 (40.4)	85 (37.0)	44 (19.1)	
Total (2452)		117 (4.8)	988 (40.3)	758 (30.9)	589 (24)	

BMI = Body mass index.

respectively. Obesity in uneducated, 1–9 year schooling, and high school or college-educated people was common in 29.6%, 26.4% and 15.4%, respectively. Statistical difference among three groups was significant ($P = 0.001$). Obesity was seen in 3.1% and 14.1% of uneducated people more than in 1–9 year schooling and in high school or college-educated groups, respectively ($P = 0.001$). The prevalence of obesity was seen in women (32.5%) more than men (15.5%), in urban (29.1%) more than in rural area (19.7%), and in 40–65 year (31.8%) more than 15–40 year (16.2%) and positively associated with economic status ($P = 0.001$). In high school or college-educated group, obesity was not significant among economic groups and in genders. Also, in uneducated groups, obesity in different age groups was not significant. The obesity was common in women more than men, in urban area more than rural area, in 40–65 year more than 15–45 year, and in good economic group more than other economic groups. Among uneducated subjects, the prevalence of obesity in 40–65 year people was 6.7% more than in 15–40 year people ($P = 0.234$). The obesity was not significant in genders in high school or college-educated people but statistical significant differences were seen both in 1–9 year schooling ($P = 0.001$) and uneducated people ($P = 0.001$). Obesity in wealth uneducated people was significantly prevalent 20.4% more than in those were high school or college-educated ($P = 0.001$). Statistical differences among three economic groups those who are in high school or college education level were not significant. Also, this situation was shown in age groups (15–40 year and 40–65 year) those who were uneducated. Obesity was common in uneducated people more than in 1–9 year schooling and in high school or college-educated people except in male and in 40–65 year age group. The outstanding result of this study was the lower obesity in high school or college-educated people in all exposure variables.

The logistic regression analysis estimated the OR of obesity for varicose exposure. The risk of obesity was 2.294 ($P = 0.001$) and 1.962 ($P = 0.001$) in uneducated subjects compared to high school or college-educated and 1–9 year schooling subjects, respectively. The risk of obesity significantly remained in uneducated people after adjusted for location area, gender, age, and economic status (OR = 2.044, 95% confidence interval [CI], 1.570–2.660). Statistically, the association between risk of obesity and location area (OR = 1.668, 95% CI), gender (OR = 2.619, 95% CI), and age groups (OR = 2.343, 95% CI) was significant. Compare to poor subjects, the OR was 1.534 ($P = 0.003$) in good economic subjects. However, there was no significant association between intermediate economic groups with risk of obesity [Table 2].

4. Discussion

In this study, the prevalence of overweight and obesity was seen in 30.9% and 24% of adults, respectively. Substantially, obesity varies worldwide and its current prevalence ranges from as low as ≤5% in China, Japan, and African nations to as high as ≥75% in urban Samoa.[12] Obesity reported 22.9% in Spain[13] and 40% in South Asians.[14] The prevalence of obesity and overweight reported in Iran[15] 18.1% and 32.0%, respectively and in another study,[16] the overweight, obesity, and pathological obesity was common in 28.6%, 10.8%, and 3.4% of adults, respectively. Comparing with other studies in Iran, in our area study, the obesity was seen higher, whereas compared to Spain and South Asian it was lower.

Notably, our study result shows that illiteracy is a risk factor for obesity and it is promoted after adjusted by economic status and location area. Gender (female) and aging were the other potential factors for weight gain. The relationship between educational level and obesity in different studies was not similar. Low education and aging were associated factors with obesity in northern Iran[17] and urbanization, income, education, and gender posed were different

Table 2
The estimated crude and adjusted odds ratio of obesity with different levels of socio-demographic factors with 95% confidential interval using multivariate logistic regression.

Variables	Crude OR (95% CI)	P-Value	Adjusted OR (95% CI)	P-Value
Educational level				
High school and college	1.0 (−)		1.0 (−)[a]	
1–9 year schooling	1.962 (1.354–2.507)	0.001	1.558 (1.134–2.139)	0.001
Uneducated	2.294 (1.783–2.957)	0.001	2.044 (1.570–2.660)	0.001
Location area				
Rural	1.0 (−)		1.0 (−)[b]	
Urban	1.668 (1.384–2.010)	0.001	2.128 (1.744–2.597)	0.001
Gender				
Male	1.0 (−)		1.0 (−)[b]	
Female	2.619 (2.154–3.185)	0.001	2.392 (1.960–2.920)	0.001
Age groups (year)				
15–40	1.0 (−)		1.0 (−)[b]	
40–65	2.343 (1.934–2.839)	0.001	2.060 (1.663–2.551)	0.001
Economic status				
Poor	1.0 (−)		1.0 (−)[b]	
Intermediate	1.064 (0.839–1.349)	0.556	1.089 (0.857–1.385)	0.462
Good	1.534 (1.172–2.007)	0.003	1.754 (1.333–2.309)	0.001

OR = Odds ratio, CI = Confidential interval.
[a] Adjusted by location area + gender + age + economic status.
[b] Adjusted by educational level.

relationships with overweight in Peruvian cities.[18] During 1991–2008, a rising burden of overweight among low economic status and low educational level was shown in some low-income countries.[19] Education inversely associated with obesity in the adult's Portuguese people from 1995 to 2005[20] and it has an attenuation trend with BMI in Indian people.[21] In Turkish men, overweight was not thoroughly related to education while it was significantly increased among the high-wealth groups but in women, it was high in low-educated and middle-wealth groups.[22] In a cohort study in European countries, a negative association was seen between higher BMI and lower education level[23] and in Spain, the old women those who are low-educated and low-income were the most susceptible group to weight gain.[24] The impact of obesity on the health-related quality of life was notable among low-educated groups in rural Spanish women.[25] In Tunis, the metabolic syndrome was observed in illiterate women more than the college-educated women.[26] The negative relationship between BMI and educational level was seen in Spanish adults with rising in men and older subject.[27] As above-mentioned studies, illiteracy and rising income were the risk factors for obesity and overweight in our study. Low education may influence on some obesity-related factors as physical activity and diet.[28] In our study, we did not see any statistical significance among three economic levels in high school or college-educated subjects but in uneducated and low-educated subjects, the difference was significant. The strong relationship between education and health knowledge[7] and cardiovascular disease control rate[29,30] is reported in previous studies.

Iran as a developing country located in the Middle-East Region is considered to be a country in nutrition transition[31] and similar to the most countries that have undergone rapid economic and demographic changeover, non-communicable diseases, especially cardiovascular disease, are the major cause of death in Iran.[32] It is necessary to design a preventive program for control of obesity and overweight, especially in illiterate and good economic people in northern Iran.

Similar to the other studies, urbanization,[33] female gender,[34] older age,[35] and good economic status[36] were found as the risk factors for obesity in our study. Socio-economic status influenced on obesity by changing lifestyle and food behaviors and resulted in low activities. They are well known as the underlying agents for weight gain.[3]

5. Conclusion

This study supports that obesity is a health problem in Iranian northern adults and illiteracy is a risk factor especially in wealth families. With regards to changing of lifestyle and booming economic status in Iran, it is expected to increase in this area. Thereby, strategic planning is necessary for preventing or reducing obesity. Public health programs that aim to reduce overweight and obesity should primarily focus on the low-educated population.

Conflicts of interest

All authors have none to declare.

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