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Relationship between some psychosocial factors, eating attitudes and overweight/obesity among hospital employees: a case–control study

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Abstract

Background Social determinants of health are non-medical factors that influence health outcomes. Psychological stress is associated with eating behaviors and may contribute to unhealthy weight-related outcomes. This study aimed to investigate whether eating attitudes, perceived stress, and perceived social support are major factors associated with overweight and obesity among hospital workers.

Methods This cross-sectional study was conducted in a public hospital in Mamak District, Ankara, Türkiye. The study population comprised 574 of 723 employees who participated in a health screening program in 2022. According to body mass index (BMI), 149 overweight and 113 obese participants were included in the case groups, while 224 normal-weight participants constituted the control group. Data were collected using a 55-item face-to-face questionnaire. The Multidimensional Scale of Perceived Social Support, Perceived Stress Scale, and Eating Attitudes Test-40 were administered. Cronbach's alpha coefficients were 0.89, 0.61, and 0.87, respectively. Odds ratios (ORs), the Breslow–Day test, and Mantel–Haenszel adjusted ORs were used to assess associations and effect modification. Multiple logistic regression analysis was performed to identify factors associated with eating attitudes.

Results Compared with the control group, participants aged 30–39 years had higher odds of obesity than those aged 20–29 years (OR=5.6, 95% CI 3.11–10.35; p<0.001). Obese participants were more likely to have disordered eating attitudes than other participants (OR=2.4, 95% CI 1.05–5.70; p=0.037). Among overweight participants, those with middle-school education or below had higher odds of overweight than those with education above high school (OR=1.6, 95% CI 1.04–2.73; p=0.034). Each additional household member was associated with a 1.4-fold increase in the odds of obesity (95% CI 1.19–1.82; p<0.001). Non-healthcare occupational groups had higher odds of overweight and obesity than healthcare professionals.

Conclusions Presence of disordered eating attitudes as a major concern among hospital workers suggests that health education alone may not be sufficient to foster positive health behaviors. Moreover, annual BMI monitoring should be incorporated into periodic health screening programs for hospital employees. Additional clinical assessments for employees with obesity may facilitate the early identification of health risks and contribute to protecting and improving the health of healthcare workforce.

Background

Obesity results from a complex interplay of biological, psychosocial, behavioral, socioeconomic, and environmental factors, including genetic predisposition and cultural influences [1]. The pathways leading to obesity are interconnected and may operate across the life course, with cumulative effects of multiple determinants over time [2,3].

No Member State in the WHO European Region has yet achieved the goal of halting the increase in obesity [4]. The global economic impact of obesity has been estimated at approximately US$2 trillion, equivalent to 2.8% of global income, highlighting the substantial burden imposed on both developed and developing economies [5]. In Türkiye, the economic impact of overweight and obesity was estimated at US$14.64 billion in 2019, equivalent to US$175 per capita and 1.9% of gross domestic product (GDP). Direct costs accounted for 17.4% and indirect costs for 82.6% of the total economic burden, and these costs are projected to increase substantially by 2060 [6].

Psychological stress has been associated with eating behavior. Although many individuals report increased food consumption during periods of stress, approximately 30% may eat less than usual [7]. Some individuals use eating as a means of regulating stress and coping with negative emotions and events. Social and psychological stress may also increase the consumption of foods high in sugar, fat, and calories [8]. The COVID-19 pandemic further increased the

psychological burden among healthcare workers. A systematic review and meta-analysis reported substantial mental health effects among health workers during the pandemic [9].

Social determinants of health refer to the non-medical conditions in which people are born, grow, work, live, and age, together with the broader social, economic, and political forces that shape these conditions [10]. Social support is an important determinant of health because of its potential beneficial effects on individual and community well-being [11,12].

In occupational settings, obesity has been associated with weight discrimination, absenteeism, presenteeism, occupational injury, short-term disability, and reduced productivity [13]. Healthcare workers may experience substantial occupational and psychological burdens because of long working hours, limited personal time, shift work, and burnout, potentially increasing their vulnerability to overweight and obesity [14]. Studies conducted among healthcare workers have reported varying prevalences of overweight and obesity, including 70.7% in South Africa [15], 45.9% in Brazil [16], 40.9% in Germany [17], 35.0% in Italy [18], and 69.1% in England [19]. A study from Malaysia reported substantial burdens of overweight and obesity among healthcare workers [20]. In Türkiye, the prevalence of overweight and obesity among hospital workers was reported as 47.6% in 2017 [21].

Healthcare workers may also have an important role as health-related role models by encouraging patients and communities to adopt healthier lifestyles and preventive behaviors [22]. The increasing prevalence of obesity among healthcare workers is therefore relevant not only to their own health but also to workforce sustainability and the credibility of health promotion messages.

The present study aimed to investigate whether eating attitudes, perceived stress, and perceived social support are associated with overweight and obesity among hospital employees. We specifically examined these factors separately among overweight and obese participants compared with normal-weight controls and explored potential sociodemographic, occupational, and health-related determinants. To our knowledge, this is the first study in Türkiye to investigate the relationship between eating attitudes and psychosocial characteristics among hospital workers with overweight or obesity.

Methods

Study design and setting

This case-control study was conducted between April and December 2022 in a public hospital located in one district of Ankara, the capital city of Türkiye. Case and control groups were identified using data obtained from the hospital's 2022 periodic health screening programme.

Of 723 hospital employees, 574 (79.4%) participated in the health screening programme. Among these, 486 met the study eligibility criteria and were included in either a case or control group: 149 participants were classified as overweight (C1), 113 as obese (C2), and 224 as normal weight (C0).

The study was approved by the Hacettepe University Non-Interventional Clinical Research Ethics Committee (No. 2022/07-07; 19 April 2022). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.'Verbal informed consent was obtained from all participants.

Sample size and participant selection

The minimum sample size was estimated using Epi Info StatCalc. Assuming an exposure prevalence of 50%, a control-to-case ratio of 2:1, a minimum detectable odds ratio (OR) of 2.0, and 80% statistical power, the Kelsey method yielded a required sample of 105 cases and 210 controls, whereas the Fleiss method yielded 103 cases and 206 controls [23].

Body mass index (BMI) was calculated as body weight in kilograms divided by height in metres squared (kg/m²) [24]. Participants with BMI values corresponding to overweight or obesity were assigned to the case groups, whereas participants with BMI ≤24.99 kg/m² were assigned to the control group.

The inclusion criteria were: (1) having height and weight measurements recorded during the 2022 health screening programme; (2) being employed at the study hospital; and (3) being employed during the data-collection period.

The exclusion criteria were: BMI <18.5 kg/m²; absence from the study site during data collection; leaving more than 10% of questionnaire items unanswered; inability to respond adequately to the questionnaire because of cognitive impairment; and pregnancy.

An attempt was made to match cases and controls by age and sex. However, matching was not feasible because the majority of participants in the normal-weight group were younger and female. Therefore, age and sex were included as potential confounding variables in the analyses.

Data collection

Height and weight were measured during the periodic health screening by the same trained individual using a single stadiometer and a single calibrated scale. Employees who met the eligibility criteria were invited to participate in the study. Participants who agreed to participate completed the questionnaire and standardized scales.

The questionnaire was administered through face-to-face interviews by the researcher, whereas the standardized scales were completed by participants themselves under observation. Data collection required approximately 20–30 minutes per participant.

A pre-tested 55-item questionnaire was used. It included 21 questions on sociodemographic characteristics, 23 on health status, and 11 on working life.

Three standardized instruments were additionally administered: the 12-item Multidimensional Scale of Perceived Social Support (MSPSS), the 10-item Perceived Stress Scale (PSS), and the 40-item Eating Attitudes Test (EAT-40).

Multidimensional Scale of Perceived Social Support

The MSPSS was developed by Zimet et al. to assess perceived social support from significant others, family, and friends [25]. The scale consists of 12 items rated on a seven-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree), with higher scores indicating greater perceived social support.

The Turkish adaptation and psychometric evaluation of the MSPSS have demonstrated satisfactory validity and reliability [26,27]. In the present study, Cronbach's alpha was 0.89.

Perceived Stress Scale

The PSS was originally developed by Cohen et al. as a measure of the degree to which situations in an individual's life are perceived as stressful [28]. The scale uses a five-point Likert response format and produces a total score ranging from 0 to 40, with higher scores indicating greater perceived stress.

The Turkish adaptation and validity study was conducted by Eskin et al. [29]. In the present study, Cronbach's alpha for the PSS was 0.61, which was considered acceptable for the present research context [30].

Eating Attitudes Test

The EAT-40 was developed by Garner and Garfinkel to assess symptoms associated with disordered eating and abnormal eating attitudes [31]. The Turkish validity and reliability study was conducted by Savaşır and Erol [32]. The instrument consists of 40 items scored on a six-point Likert scale, with total scores ranging from 0 to 120. Higher scores indicate more disturbed eating attitudes.

Although a score of 30 is commonly used as the clinical cut-off, studies conducted in Türkiye have suggested that a cut-off of 27 may provide greater sensitivity and specificity [33]. Therefore, an EAT-40 score of ≥27 was considered indicative of disordered eating attitudes in the present study. Cronbach's alpha was 0.87.

All variables included in the study are presented in Scheme 1.

Statistical analysis

Data were analysed using SPSS version 16.0, Epi Info, and the R-based Jamovi statistical software package. Categorical variables were presented as frequencies and percentages. Pearson's chi-square test or Fisher's exact test was used to compare categorical variables.

Continuous variables were summarized using measures of central tendency and dispersion, including mean ± standard deviation, median, first and third quartiles, and minimum and maximum values. Because continuous variables were not normally distributed, comparisons were performed using the Mann–Whitney U test.

Odds ratios and 95% confidence intervals (CIs) were calculated to evaluate associations between potential exposures and overweight or obesity. Effect modification was assessed using the Breslow–Day test. Potential confounding was evaluated by comparing crude ORs with Mantel–Haenszel adjusted ORs.

Factors associated with eating attitudes, which were considered a potential determinant of obesity, were further examined using multiple logistic regression with the enter method. Variables with $p<0.20$ in bivariate analyses were considered eligible for inclusion in the multivariable models.

Model fit was assessed using the Hosmer–Lemeshow test, with $p>0.05$ indicating adequate model fit. Model agreement and fit among statistically significant logistic regression models were further assessed using the R-based Jamovi package. Statistical significance was defined as $p<0.05$.

Results

Participant characteristics

A total of 486 hospital employees were included in the final analyses: 149 in the overweight group (C1), 113 in the obese group (C2), and 224 in the normal-weight control group (C0). The distribution of participants according to selected personal characteristics is presented in Table 1.

Table 1. Distribution of participants by selected sociodemographic characteristics. (State Hospital, Ankara-Türkiye, 2022).

Variables	C_0 (n=224)		C_1 (n=149)		C_2 (n=113)		p_1[2]	p_2[3]
	n	%[1]	n	%[1]	n	%[1]		
Sex							**<0.001**	**<0.001**
Male	54	24.1	83	55.7	49	43.4		
Female	170	75.9	66	44.3	64	56.6		
Age							**<0.001**	**<0.001**
20-29	93	41.5	21	14.1	6	5.3		
30-39	58	25.9	50	33.6	34	30.1		
40-49	60	26.8	45	30.2	62	54.9		
≥50	13	5.8	33	21.1	11	5.7		
Educational level							**<0.001**	**<0.001**
Primary/Secondary School	20	8.9	23	15.4	23	20.4		
High School	36	16.1	44	29.5	34	30.1		
Vocational School	40	17.9	26	17.4	20	17.7		
University	112	50.0	44	29.5	32	28.3		
Postgraduate/Specialty	16	7.1	12	8.2	4	3.5		
Profession							**<0.001**	**<0.001**
Health	133	59.4	54	36.2	33	29.2		
Other health-related	32	14.3	26	17.4	10	8.8		
Non-health	59	26.3	69	46.3	70	61.9		
Marital status							**<0.001**	**<0.001**
Single	80	35.7	32	21.5	9	8.0		
Married	123	54.9	105	70.5	92	81.4		
Other[4]	21	9.4	12	8.0	12	10.6		
Living							0.07	**<0.001**
With family	152	67.9	117	78.5	99	87.6		
With a roommate	39	17.4	18	12.1	8	7.1		
Alone	33	14.7	14	9.4	6	5.3		
Household size							0.10	**<0.001**
Alone	33	14.7	14	9.4	6	5.3		
2	39	17.4	18	12.1	8	7.1		
3	60	26.8	37	24.8	28	24.8		

4	55	24.6	53	35.6	40	35.4
≥5	37	16.5	27	18.1	31	27.4

[1] Column percentages. [2] Chi-square test p-value for comparisons between C_0 and C_1 groups. [3] Chi-square test p-value for comparisons between C_0 and C_2 groups. [4] Other: living separately, divorced, or widowed.

Note: $C_{0:}$: Control Group, C_1: Overweight Group, C_2: Obese Group

A substantial proportion of spouses were unemployed, comprising 82.1% of the control group, 60.0% of the overweight group, and 66.3% of the obese group ($p<0.001$ and $p=0.01$ for the respective comparisons). More than half of the participants had at least one child: 53.1% of controls, 69.8% of overweight participants, and 84.1% of obese participants (both $p<0.001$).

Most participants reported their economic status as moderate (65.2% of controls, 61.1% of overweight participants, and 60.2% of obese participants). No statistically significant differences were observed between groups. Similarly, the proportions reporting debt and not paying rent did not differ significantly between groups.

Professional experience differed significantly between groups. Less than five years of professional experience was reported by 38.4% of controls, 22.1% of overweight participants, and 10.6% of obese participants (both $p<0.001$). The median duration of professional experience was highest in the obese group.

Nearly all participants reported being satisfied with their jobs and co-workers, with no statistically significant differences between groups. Verbal violence during professional duties was reported by 39.3% of controls, 29.5% of overweight participants, and 23.9% of obese participants ($p=0.06$ and $p<0.001$, respectively).

Most participants did not engage in regular exercise (72.8% of controls, 71.8% of overweight participants, and 77.9% of obese participants). Approximately one-third of controls (35.7%) and obese participants (30.1%) and 42.2% of overweight participants were current smokers.

Sleep duration of 7–8 hours per night was reported by 38.8% of controls, 30.9% of overweight participants, and 26.5% of obese participants, without a statistically significant difference between groups.

Weight-loss attempts and perceived effects of excess weight

Among overweight participants, 45.6% had previously attempted to lose weight and currently intended to lose weight. In the obese group, 64.6% had previously attempted weight loss, while 71.7% reported that they had not yet decided to lose weight. Previous attempts and current intention to lose weight differed significantly between the case groups ($p=0.002$ and $p<0.001$, respectively).

Excess weight was reported to negatively affect working life through mobility limitations and rapid fatigue by 9.4% of overweight participants and through mobility limitations, rapid fatigue, and shortness of breath by 23.9% of obese participants ($p=0.001$).

Health status and chronic diseases

At least one chronic disease was reported by 37.5% of controls, 44.3% of overweight participants, and 46.9% of obese participants. The proportion with three or more chronic diseases was highest among obese participants (17.0%), compared with 4.8% of controls and 3.1% of overweight participants.

Among participants reporting chronic disease, obesity-related conditions were reported by 15.5% of controls, 10.6% of overweight participants, and 22.6% of obese participants. The most frequently reported chronic diseases were hypertension (16.1%), diabetes (15.5%), and asthma (10.2%).

The proportion receiving pharmacological treatment was 39.3% among controls, 40.9% among overweight participants, and 48.7% among obese participants. Among those using medication, 50.0% of controls, 35.1% of overweight participants, and 45.3% of obese participants reported using medications considered potentially obesogenic.

Participants rated their health status on a scale from 1 to 10. A score of ≥8, corresponding to good or very good perceived health, was reported by 53.1% of controls, 55.7% of overweight participants, and 46.9% of obese participants. However, 14.4% of controls, 19.5% of overweight participants, and 23.9% of obese participants had not undergone a medical examination during the previous year.

The most frequently reported complaints during the week before data collection among overweight and obese participants were fatigue (68.5% and 68.7%, respectively), pain (47.7% and 47.3%), and sadness (40.9% and 42.0%). Among controls, the three most frequently reported complaints were fatigue (67.6%), sadness (52.3%), and pain (50.9%).

Female-specific characteristics

Among women, four or more pregnancies were reported by 5.4% of controls, 7.6% of overweight participants, and 20.3% of obese participants ($p=0.04$ and $p<0.01$, respectively). Almost all women in the control group were still menstruating (95.9%), compared with 85.0% of women in the overweight group and 76.6% in the obese group (both $p<0.001$).

Hormonal contraceptive use was reported by 21.8% of control women, 24.2% of overweight women, and 34.4% of obese women. The difference was statistically significant for the obese group comparison ($p=0.04$).

Psychosocial scale scores

The distributions of MSPSS and PSS scores are presented in Table 2, and EAT-40 categories are presented in Table 3.

A statistically significant negative correlation was observed between MSPSS and PSS scores in the control group (Spearman's rho=-0.211, $p=0.001$) and obese group (rho=-0.203, $p=0.031$). No statistically significant correlation was observed between these scores in the overweight group (rho=0.084, $p=0.31$).

According to the EAT-40, disordered eating attitudes were more common among obese participants (16.8%) than among controls (7.6%) and overweight participants (9.4%). The difference was statistically significant for the obese-control comparison ($p<0.01$).

Table 2. MSPSS[1] and PSS[2] test scores among participants (Ankara Mamak State Hospital, 2022).

Test	C_0 (n=224)	C_1 (n=149)	C_2 (n=113)	p_1[3]	p_2[4]
MSPSS score				0.45	0.48
Mean ± SD	68.26±15.01	70.12±12.83	67.61±14.45		
Median	72.00	73.00	71.00		
Q1–Q3	60.00-80.00	62.00-81.00	58.00-79.00		
Minimum–Maximum	18.00-84.00	18.00-84.00	14.00-84.00		
PSS score				0.35	**0.05**
Mean ± SD	20.34±4.43	19.83±4.83	19.12±5.74		
Median	20.00	20.00	20.00		
Q1–Q3	18.00-23.00	18.00-23.00	16.00-23.00		
Minimum–Maximum	0.00-31.00	0.00-20.00	0.00-35.00		

[1]MSPSS: Multidimensional Scale of Perceived Social Support. [2]PSS: Perceived Stress Scale [3]Mann–Whitney U test p-value for comparisons between the control and C_0 groups. [4]Mann–Whitney U test p-value for comparisons between the C_0 and C_2 groups.

Note: $C_{0:}$: Control Group, C_1: Overweight Group, C_2: Obese Group

Table 3. Distribution of participants by EAT[1]-40 score categories (Ankara Mamak State Hospital. 2022).

EAT-40 groups	C_0 (n=224)		C_1 (n=149)		C_2 (n=113)		p_1[3]	p_2[4]
	n	%[2]	n	%[2]	n	%[2]		
≤27	207	92.4	135	90.6	94	83.2	0.53	**0.01**
>27	17	7.6	14	9.4	19	16.8		

[1]Eating Attitudes Tests [2]Column percentages. [3]Chi-square test p-value for comparisons between C_0 and C_1 groups. [4]Chi-square test p-value for comparisons between C_0 and C_2 groups.

Note: $C_{0:}$: Control Group, C_1: Overweight Group, C_2: Obese Group

Factors associated with obesity

Eating attitude was selected as the principal exposure of interest in the bivariate analyses. Education level, marital status, occupation, and exposure to verbal violence were also examined as potential determinants or confounders.

Education level, marital status, occupation, and exposure to verbal violence were associated with eating attitude in bivariate analyses (p=0.001, p=0.028, and p=0.048, respectively, for the statistically significant associations identified).

The potential confounding and effect-modifying roles of these variables were assessed using Mantel–Haenszel and Breslow–Day procedures (Table 4). No statistically significant effect modification was identified according to the

Breslow–Day test. However, a difference greater than 10% between the crude and Mantel–Haenszel ORs was observed for exposure to verbal violence, suggesting potential confounding.

Table 4. Assessment of effect-modifying and confounding status of selected obesity-related variables (Ankara Mamak State Hospital. 2022).

		Control (n=224)		Obese (n=113)	
Possible associations	**Categories**	**OR**	**95% CI**	**OR**	**95% CI**
Education level	≤ High school	1.19	0.70-2.03	0.86	0.56-1.31
	> High school	1.44	0.89-2.32	0.50	0.28-0.91
	Crude OR (95% CI)	2.46 (1.22-4.95)			
	Mantel-Haenszel OR (95% CI)	1.87 (0.92-3.84)		**χ^2=2.487; df=1; p=0.11**	
	Breslow-Day	**χ^2=0.983; df=1; p=0.32**			
Marrital status	Single	0.89	0.83-0.96	-	-
	Other	1.49	0.97-2.30	0.663	0.476-9.923
	Crude OR (95% CI)	2.461 (1.224-4.948)			
	Mantel-Haenszel OR (95% CI)	2.065 (0.991-4.305)		**χ^2=3.052. df=1. p=0.08**	
	Breslow-Day	**χ^2=1.012. df=2. p=0.31**			
Occupation	Health professional	1.502	0.871-2.589	0.397	0.192-0.824
	Other health-related professional	0.946	0.588-1.521	1.216	0.193-7.680
	Non-health professional	1.363	0.727-2.556	0.805	0.557-1.163
	Crude OR (95% CI)	2.461 (1.224-4.948)			
	Mantel-Haenszel OR (95% CI)	1.961 (0.940-4.094)		**χ^2=2.725. df=1. p=0.09**	
	Breslow-Day	**χ^2=1.806. df=1. p=0.40**			
Verbal violence at work	No	1.536	1.002-2.355	0.613	0.430-0.874
	Yes	0.955	0.608-1.498	1.182	0.198-7.043
	Crude OR (95% CI)	2.461 (1.224-4.948)			
	Mantel-Haenszel OR (95% CI)	2.190 (1.073-4.471)		**χ^2=3.913. df=1. p=0.04**	
	Breslow-Day	**χ^2=0.939. df=1. p=0.33**			

OR: odds ratio. CI: confidence interval.

Four multivariable logistic regression models were evaluated (Table 5). Model 2 was considered the most appropriate model and included eating attitude, sex, age, occupation, household size, and perceived stress. The model explained

approximately 35% of the variation in obesity status (Nagelkerke R^2=0.35) and had a predictive accuracy of 75.7% ($p<0.05$).

Sex was the only variable that was not statistically significant in the final model. Participants aged 30–39 years had 5.6-fold higher odds of obesity than those aged 20–29 years (OR=5.6, 95% CI 3.11–10.35; $p<0.001$). Participants with disordered eating attitudes had 2.4-fold higher odds of obesity than those without disordered eating attitudes (OR=2.4, 95% CI 1.05–5.70; p=0.037).

Table 5. Results of regression analyses of obese and control groups (Ankara Mamak State Hospital, 2022).

	Model 1			Model 2			Model 3			Model 4		
Variables	**OR**	**95% CI**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**	**p**
Sex Male (R)	1	-	-	1	-	-	1	-	-	1	-	-
Female	1.6	0.8-3.0	0.12	1.4	0.7-2.6	0.30	1.4	0.7-2.6	0.29	1.3	0.6-2.6	0.38
Age 20-29 (R)	1	-	-	1	-	-	1	-	<0.001	1	-	<0.001
30-39	5.1	2.8-9.1	<0.001	5.6	3.1-10.3	<0.001	5.6	3.1-10.3	<0.001	4.7	2.5-8.8	<0.001
≥40	1.7	0.6-4.7	0.29	1.7	0.6-4.9	0.27	1.7	0.6-4.8	0.28	2.2	0.7-6.5	0.13
EAT-40 score ≤27(R)	1	-	-	1	-	-	1	-	-	1	-	-
>27	2.3	1.0-5.4	0.04	2.4	1.05-5.7	0.03	0.7	0.1-38.0	0.89	2.0	0.08-4.9	0.09
Household size	1.4	1.1-1.7	<0.001	1.4	1.19-1.8	<0.001	1.6	1.1-2.3	<0.001	1.3	1.0-1.6	0.01
Profession Health Professional(R)	1	-	-	1	-	-	1	-	<0.001	1	-	<0.001
Other health-related professional	1.7	0.7-4.2	0.22	1.6	0.6-4.1	0.24	1.6	0.6-4.1	0.24	1.7	0.6-4.2	0.24
Non-health professional	5.2	2.8-9.7	<0.001	5.1	2.7-9.7	<0.001	5.1	2.7-9.6	<0.001	4.8	2.4-9.5	<0.001
Perceived stress	-	-	-	0.9	0.8-0.9	0.03	0.9	0.1-1.0	0.09	0.9	0.8-0.9	0.03
EAT-40*PSS	-	-	-	-	-	-	1.0	0.8-1.1	0.98	-	-	-
EAT-40* Household size	-	-	-	-	-	-	1.4	0.7-2.7	0.33	-	-	-
Marrital status Single and other (R)	-	-	-	-	-	-	-	-	-	1	-	-
Married	-	-	-	-	-	-	-	-	-	2.8	1.1-6.9	0.02
Years in profession	-	-	-	-	-	-	-	-	-	1.0	1.0-1.07	0.03
Constant	-1.620			-.541			-1.008			-.934		

-2 Log likelihood	335.734	331.052	329.967	315.514
Hosmer Lemeshow p değeri	0.930	0.303	0.136	0.227
Nagelkerke r^2	0.338	0.353	0.356	0.399
Predictive power (%)	75.1	75.7	75.7	76.6

OR: odds ratio. CI: confidence interval. R: reference.

Compared with healthcare professionals, participants in the other healthcare professional category had higher but non-significant odds of obesity (OR=1.6, 95% CI 0.69–4.09; p=0.24), whereas those in non-healthcare occupational groups had significantly higher odds of obesity (OR=5.1, 95% CI 2.76–9.71; p<0.001).

Each additional household member was associated with a 1.4-fold increase in the odds of obesity (OR=1.4, 95% CI 1.19–1.82; p<0.001). Conversely, each one-point increase in the PSS score was associated with approximately 10% lower odds of obesity (OR=0.90, 95% CI 0.80–0.90; p=0.031).

When perceived stress was removed from the model, the OR for eating attitude changed by more than 10%, suggesting that stress may have acted as a confounder. Previous analyses did not support an effect-modifying role for stress.

Given the sample size of 113 obese participants, model complexity was restricted so that each category contained an adequate number of observations. Marital status, household size, spouse's employment status, having children, occupation, duration of employment, smoking, job satisfaction, and perceived stress were considered in model construction. Education was excluded because of its correlation with occupation (collinearity coefficient=0.597). Exposure to workplace verbal violence and alcohol consumption were also excluded because of their distributional characteristics.

Factors associated with overweight

Perceived stress, perceived social support, and eating attitudes were not significantly associated with overweight in the bivariate analyses. Therefore, separate regression models were constructed using potential sociodemographic and occupational determinants.

Model 1 included potential confounding variables and demonstrated adequate fit (Nagelkerke R^2=0.188; Hosmer–Lemeshow p=0.707).

In Model 2, which included sex, age, and educational status, participants with education at or below high school had 1.6-fold higher odds of being overweight than those with education beyond high school (OR=1.6, 95% CI 1.04–2.73; p=0.034; Nagelkerke R^2=0.20; Hosmer–Lemeshow p=0.26).

In Model 3, including sex, age, and marital status, currently married participants had higher odds of being overweight than unmarried participants (OR=1.4; 95% CI reported in the original analysis; p=0.03; Nagelkerke R^2=0.19; Hosmer–Lemeshow p=0.82).

In Model 4, including sex, age, and occupation, the odds of overweight were 2.4-fold higher among other healthcare professionals than healthcare professionals (OR=2.4, 95% CI 1.27–4.70; p=0.001) and 1.7-fold higher among

participants in other occupational groups (OR=1.7, 95% CI 1.00–2.94; p=0.05; Nagelkerke R^2=0.21; Hosmer–Lemeshow p=0.44).

Discussion

Obesity is a multifactorial condition shaped by biological, social, economic, occupational, and behavioral determinants [1–3]. In the present study, we examined potential determinants of overweight and obesity among hospital employees and analysed overweight and obesity separately in comparison with a normal-weight control group. This approach allowed us to investigate whether the psychosocial factors of primary interest—eating attitudes, perceived stress, and perceived social support—were associated differently with overweight and obesity.

In accordance with previous evidence, age was strongly associated with obesity. Participants aged 30–39 years had substantially higher odds of obesity than those aged 20–29 years. Similar age-related increases in BMI have been reported in longitudinal research [34]. Age-related changes in body composition, including reductions in muscle mass and energy expenditure, may contribute to weight gain when energy intake does not decrease proportionately [35].

Marital status has also been associated with obesity in previous studies [36, 37]. In our study, the proportion of married participants increased progressively from the control group to the overweight and obese groups. Participants living alone were less common in both case groups than in the normal-weight group. These findings are broadly consistent with studies reporting higher obesity prevalence among married individuals [36, 37].

Household size was also associated with obesity. The proportion of households containing five or more individuals was highest in the obese group, and each additional household member increased the odds of obesity by approximately 1.4-fold. Changes in household composition in Türkiye have included declining average household size and increasing proportions of single-person households [38]. Household composition may influence food availability, dietary practices, financial resources, and opportunities for physical activity.

Marriage and household composition may also influence economic circumstances. The economic benefits of marriage can include risk sharing, division of labour, and shared household resources [39]. Conversely, dependent children may increase household expenditure and financial vulnerability [40]. In the present study, however, most participants described their economic situation as moderate, and indicators such as debt and housing expenditure were not significantly associated with overweight or obesity. Household size was the main family-related factor associated with obesity.

Educational attainment was associated with overweight. Participants with education at or below high school had 1.6-fold higher odds of overweight than those with education beyond high school. This finding is consistent with evidence suggesting that lower educational attainment may be associated with greater obesity risk, although the direction and magnitude of this association vary across populations [41, 42].

Occupation was another important determinant. Compared with healthcare professionals, participants in non-healthcare occupational groups had substantially higher odds of obesity, while other healthcare professionals also showed increased odds. Similar occupational differences in obesity prevalence have been reported among healthcare workers [19]. Differences in educational attainment, health knowledge, occupational demands, work environments, and opportunities for healthy eating and physical activity may contribute to these patterns.

The occupational environment of hospitals may influence employees' dietary and physical activity behaviors. Hospital food environments, vending facilities, and workplace health promotion programmes may influence employees' opportunities to maintain healthy lifestyles [16, 43]. However, in the present study, night-shift work and overtime were

not significantly associated with overweight or obesity. This may partly reflect the limited sample size and the relatively homogeneous occupational setting.

Psychological stress was one of the main variables of interest. The mean PSS scores in all three groups were approximately 20 on a 0–40 scale, suggesting low-to-moderate perceived stress. Contrary to much of the literature linking stress to unhealthy eating and weight gain [7, 44], higher perceived stress was associated with slightly lower odds of obesity in the final model (OR = 0.90). This finding should be interpreted cautiously. It may reflect the selective nature of the study population, relatively low overall stress levels, self-reporting, or non-participation by employees experiencing particularly high levels of stress.

Stress was also identified as a potential confounder because removal of the stress variable changed the OR for eating attitude by more than 10%. However, no evidence of effect modification was identified. Because stress and eating behavior are closely interrelated, larger longitudinal studies are needed to clarify their temporal and causal relationships.

The workplace may be an important source of stress for healthcare workers. However, direct information regarding specific occupational stressors could not be collected because the hospital administration did not approve direct questioning about workplace stressors. Instead, job satisfaction, satisfaction with co-workers, and exposure to verbal violence were used as indirect indicators. Most employees reported high levels of job and co-worker satisfaction, while verbal violence was reported less frequently among case participants. Previous evidence indicates that workplace violence is an important occupational stressor for healthcare workers [45]. The inverse association observed in our data may therefore reflect selection or residual confounding rather than a protective effect.

Eating attitudes were the most important psychosocial factor identified in relation to obesity. Obese participants were 2.4 times more likely to have disordered eating attitudes than participants without disordered eating attitudes. This association remained significant after adjustment for age, sex, occupation, household size, and perceived stress.

Eating behavior is influenced by emotional, cognitive, environmental, and psychological factors [46]. Stress may alter food reward mechanisms and eating behavior [7]. However, the relatively low stress levels observed in this study may explain why the association between disordered eating attitudes and overweight was not statistically significant. In contrast, the association became apparent among obese participants, suggesting that disturbed eating attitudes may be more strongly related to established obesity than to overweight.

Perceived social support was not significantly associated with either overweight or obesity. Nevertheless, perceived social support was negatively correlated with perceived stress in the control and obese groups. The absence of an association between social support and weight status may reflect insufficient statistical power, the characteristics of the study population, or the complexity of pathways linking social support to dietary and weight-related behaviors.

The health perception findings were noteworthy. A substantial proportion of overweight and obese employees rated their general health as good or very good despite the higher prevalence of chronic disease and health complaints in the case groups. According to the Health Belief Model, perceived health status can influence health behaviors and health responsibility [47]. The discrepancy between objective health indicators and subjective health perception may therefore be important in occupational health interventions.

Many overweight and obese employees had previously attempted to lose weight and continued to express an intention to lose weight. This suggests awareness of excess weight and its potential consequences. However, the findings may also indicate that body image rather than health perception is an important motivation for weight-loss attempts.

Fatigue was reported by more than half of participants and was particularly common among obese employees. Obese participants also more frequently reported dyspnea and had a greater burden of chronic disease. Obesity is associated with several cardiometabolic and respiratory conditions, including asthma [48]. These findings suggest that occupational health screening should not be limited to BMI measurement but should also consider relevant symptoms and chronic disease risk.

The relatively high prevalence of chronic disease among obese employees is another important finding. Approximately half of obese participants reported at least one chronic disease, and the proportion with three or more chronic diseases was considerably higher than in the control group. Despite this, some participants had not undergone a medical examination during the previous year. This suggests that healthcare workers, despite working within healthcare institutions, may not consistently use available occupational or preventive health services.

An important finding was that many overweight and obese participants did not know how long they had been at their current weight. This may indicate limited body-weight awareness and suggests that routine monitoring could improve recognition of gradual weight gain.

The final obesity model included eating attitude, sex, age, occupation, household size, and perceived stress and explained approximately 35% of the variation in obesity status. Genetic factors may account for a substantial proportion of interindividual variation in body fat, while environmental and behavioral factors contribute to the remaining variation [49]. Although the explanatory power of our model should not be interpreted as a direct estimate of genetic versus non-genetic causality, the findings demonstrate that a combination of psychosocial, demographic, occupational, and household factors may meaningfully contribute to obesity among hospital employees.

This study has several strengths. First, height and weight were objectively measured during the hospital's health screening programme rather than self-reported. Second, the study distinguished overweight from obesity rather than combining both conditions into a single outcome. Third, standardized instruments were used to assess eating attitudes, perceived stress, and perceived social support. Finally, potential confounding and effect modification were explicitly examined.

Several limitations should also be considered. First, the cross-sectional nature of the study limits causal inference. Second, the study was conducted in a single public hospital, limiting generalisability to other healthcare institutions and occupational groups. Third, some potentially important occupational stressors could not be assessed directly. Fourth, the sample size may have limited the ability to detect associations, particularly for perceived social support and overweight.

Conclusions

Among the three psychosocial factors examined as primary variables of interest—perceived stress, perceived social support, and eating attitudes—only eating attitudes showed a statistically significant association with obesity. No significant association was identified between these three factors and overweight.

Age, education, occupation, marital status, and household size were associated with overweight and/or obesity. In particular, older age, larger household size, lower educational attainment, and employment in non-healthcare occupational groups were associated with higher odds of overweight or obesity.

The findings support the incorporation of annual BMI assessment into periodic occupational health screening programmes for hospital employees. Screening should not be limited to BMI measurement; employees with obesity

may benefit from additional assessment of cardiometabolic risk, chronic disease, respiratory symptoms, mental health, and other obesity-related health consequences.

Interventions addressing obesity among healthcare workers should also consider eating attitudes and the broader social and occupational environment. Larger multicentre and longitudinal studies are needed to clarify the temporal relationships between eating attitudes, perceived stress, social support, and obesity. Qualitative studies may be particularly useful for identifying the underlying determinants of disordered eating attitudes among healthcare workers.

Healthcare institutions should strengthen education and awareness programmes, facilitate employees' participation in periodic occupational health examinations, and improve access to preventive healthcare services. Protecting the health of healthcare workers is essential for maintaining a healthy and sustainable health workforce.

Abbreviations

BMI: Body Mass Index

CI: Confidence Interval

COVID-19: Coronavirus Disease 2019

df: Degrees of Freedom

EAT-40: Eating Attitudes Test-40

GDP: Gross Domestic Product

MSPSS: Multidimensional Scale of Perceived Social Support

OR: Odds Ratio

PSS: Perceived Stress Scale

Q1–Q3: First–Third Quartiles

R: R Statistical Programming Language

R^2: Coefficient of Determination

SD: Standard Deviation

SPSS: Statistical Package for the Social Sciences

Study Group Codes

C0: Control Group

C1: Overweight Group

C2: Obese Group

Declarations

Ethics approval Ethical approval for the study was obtained from the Hacettepe University Non-Interventional Clinical Research Ethics Committee (19 April 2022; No. 2022/07-07). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.'Administrative permission was also obtained from the Chief Physician of the study hospital.

Consent to participate Verbal informed consent was obtained from all participants before administration of the questionnaire.

Consent for publication Not applicable.

Availability of data and materials The data generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests The authors declare that they have no conflict of interest.

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Scheme

Scheme 1 is available in the Supplementary Files section.

Supplementary Files

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