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The Prevalence Of Obesity, Overweight, And Associated Factors Among Healthcare Professionals

Naif Awaid Aydha Al Harithi[1], Khaled Aali Ali Al Haritiey[2], Ahmed Mohammad Bahri[3], Ayman Mohammad Himli[3], Fahd Abbas Ali Moafa[4], Mohammed Ismail Hamad Mawkili[5], Mohammed Abdullah Alyami[6], Dakhel Jaber Ghareeb Alqahtani[7], Fahad Nasser Abdullah Alqahtani[8], Abdulrahman Mohammed Alotaibi[9], Abdulrahman Abdulaziz Yahya Alzahrani[10]

Abstract

Background: *Obesity and overweight are multifactorial conditions that are widespread in developing and developed countries. They refer to an excessive or abnormal accumulation of fat in the body that can cause impairment of health and that can be measured on a scale of high body mass index (BMI). They are emerging as a significant public health concern among healthcare professionals (HCPs).* ***The study aims*** *to estimate the prevalence of obesity and overweight and their associated factors among HCPs.* ***Methods:*** *A cross-sectional study was conducted to recruit 1,850 HCPs aged 22 years and older. Interviews were carried out to collect socio-demographic information, nutritional information and physical activity. Anthropometric measurements [height, weight, and waist circumference] were conducted with the HCPs. The body mass index was computed to determine the prevalence of overweight and obesity. Chi-square, t-test, and one-way ANOVA were used to compare the variables, and logistic regression was used to examine the associated factors of obesity and overweight.* ***Results:*** *The combined prevalence of obesity and overweight among HCPs was 65%. The result of logistic regression showed the risk of being obesity and overweight increased within the age group of 40–49 years (OR = 3.20; 95% CI: 2.37– 4.32; P < 0.001). Male participants had more risk of obesity than female participants (OR = 1.77; 95% CI: 1.45–2.15). Married participants had a significantly higher risk of being overweight and obese (OR = 2.52; 95% CI: 2.05–3.28; P = 0.001). In addition, hypertension (OR = 2.49; 95% CI: 1.65–3.78; P < 0.001) and type 2 diabetes (OR = 2.42; 95% CI: 1.21–4.85; P= 0.012) were associated with overweight and obesity. Finally, a family history of NCDs was associated with overweight and obesity (OR = 1.69; 95% CI: 1.38–2.07; P < 0.001).* ***Conclusion:*** *This study showed a high prevalence of obesity and overweight among HCPs. Age, marital status, hypertension, type II diabetes, and eating habits were associated with the prevalence of obesity and overweight compared to other variables that were not asso[1]ciated with obesity and overweight such as profession, vegetables, fruit consumption, and physical activity. Urgent action is needed to tackle obesity and overweight among HCPs.*

[1]Epidemiological monitoring technician ,South Shuhada Health Center, Saudi Arabia.
[2]Environmental health department, Observator epidemiologicus, Saudi Arabia.
[3]Public Health, King Faisal Hospital
[4]Technician,Jazan Health Cluster - Reporting vectors and common diseases- Epidemiology Supervision Al-Aydabi Malaria Station Center
[5]Technician, Jazan Health Cluster - Reporting vectors and common diseases - Bish Malaria Station Epidemiology Supervision Center - alReeth Malaria
[6]Epidemiology Supervision Technician, Irada and Mental Health Hospital in Najran, Saudi Arabia.
[7]Epidemiological monitoring technician, ALRAYN GENERAL HOSPITAL, Saudi Arabia.
[8]Epidemiological monitoring technician, AlQuwayiyah General Hospital, Saudi Arabia.
[9]Epidemiological monitoring technician, RIYADH THIRD HEALTH CLUSTER, SAJIR GENERAL HOSPITAL, Saudi Arabia.
[10]Public health, Taif - King Faisal Medical Complex, Saudi Arabia.

Keywords: *Prevalence, Obesity, Overweight, Associated factors and Healthcare Professionals*

Introduction

The World Health Organization (WHO) defines overweight as a condition manifested by excessive adiposity and obesity as a chronic complex disease impairing health, characterized by further excessive adiposity [(1)]. The imbalance between energy input and expenditure (energy surplus) leads to fat deposits forming and results in overweight and obesity (OWOB) that can be caused by multiple factors, including genetics, environments, and various psycho-social factors [(2)]. Being OWOB is associated with an elevated risk of developing non-communicable diseases (NCDs), including hypertension and cardiovascular diseases, dyslipidemia, insulin resistance, diabetes, neurological diseases such as Alzheimer's, and other neurodegenerative diseases, osteoarthritis and other musculoskeletal problems, as well as malignant diseases, which are the leading causes of mortality worldwide [(3, 4)].

Around the world, 650 million adults, 340 million adolescents, and 39 million children are obese. This estimation is still rising. According to the WHO, 167 million adults and children will experience deteriorating health by 2025 as a result of being overweight or obese [(5)]. Obesity is a significant contributor to poor health, including type II diabetes, cardiovascular disease, cancer, decreased life expectancy, and mortality [(6)], which could impact all classes of communities. Most body systems, including the endocrine, gastrointestinal, neurological, and cardiovascular systems, are severely impacted by OWOB, increasing a person's risk of contracting infectious diseases [(7)]. Obesity-related complications increase the number of morbidities that need to be managed by the declining number of healthcare professionals [(8)].

Healthcare professionals (HCPs) who have direct interaction with patients and often impact their behaviors ought to have a healthy physique to show a respectable role model in front of patients, and this revealed the importance of a healthy physique toward disease prevention [(9)]. OWOB, HCPs might have difficulty counseling the patients even if the patients clinically state with weight increase, which could be one of the obstacles that can affect the patient consultation due to the same health, issue [(10)]. OWOB rates are rapidly rising in developed and developing countries, including KSA [(11)]. Body mass index (BMI) of overweight (25.0–29.9 kg/m2) and BMI of obesity (≥ 30 kg/m2) increases the risk of non-communicable diseases (NCDs) [(12)].

A meta-analysis study in Middle East countries found that the prevalence of OWOB was 21.17 and 33.14%, respectively [(13)]. According to World Health Organization (WHO) [(14)] data, the overall prevalence of obesity in KSA was estimated to be 35.4% compared with 31.7%, 30.4%, and 27% in the neighboring United Arab Emirates, Iraq, and Oman, respectively, 27.8% in Syria, and 8.6% in Sudan. Obesity is a risk factor for many chronic NCDs including type II diabetes mellitus, cardiovascular disease (CVD), osteoarthritis, and some cancers [(15)], all of which are also associated with a great economic burden on health care, and work productivity of the affected individuals [(16, 17)]. In a recent population survey conducted in Jeddah on the western coast of Saudi Arabia, obesity and, in particular, abdominal obesity was found to be, after age, the second most important predictor of both DM and pre-diabetes [(18)].

Whilst aging is unavoidable, obesity is a modifiable risk factor, which has the potential to be reversed or prevented. The success of programs designed to do this are dependent on characteristics of the target population. In Saudi Arabia, the Ministry of Health (MOH) has proposed several public health programs on NCDs focusing on awareness and behavioral change [(19)]. The most recent national household survey of the MOH has indicated that the prevalence of obesity might be lower than previously reported [(20-22)], but could not determine whether this decline in prevalence was due to the success of campaigns or other factors. Although the MOH study was conducted on a national level and included a large population (>10,000 participants) to determine the frequency of

obesity and associated risk factors and chronic conditions, it did not report region-specific data [20].

A healthy society depends on the efforts of an important set of professionals, the HCPs [23]. Unfortunately, little health research has been done on managing NCDs. Previous studies revealed that sedentary jobs, long periods of sitting and shift work all greatly raise the risk of obesity [24]. Healthcare providers include certified medical personnel (e.g., doctors, nurses, medical scientists, pharmacists, and technicians) and non-clinical support staff (e.g., the administrative class) [25]. Because of their specialized training, HCPs are supposed to have a high level of knowledge and awareness of their health condition and the effects of lifestyle changes on their health [26, 27]. In addition, HCPs are responsible for promoting appropriate lifestyle changes that affect disease prevention and serve as role models for the general population by leading healthy lifestyles [28].

Therefore, few studies have been conducted to evaluate OWOB and the risk factors associated to these conditions among HCPs working in KSA. Because they are overlooked in research studies while being identified as high-risk populations, this study was done to evaluate the prevalence of OWOB and its associated factors among HCPs.

Methods

A cross-sectional study was conducted from January to April 2023 in ten hospitals, and the 51 primary healthcare (PHCs), KSA among a representative sample of HCPs (physicians, nurses, paramedics, and non- medical) who work in hospitals and the primary healthcare (PHCs) of the ministry of health. The study sample was distributed according to the number of hospitals and PHCs in each governorate. The participants were selected by multistage stratified random sampling. The sample size was determined using the formula n = Z2 P (1–P)/d2 at 95% CI [29]. The consistency and completeness of all 1,900 responses were rigorously checked. The final analysis had 1,850 responses after 50 were excluded since they were considered incomplete or inconsistent. Inclusion criteria were HCPs with at least 1 year of experience, aged 22 years and older. Pregnant and lactating women were excluded.

Using a self-constructed face-to-face interview questionnaire, data were collected with multistage stratified random sampling. The data included detailed socio-demographic information (sex, marital status, educational levels, workplace, experience, etc.), lifestyle involved (sleep duration, workload, work routine, and physical activity [measured by the International Physical Activity Questionnaire, IPAQ-short version]) [30]; the health profile involved [dietary patterns adapted from questions used in the food frequency questionnaire [31, 32], menstrual cycle, family history of the disease, medical records, etc. After analyzing the literature on the subject, the questionnaire was well-prepared.

The questionnaire's validity was tested by sending the completed questionnaire and a cover letter explaining the study's goal to ten experts in various health professions (associated professors, hospital directors, managers of health departments, and academic teachers) who were asked to comment on the questionnaire. From the original English edition, all questions were translated into Arabic. The researchers collected the questionnaires by filling out the printed sheets. Expert nurses measured each participant's anthropometric data by using standard protocols [33, 34], and height and weight were measured using stadiometers and weighing scales, respectively [33]. A measuring tape was positioned 1 cm below the umbilicus and at the iliac crest to measure the circumferences of the waist and hips, respectively [34].

The body mass index (BMI) formula (kg/m^2) = Weight (kg)/Height squared (m^2) [35] was used to calculate the BMI. We defined obesity according to WHO criteria; where underweight people had a BMI of <18.5 kg/m^2, normal weight had a BMI of 18.5–24.9 kg/m^2, overweight had a BMI of 25.0–29.9 kg/m^2, and obese were over 30.0 kg/m^2 [36]. The blood pressure (BP) values were taken with a sphygmomanometer. After participants had rested in a sitting position for at least 10 min, experienced nurses took two measurements

on the right arm at a properly sized cuffed 1-min interval, with the arm supported at heart level and feet flat on the floor [37].

All subjects signed consent forms before participating in the study. The ethical committee of University approved the protocol. The Ministry of Health, KSA approved the protocol. The data were analyzed in an anonymous and non-linked manner, with no participant names being used. Moreover, there are no physical risks as there is no intervention such as blood sampling during the study.

Statistical analysis: SPSS V.28 was used to carry out all data analyses. Continuous variables were represented by mean values and standard deviations (SD), while categorical variables were described by frequency and percentage. For categorical and continuous variables, chi-square and t-tests were used. If three or more groups were studied, one-way variance analysis (ANOVA) was used to compare demographic characteristics between groups. The odds ratio (OR) and 95% confidence interval (CI) of overweight and obesity were calculated by using univariate logistic regression, with the predictors associated (gender, age, marital status, work experience, known hypertension, type II diabetes, and family history of NCDs). The statistical significance was set as a two-sided level, $P < 0.05$.

Results

Socio-demographic characteristics of the HCPs

Table (1) shows a total of 1,850 HCWs were included in this study, 1,146 (61.9%) were male participants, 704 (38.1%) were female participants, and most of the participants were in the age group (30–39) with 49.3%. About 78.1% of participants were married, while 68.6% had a first degree (Bachelor's). The HCWs included 226 physicians (12.2%), 1,208 nurses (65.3%), 334 paramedics (18.1%), and 82 non-medical (4.4%). Most of the participants (33.8%) had work experience of 10–15 years.

Table (2) shows the means anthropometric measurements for the participants were as follow: height 170.39 ± (8.86) cm, weight 78.63 ± (14.92) Kg, BMI 27.09 ± (4.77) Kg/m^2, waist circumference 107.14 ± (11.63) cm, hip circumference 99.83 ± (7.02) cm, systolic blood pressure (SBP) 118.16 ± (10.13) mmHg, and diastolic blood pressure (DBP) 73.04 ± (10.01) mmHg. Moreover, 65% of the participants were overweight or obese. BMI had significant associations with gender, age, marital status, profession, experience, and anthropometric measurements (weight, height, waist circumference, hip circumference, SBP, and DBP) ($P < 0.05$).

Prevalence of overweight and obesity among HCPs

Based on gender, the prevalence of overweight and obesity among HCPs was 43.4% for male participants and 21.6% for female participants. Moreover, the total prevalence in both genders was 65% for the whole study participants and 35% had normal weight. There is a statistical association between gender and BMI ($P < 0.05$; Table 1, 2).

The prevalence of overweight and obesity among HCPs stratified by age group also offers the most age group at risk of overweight and obesity between 30 and 39 years with 32.32%, followed by 40 and 49 years with 17.09%, and the lowest prevalence for the age group of 50–61 years with 7.56%. There is a statistically significant association between age and BMI ($P < 0.05$; Table 1, 2).

Lifestyle factors of the healthcare workers and BMI

Table (3) shows approximately 18.9% of the study participants were smokers, and 65.5% had low physical activity. The consumption of fruits <3 days/week was 92.9%, and the consumption among overweight and obese, as well as for vegetables, was 96.6%, <3 days/week. However, there is no relationship between fruit/vegetable consumption and the prevalence of overweight, and obesity. While 91.6% of the participants ate three meals daily, 8.9% ate more than three times per week out of home, and 65.2% ate with more than five people. The prevalence of hypertension was 8.4%, type 2 diabetes was 2.9%, and family history of NCDs among participants was 67.6%. There are statistically significant

associations between BMI and the number of meals, the number of meals eaten outdoors, the total number of members who ate together, known hypertension, type II diabetes, and family history of NCDs ($P < 0.05$).

The prevalence of overweight and obesity among HCPs was 65%. Approximately 21.6% of them were female participants and 43.4% were male participants. The most age group of overweight and obesity was 30–39 years with 32.3%. Moreover, nurses were the most HCWs who had overweight and obese, with 42.6%. In addition, the prevalence of type 2 diabetes and hypertension was higher in a group of overweight and obese; thus, there is a statistically significant association between BMI and type II diabetes and hypertension ($P < 0.05$; Table 3).

Association between overweight, obesity, and associated risk factors

Table (4): univariate analysis using logistic analysis showed the significant predictors associated (gender, age, marital status, work experience, known hypertension, type II diabetes, and family history of NCDs) with overweight and obesity among HCPs. The odds ratio of overweight and obesity increased 1.77 times for male participants than female participants (95% CI: 1.45–2.15). This relationship was statistically significant ($P < 0.001$). Moreover, the age group (40–49) was associated with overweight and obesity by almost three times (OR = 3.20; 95% CI: 2.37–4.32; $P < 0.001$). The OR of overweight and obesity among married participants was two times greater than that of unmarried participants (OR = 2.30; 95% CI: 1.84–2.88; $P < 0.001$).

Doctors were associated with an increase in overweight and obesity than non-medical professions by 1.67 times (OR = 1.67; 95% CI: 0.99–2.81). This relationship was not statistically significant ($P = 0.051$). The work experience increased overweight and obesity by 3.8 times for more than 15 years (OR = 3.83; 95% CI: 2.69–5.46; $P < 0.001$). Furthermore, the increase in monthly income was associated with overweight and obesity by 1.59 times (OR = 1.59; 95% CI: 1.30–1.95; $P < 0.001$) (Table 4).

Hypertension was strongly associated with overweight and obesity (OR = 2.49; 95% CI: 1.65–3.78; $P < 0.001$) as well as overweight and obesity was associated with type 2 diabetes (OR = 2.42; 95% CI: 1.21–4.85; $P = 0.012$). Finally, a family history of NCDs was associated with overweight and obesity (OR = 1.69; 95% CI: 1.38–2.07; $P < 0.001$; Table 4).

Table (1): Baseline characteristics of HCPs (N = 1,850).

Variable	All n =1,850	Underweight n = 18 (1.0%)	Normal n = 630 (34.0%)	Overweight n = 727 (39.3%)	Obese n = 475 (25.7%)	P-value
Gender						
Male	1,146	8 (0.7)	336 (29.3)	490 (42.8)	312 (27.2)	<0.001[a]
Female	704	10 (1.4)	294 (41.7)	237 (33.7)	163 (23.2)	
Age group (years)						
22–29	334	2 (0.6)	184 (55.1)	98 (29.3)	50 (15.0)	<0.001[a]
30–39	912	10 (1.1)	304 (33.3)	390 (42.8)	208 (22.8)	
40–49	440	6 (1.4)	118 (26.8)	184 (41.8)	132 (30.0)	
50–61	164	-	24 (14.6)	55 (33.6)	85 (51.8)	

Variable	All n =1,850	Underweight n = 18 (1.0%)	Normal n = 630 (34.0%)	Overweight n = 727 (39.3%)	Obese n = 475 (25.7%)	P-value
Marital status						
Unmarried	406	4 (1.0)	201 (49.5)	135 (33.2)	66 (16.3)	<0.001[a]
Married	1,444	14 (1.0)	429 (29.7)	592 (41.0)	409 (28.3)	
Educational level						
Diploma	354	5 (1.4)	129 (36.5)	142 (40.1)	78 (22.0)	0.258[a]
Bachelor	1,269	12 (0.9)	433 (34.1)	498 (39.3)	326 (25.7)	
Post-graduated	227	1 (0.4)	68 (30.0)	87 (38.3)	71 (31.3)	
Profession						
Physician	226	4 (1.8)	68 (30.1)	94 (41.6)	60 (26.5)	0.033[a]
Nurse	1,208	6 (0.5)	414 (34.3)	483 (40.0)	305 (25.2)	
Paramedics	334	8 (2.4)	112 (33.5)	122 (36.5)	92 (27.5)	
Non-medical	82	–	36 (43.9)	28 (34.1)	18 (22.0)	
Experience (years)						
<5	381	4 (1.0)	192 (50.4)	132 (34.7)	53 (13.9)	<0.001[a]
5–10	575	6 (1.0)	192 (33.4)	238 (41.4)	139 (24.2)	
10–15	626	6 (1.0)	190 (30.3)	258 (41.2)	172 (27.5)	
>15	268	2 (0.8)	56 (20.9)	99 (36.9)	111 (41.4)	

Table (2): The means anthropometric measurements for the participants

	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Height	170.39 (8.86)	170.44 (10.39)	170.05 (8.97)	171.46 (8.95)	169.19 (8.33)	<0.001[b]
Weight	78.63 (14.92)	52.67 (6.41)	65.36 (8.45)	80.28 (8.61)	94.69 (11.68)	<0.001[b]
BMI	27.09 (4.77)	18.07 (0.37)	22.53 (1.64)	27.24 (1.24)	33.25 (3.78)	<0.001[b]
WC	107.14 (11.63)	82.22 (2.41)	97.25 (5.58)	110.51 (9.96)	116.03 (9.20)	<0.001[b]
HC	99.83(7.02)	82.72 (4.53)	95.61 (5.08)	100.32 (5.29)	105.30 (7.02)	<0.001[b]
SBP	118.16 (10.13)	113.33 (8.40)	115.72 (8.76)	118.51 (10.02)	121.04 (11.18)	<0.001[b]
DBP	73.04 (10.01)	67.78 (9.42)	70.40 (9.44)	73.55 (9.48)	75.94 (1.61)	<0.001[b]

BMI, Body mass index; DBP, Diastolic blood pressure; SBP, Systolic blood pressure [a] Chi-square test; [b] ANOVA. The P-value was considered statistically significant when $P < 0.05$.

Table (3) : Lifestyle factors and medical history of HCWs in the Gaza Strip by BMI category (n = 1,850)

Variable	All n = 1,850	Underweight n = 18 (1.0%)	Normal n = 630 (34.0%)	Overweight n = 727 (39.3%)	Obese n = 475 (25.7%)	P-value
Smoking						
Yes	350	2 (0.6)	100 (28.6)	152 (43.4)	96 (27.4)	
No	1,500	16 (1.1)	530 (35.3)	575 (38.3)	379 (25.3)	
Physical activity						
Low	1,211	12 (1.0)	421 (34.8)	456 (37.6)	322 (26.6)	0.353
Moderate	540	5 (0.9)	174 (32.2)	236 (43.7)	125 (23.2)	
Height	99	1 (1.0)	35 (35.4)	35 (35.4)	28 (28.2)	
Fruits consumption in a week						
≤3 days	1,718	18 (1.0)	584 (34.0)	677 (39.4)	439 (25.6)	0.654
>3 days	132	–	46 (34.8)	50 (37.9)	36 (27.3)	
Vegetable consumption in a week						
≤3 days	1,788	18 (1.0)	604 (33.8)	707 (39.5)	459 (25.7)	0.457
>3 days	62	–	26 (41.9)	20 (32.3)	16 (25.8)	
Number of meals (day)						
≤3	1,694	16 (0.9)	570 (33.7)	685 (40.4)	423 (25.0)	0.009
>3	156	2 (1.3)	60 (38.5)	42 (26.9)	52 (33.3)	
How many days do you usually eat at home every week?						
≤3	164	4 (2.5)	44 (26.8)	62 (37.8)	54 (32.9)	0.015
>3	1,686	14 (0.8)	586 (34.8)	665 (39.4)	421 (25.0)	
How many people do you usually eat together?						
≤5	1,206	12 (1.0)	428 (35.5)	498 (41.3)	268 (22.2)	<0.001
>5	644	6 (0.9)	202 (31.4)	229 (35.6)	207 (32.1)	
Known hypertension						
Yes	155	–	29 (18.7)	55 (35.5)	71 (45.8)	
No	1,695	18 (1.1)	601 (35.5)	672 (39.6)	404 (23.8)	

Variable	All n = 1,850	Underweight n = 18 (1.0%)	Normal n = 630 (34.0%)	Overweight n = 727 (39.3%)	Obese n = 475 (25.7%)	P-value
Known type 2 diabetes						
No	1,796	15 (0.8)	623 (34.7)	705 (39.3)	453 (25.2)	<0.001
Yes	54	3 (5.6)	7 (13.0)	22 (40.7)	22 (40.7)	
Family history of NCDs						
Yes	1,250	8 (0.6)	380 (30.4)	505 (40.4)	357 (28.6)	
No	600	10 (1.7)	250 (41.7)	222 (37.0)	118 (19.6)	

The P-value was considered statistically significant when P<0.05. NCDs, Non-communicable diseases

Table (4) : The association between HCWs' overweight and obesity and associated factors

Variables	Regression coefficient B	OR (95% CI)	Wald statistics (df)	P-value
Gender				
Male	0.572	1.77 (1.45–2.15)	32.90	<0.001
Female		1		
Age group				
22–29		1		
30–39	0.873	2.393 (1.85–3.09)	44.83	<0.001
40–49	1.164	3.203 (2.37–4.32)	57.99	<0.001
50–61	1.992	7.331 (4.51–11.89)	65.12	<0.001
Marital status				
Unmarried		1		
Married	0.835	2.305 (1.84–2.88)	53.17	<0.001
Profession				
Physician	0.515	1.674 (0.99–2.81)	3.80	0.051
Nurse	0.384	1.468 (0.93–2.30)	2.77	0.096
Paramedics	0.333	1.396 (0.85–2.27)	1.77	0.182
Non-medical		1		
Experience (years)				
<5		1		
5–10	0.702	2.017 (1.54–2.62)	27.04	<0.001
10–15	0.843	2.324 (1.78–3.02)	39.66	<0.001
>15	1.340	3.836 (2.69–5.46)	55.59	<0.001
Number of meals (day)				
≤3		1		

Variables	Regression coefficient B	OR (95% CI)	Wald statistics (df)	P-value
>3	−0.044	0.957 (0.83–1.09)	0.42	0.515
How many people do you usually eat together?				
≤5		1		
>5	0.186	1.204 (0.98–1.47)	3.23	0.072
Known hypertension				
No		1		
Yes	0.916	2.499 (1.65–3.78)	18.66	<0.001
Type 2 diabetes				
No		1		
Yes	0.885	2.424 (1.21–4.85)	6.26	0.012
Family history of NCDs				
NO		1		
YES	0.530	1.699 (1.38–2.07)	26.68	<0.001

The P-value was considered statistically significant when P < 0.05. NCDs, Non-communicable diseases.

Discussion

Obesity among HCPs is an important issue as it impacts the morbidity. Obesity is a significant risk factor for multiple diseases such as diabetes mellitus and cardiovascular diseases. Many healthcare organizations worldwide have identified a high prevalence of obesity among their employees. In this study, the overall prevalence of OWOB among HCPs was 65% (39.3% overweight and 25.7% obesity). These findings are comparable with the meta-analysis in the Middle Eastern countries, which reported the prevalence of overweight and obesity were 33.14 and 21.17%, respectively [(13)]. The current research has found a higher prevalence of OWOB among HCPs than the prevalence of OWOB reported in the previous study. When compared to the overall adult population, healthcare workers have a higher prevalence of obesity. This may be because they are more susceptible to the disease due to irregular and extended work hours, poor food, and workplace stress.

There is a significant association between the elevation of the anthropometric measure (Height, weight, WC, HC, SBP, and DBP) and being OWOB. It was also noted that the participant's elevation in anthropometric measurements had a significant positive association with being OWOB. The higher prevalence of OWOB among HCPs might be influenced by sedentary behaviors, which might be contributed to the work environments that may encourage the adaption of less physical activity and eating habits [(38, 39)]. One of the contributing factors may be eating a poor diet while watching TV, especially sugary snacks. Other researchers have discovered a link between screen time and sugary, high-energy snacks [(40)]. Due to the work environment, the HCP's low frequency of intake of meals, low intake of fruits and vegetables, and low physical activity increased OWOB. Further research is needed to investigate dietary habits and their association with OWOB among HCPs.

Furthermore, the prevalence of OWOB increased with age. Similar results were reported by Low et al., (2009) [(41)], Addo et al., (2015) [(42)], Kishawi et al., (2020) [(43)], and Firouzbakht et al., (2019) [(44)], that the prevalence of OWOB increased as age increased. This places a future load of illness on the medical workforce. In addition, the previous study found that the estimated peak increase in the prevalence of OWOB as age increased was 40–50 years in developing countries while it was 50–60 years in developed countries [(41)],

which is in line with the current study. The peak increase in the prevalence of obesity with age was 30–39 years. In the present study, the peak age is lower than in the previous study. Most of the studies confirmed the association between age increasing and susceptibility to non-communicable diseases and OWOB as one of the risk factors of illness. OWOB are associated with increased age due to decreased physical activity, routine daily activities, comorbidities, and dietary habits. Therefore, the high ratio of youth and the predominance of the HCPs category found in this study represent the actual age and job category distribution among HCPs.

In addition, the findings from this study show that married participants had a higher prevalence of overweight and obesity than single participants. The results support the findings reported by Dagne et al., (2019) [45] and Tzotzas et al., (2010) [46] that married adults had a higher prevalence of being OWOB than single adults and hypothesized that the increase in BMI among married couples is due to the increased social support, along with regularly eating dense food that increases the risk of being overweight or obese [46].

The present results revealed that the prevalence of OWOB increased among patients who had hypertension and type II diabetes. In addition, participants with a positive family history of NCDs had a higher prevalence of overweight and obesity than those without a family history of NCDs, in which similar findings have been found in previous studies [47-50]. Similar to the findings of our investigation, numerous studies have shown that nurses had a higher risk of obesity than workers in other occupations. In their academic careers in Scotland and England [51, 52], it is covered that the risk of obesity was lower for different HCP job categories than for nurses. Unfortunately, Hegde et al., (2015) [53] in their studies in India, found results that contradicted our study, suggesting that the burden of obesity was greater among physicians than nurses. All the studies mentioned earlier agree that different job categories were associated with obesity among HCPs. However, the aforementioned studies did not share comparable socio-demographic populations. Most studies among HCPs did not specifically analyze different types of HCP occupations and obesity.

Hazmi et al., (2015) [54] only mentioned the overall prevalence of obesity without further analysis according to job category, while Mustafa et al., (2013) [55] and Ramli, (2013) [56] only divided the occupations of HCWs into professional vs. ancillary jobs. In contrast, our study is to work with HCWs and determine the prevalence of overweight and obesity and classify HCP occupations into four main groups, doctors, nurses, paramedical, and non-medical categories, with the prevalence of OWOB. Thus, we know nurses are at a greater risk of becoming obese than doctors and other job categories.

The present finding findings reported that eating behavior was significantly associated with increased OWOB, thus, the participants <3 meals per day had increased the prevalence of OWOB in other groups. Incomparable to previous studies, eating behavior was reported as one of the leading factors in the development of overweight and obesity with carried gender and age differences [57-60]. In addition, no local studies reported an association between eating behavior and the prevalence of obesity. In addition, physical inactivity is identified as a risk factor for OWOB [61, 62]. However, the current study revealed that all HCPs with low or moderate activity had no significant association between physical activity and OWOB. A similar result was reported by El Kishawi et al., (2020) [43] and Firouzbakht et al., (2019) [44]. These previous studies recognized the low physical activity due to the working shift of HCPs, limited availability of exercise facilities, and workload. However, the current study showed significant predictors associated with an increase in the prevalence of OWOB among HCPs. These associated factors included gender, age, marital status, known hypertension, type II diabetes, family history of NCDs, and elevation of anthropometric measurements. On the other hand, the current study did not find any significant associations between educational level, smoking status, physical activity, and fruit and vegetable consumption.

Conclusion

This study showed a high prevalence of overweight and obesity among HCPs. Age, marital status, known hypertension, type II diabetes, and eating habits were associated with the prevalence of overweight and obesity. These findings appear to show an emerging problem in HCPs. A wellness program should be developed by decision-makers throughout mass-level educational awareness for HCPs to prevent and manage the modifiable risk factors that increase overweight or obesity.

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