ORIGINAL ARTICLE

# Prevalence and Factors of Overweight and Obesity among Medical Personnel in a District Hospital

Piraya Intarakamhang, MD[1], Poonyawee Chansaenwilai, MD[1], Wisit Kaewput, MD[1], Pongpisut Thakhampaeng, MD[1], Teeraboon Lertwanichwattana, MD[1], Ungsinun Intarakamhang, PhD[2]

[1] Phramongkutklao College of Medicine, Bangkok, Thailand; [2] Behavioral Science Research Institute, Srinakharinwirot University, Bangkok, Thailand

**Background**: In 2022, the prevalence of overweight and obesity in Thailand reached 47.8%, marking a rise from 34.7% in 2016, the second highest in ASEAN following Malaysia. Furthermore, there is high obesity among healthcare workers.

**Objective**: To investigate the prevalence rate and factors affecting overweight and obesity among medical personnel.

**Materials and Methods**: The cross-sectional study was designed. The sample size of 169 medical personnel working at a district hospital was included in the present study. Age over 20 years old and informed consent was required in the inclusion criteria. Weight, height, and body mass index (BMI) through self-reports for assessing obesity. A 5-level scale of eating behavior and the Global Physical Activity Questionnaire (GPAQ) with a reliability of 0.79 to 0.93 were used to collect the data in September and October 2022. Logistic Regression was used to analyze the data.

**Results**: The prevalence of overweight was 14.79%, (BMI of 23.0 to 24.9 kg/m$^2$) and 40.24% obesity (BMI of 25.0 kg/m$^2$ or greater), with more obesity in males than females. The factors associated with obesity were male gender, increasing age, occupation, job position, poor eating behavior, and moving of body while working less than six hours/shift ($p<0.05$). The findings from the multivariate analysis factors for obesity revealed male gender (AOR 7.99, 95% CI 2.74 to 23.25), age 50 to 58 years (AOR 17.48, 95% CI 2.30 to 133.04), nurse (AOR 0.39, 95% CI 0.17 to 0.91), and poor eating behavior (AOR 3.22, 95% CI 1.46 to 7.08) were associated with obesity.

**Conclusion**: The prevalence of overweight and obesity among health personnel is higher than the prevalence in Thailand and the main factors are shift working, eating behavior, and less moving. The present study finding can be useful in planning the program and practical policies on decreasing obesity in the future.

**Keywords**: Prevalence; Overweight; Obesity; Medical personnel; Eating behavior; Physical activity

Received 3 July 2023 | Revised 5 September 2023 | Accepted 15 September 2023

**J Med Assoc Thai 2023;106(10):956-64**

**Website:** http://www.jmatonline.com

The lifestyles of Thai people have undergone significant changes when compared to the past. These changes encompass various aspects, such as eating behavior, sedentary habits, transportation preferences, rushed commuting, and a preference for car travel over walking[1]. Additionally, there is also an observed imbalance between calories used and calories consumed through metabolism physical activity, and movement of the body[2,3]. This has led to a rise in overweight and obesity rates among children, adolescents, and adults between 1975 and 2022. It is predicted that globally, by 2030, the number of overweight and obese individuals with a body mass index (BMI) over 30 will exceed 800 million, accounting for approximately 39% of the population[4]. In Thailand, the prevalence of overweight and obesity was 47.8% in 2022, an increase from 34.7% in 2016, making it the second highest in ASEAN, following Malaysia. The upward trend in overweight and obesity rates in Thailand has consistently remained high, accounting for 48.28%[5,6]. In Thailand, the prevalence of abdominal obesity among personnel in Somdejphrajaotaksinmaharaj Hospital was 15.80%[7]. In Nopparat Rajathanee Hospital, the overall rate of obesity was 27.8%, which males had a higher prevalence of obesity than females, at 32.9% and 27.0%, respectively[8]. Obesity among Malaysian healthcare workers was categorized as overweight in 33.1%, of which 21.1% were obese[9].

**Correspondence to:**

Intarakamhang U.

Behavioral Science Research Institute, Srinakharinwirot University, Bangkok 10110, Thailand.

**Phone**: +66-89-1653520

**Email**: ungsinun@g.swu.ac.th

**How to cite this article:**

Intarakamhang P, Chansaenwilai P, Kaewput W, Thakhampaeng P, Lertwanichwattana T, Intarakamhang U. Prevalence and Factors of Overweight and Obesity among Medical Personnel in a District Hospital. J Med Assoc Thai 2023;106:956-64.

DOI: 10.35755/jmedassocthai.2023.10.13896

The issue of being overweight has been on the rise, and individuals with abdominal obesity are often unaware of this health problem[10] due to a lack of self-care. The main contributing factors are genetics and unhealthy eating behavior. Socializing frequently in environments that promote unlimited quantities of food, such as buffet dining, consuming fried, sugary, and oily foods, and being encouraged to drink alcohol and smoke are all culprits. Insufficient physical activity is a major contributor to being overweight, and when obesity sets in, it becomes challenging to engage in regular exercise[11,12], which further exacerbates the risk of non-communicable diseases (NCDs) such as diabetes, high blood pressure, and cardiovascular ailments.

Working is a significant factor associated with obesity among healthcare professionals working in hospitals, as they have been found to be at a higher risk of obesity[6]. The issue of obesity among healthcare workers is significant, as it has impacted both their well-being and their professional capacity. Nurses had higher obesity (adjusted odds ratio [AOR] 1.91, 95% confidence interval [CI] 1.45 to 2.53, $p<0.001$)[9]. A study investigating the risk factors for obesity among medical personnel significantly revealed factors that contribute to this issue, including increasing age, work shifts, lack of exercise, low levels of physical activity during work hours[13,14], and prolonged periods of sedentary work[15]. Therefore, the objective of the present study was to examine the prevalence and underlying factors of overweight and obesity among medical personnel in hospital settings. The present research specifically focused on groups of medical personnel in Thailand. The information obtained from the study can be utilized for planning, developing, and promoting healthcare strategies aimed at preventing NCDs and improving the future quality of life for medical personnel in the public sector.

## Materials and Methods

The present study was designed as a cross-sectional investigation and was carried out in September and October 2022. It involved medical personnel from a community hospital as a district hospital in Chachoengsao Province, Thailand. To determine an appropriate sample size for assessing the prevalence of overweight and obesity, a previous study[16] was considered. The sample size was determined using Cohen's principle[17] and G*Power[18], with a power value of 0.95, a significance level of 0.05, and a medium effect size of 0.25. Initially, 164 cases were enrolled. However, to account for potential participant dropouts, the sample size was increased by 5% to prevent data loss, resulting in a total sample size of 169 participants being recruited to partake in the present study. Participants were selected by stratified random sampling equally from shift workers and non-shift workers.

The present study included medical personnel aged 20 years and above, working in a district community hospital. Inclusion criteria required participants to have the ability to make independent decisions and express willingness to participate. Exclusion criteria involved individuals with health conditions known to contribute to obesity, such as hypothyroidism, polycystic ovarian syndrome, Cushing's syndrome, and others. Individuals who were unwilling to be enrolled were also excluded. Participants had the option to skip specific questions or withdraw from the study if they felt uncomfortable answering or undergoing measurements.

The study received ethical approval from the Institutional Review Board Royal Thai Army Medical Department (IRBRTA), M022q/65. Participants provided informed consent in Thai prior to participating, and the data collection process took around 30 minutes per participant. The information gathered from the questionnaires was utilized to determine the prevalence of overweight and obesity among medical personnel and identify associated factors.

### Measures

The Thai Adult Health Questionnaire[19] was adapted to be culturally appropriate for measuring the health indicators among medical personnel. This included assessing weight, and height to use in calculating BMI, waist circumference, and neck circumference (which classified participants as overweight, obese, and having abdominal obesity through criteria of the Army Medical Research Institute, Thailand)[20], working details (work shift, occupation, income, job position, and body movement, which was divided into two groups as less than six hours/shift and six hours/shift or more, by average score of body movement estimated by the participants themselves), using the Global Physical Activity Questionnaire (GPAQ)[21], and items related to eating behavior. The modified questionnaire underwent expert evaluation with IOC scores ranging from 0.80 to 1.00 and a reliability test between 0.79 and 0.93. Eating behavior scores of 60 and above

**Table 1.** Prevalence of overweight and obesity among medical personnel

| Variables | Male (n=37); n (%) | Female (n=132); n (%) | Total (n=169); n (%) |
|---|---|---|---|
| BMI (kg/m$^2$) | | | |
| <18.5 (underweight) | 1 (2.70) | 11 (8.33) | 12 (7.10) |
| 18.5 to 22.9 (normal weight) | 3 (8.11) | 61 (46.21) | 64 (37.87) |
| 23.0 to 24.9 (overweight) | 6 (16.22) | 19 (14.40) | 25 (14.79) |
| ≥25.0 (obesity) | 27 (72.97) | 41 (31.06) | 68 (40.24) |
| Waist circumference (cm) | | | |
| Male <90, female <80 (normal) | 5 (13.51) | 81 (61.36) | 86 (50.89) |
| Male ≥90, female ≥80 (abdominal obesity) | 32 (86.49) | 51 (38.64) | 83 (49.11) |
| Neck circumference (cm) | | | |
| Male <38, female <33 (normal weight) | 7 (18.92) | 83 (62.88) | 90 (53.25) |
| Male ≥ 38, female ≥ 33 (overweight/obesity) | 30 (81.08) | 49 (37.12) | 79 (46.75) |

BMI=body mass index

were classified as good, scores of 45 to 59 as fair, and scores below 45 as poor, which was a 5-rating scale. The GPAQ was used to assess the intensity and was categorized into three levels as light exercise if you can talk and sing during the activity, moderate exercise if can talk but cannot sing during the activity, and vigorous exercise if you are not able to speak more than a few words without pausing for a breath, duration (hour/minute), and frequency of physical activity during work (day/week), transportation, and leisure time (sedentary behavior as sitting or lying more than two hours/day)[22]. Data were collected by self-assessment questionnaire, self-report, and partly interviewed those who did not complete the survey.

### Statistical analysis

Data were analyzed using IBM SPSS Statistics, version 25.0 (IBM Corp., Armonk, NY, USA). Continuous data were shown as mean ± standard deviation and categorical data as a percentage. The prevalence of overweight and obesity was reported as a percent with BMI criteria. Logistic regression analysis was used to explore the associations among factors influencing obesity. For the univariate analysis factors, we selected the significant factors by entering the selection criteria. When there was statistical significance, it was also analyzed by multiple logistic regression to identify potential risk factors. Factors of obesity were revealed after adjusting confounding factors at the confidence level of 95% and statistically significant at $p<0.05$.

## Results

### Demographic characteristics

The 169 participants consisted of 21.89% male and 78.11% female with an average age of 36±9.41 years and range of 22 to 58 years. The major findings were 52.66% single, 38.46% were nurses, 46.15% had sufficient income, and 18.93% of them had diseases such as type 2 diabetes mellitus (T2DM), hypertension, dyslipidemia, hyperthyroidism, and knee osteoarthritis. In terms of eating behavior, 5.32% were classified as good, 54.44% as fair, and 40.24% as poor. Regarding total physical activity, 33.14% had less than 600 metabolic equivalents (MET) minutes/week (light exercise), 17.16% had 600 to 1,500 MET minutes/week (moderate exercise), and 49.70% had 1,500 MET minutes/week or more (vigorous exercise). Sedentary behavior was reported as always by 29.58%, sometimes by 50.89%, and never by 19.53% of participants. Among the participants, 10.65% held the position of chief, while the majority were subordinate staff 89.35%. Approximately 45.60% of participants worked in shifts, with a mean of 11.51±5.54 days shift assignments per month, 8.95±2.96 evening shift assignments, and 7.14±3.26 nights shift assignments. The mean score for body movement while performing duties was 5.29±3.19 hours/shift.

### The prevalence of overweight and obesity

Overall, the prevalence of 55.03% were overweight and obese (14.79% among overweight and 40.24% among obesity) with BMI of 23.0 or greater. Discussing waist circumference for abdominal obesity (male at 90 cm or greater and female at 80 cm or greater) was 49.11%, and neck circumference for overweight and obesity (male 38 cm or greater and female 33 cm or greater) was 46.75% as in Table 1.

### The univariate analysis factors for obesity

The results of the present study showed that

**Table 2.** Univariate analysis factors for obesity among medical personnel

| Variable | Total | Obesity; n (%) | Crude OR | 95% CI | p-value |
|---|---|---|---|---|---|
| Sex | | | | | |
| Male | 37 | 27 (72.97) | 5.99 | 2.66 to 13.52 | <0.01* |
| Female | 132 | 41 (31.06) | 1 | | |
| Age (years) | | | | | |
| Mean±SD | 169 | 36.38±9 | | | |
| 22 to 29 | 49 | 14 (28.57) | 1 | | |
| 30 to 39 | 57 | 31 (54.39) | 2.98 | 1.33 to 6.70 | 0.01* |
| 40 to 49 | 47 | 18 (38.30) | 1.55 | 0.66 to 3.65 | 0.31 |
| 50 to 58 | 16 | 5 (31.25) | 1.14 | 0.33 to 3.87 | 0.84 |
| Marital status | | | | | |
| Single | 89 | 36 (40.45) | 1.70 | 0.31 to 9.24 | 0.54 |
| Married | 73 | 30 (41.10) | 1.74 | 0.32 to 9.59 | 0.52 |
| Widowed/divorced/separated | 7 | 2 (28.57) | 1 | | |
| Occupation | | | | | |
| Nurse | 65 | 17 (26.15) | 0.19 | 0.07 to 0.50 | 0.01* |
| Medical office worker | 14 | 9 (64.29) | 0.95 | 0.25 to 3.71 | 0.95 |
| Physician | 13 | 3 (23.08) | 0.16 | 0.04 to 0.73 | 0.02* |
| Practical nurse | 12 | 7 (58.33) | 0.74 | 0.18 to 3.02 | 0.68 |
| Pharmacist | 12 | 6 (50.00) | 0.53 | 0.13 to 2.13 | 0.37 |
| Allied health science | 11 | 2 (18.18) | 0.12 | 0.01 to 0.67 | 0.02* |
| Public health worker | 9 | 4 (44.44) | 0.42 | 0.09 to 1.98 | 0.28 |
| Dentist | 7 | 3 (42.86) | 0.40 | 0.07 to 2.18 | 0.29 |
| Other | 26 | 17 (65.38) | 1 | | |
| Income/overall finance | | | | | |
| Sufficient/remaining | 79 | 31 (39.74) | 0.66 | 0.28 to 1.54 | 0.34 |
| Sufficient/not remaining | 45 | 16 (35.56) | 0.55 | 0.22 to 1.41 | 0.22 |
| Insufficient/not indebted | 15 | 6 (40.00) | 0.67 | 0.19 to 2.34 | 0.53 |
| Insufficient/indebted | 30 | 15 (50.00) | 1 | | |
| Job position | | | | | |
| Subordinate staff | 152 | 65 (43.05) | 5.70 | 1.25 to 25.66 | 0.02* |
| Chief | 17 | 2 (11.76) | 1 | | |
| Sedentary behavior | | | | | |
| Always | 49 | 21 (42.86) | 1.31 | 0.53 to 3.25 | 0.56 |
| Sometimes | 87 | 34 (39.53) | 1.14 | 0.50 to 2.63 | 0.75 |
| Never | 33 | 12 (36.36) | 1 | | |
| Eating behavior | | | | | |
| Poor | 68 | 37 (54.41) | 2.70 | 1.43 to 5.10 | 0.01* |
| Fair to good | 101 | 31 (30.69) | 1 | | |
| Total physical activity MET minutes/week | | | | | |
| ≥1,500 | 56 | 27 (48.21) | 1.77 | 0.89 to 3.52 | 0.12 |
| 600 to 1,500 | 29 | 12 (41.38) | 1.34 | 0.56 to 3.18 | 0.51 |
| <600 | 84 | 29 (34.52) | 1 | | |
| Shift worker | | | | | |
| Yes | 77 | 34 (44.16) | 1.35 | 0.73 to 2.50 | 0.34 |
| No | 92 | 34 (36.96) | 1 | | |
| Number of day shift assignments per month | | | | | |
| Mean±SD | 80 | 11.51±5.54 | | | |
| <12 | 56 | 29 (51.79) | 2.61 | 0.94 to 7.27 | 0.07 |
| ≥12 | 24 | 7 (29.17) | 1 | | |
| Body movement while performing duties (hour/shift) | | | | | |
| Mean±SD | 158 | 5.28±3.19 | | | |
| <6 | 87 | 44 (50.57) | 2.61 | 1.34 to 5.08 | 0.01* |
| ≥6 | 71 | 20 (28.17) | 1 | | |

OR=odds ratio; CI=confidence interval; SD=standard deviation; MET=metabolic equivalent

* $p<0.05$, statistical significance

**Table 3.** Multivariate analysis factors for obesity among medical personnel

| Variable | Total | Obesity; n (%) | Adjusted OR | 95% CI | p-value |
|---|---|---|---|---|---|
| Sex | | | | | |
| Male | 37 | 27 (72.97) | 7.99 | 2.74 to 23.25 | <0.01* |
| Female | 132 | 41 (31.06) | 1 | | |
| Age (years) | | | | | |
| 22 to 29 | 49 | 14 (28.57) | 1 | | |
| 30 to 39 | 57 | 31 (54.39) | 4.04 | 1.42 to 11.47 | 0.01* |
| 40 to 49 | 47 | 18 (38.30) | 3.49 | 1.15 to 10.65 | 0.03* |
| 50 to 58 | 16 | 5 (31.25) | 17.48 | 2.30 to 133.04 | 0.01* |
| Occupation | | | | | |
| Nurse | 65 | 17 (26.2) | 0.39 | 0.17 to 0.91 | 0.03* |
| Physician | 13 | 3 (23.1) | 0.28 | 0.05 to 1.50 | 0.14 |
| Allied health science | 11 | 2 (18.2) | 0.10 | 0.01 to 0.75 | 0.03* |
| Other | 80 | 46 (57.5) | 1 | | |
| Job position | | | | | |
| Chief | 17 | 2 (11.76) | 1 | | |
| Subordinate staff | 151 | 65 (43.05) | 16.02 | 1.85 to 138.91 | 0.01* |
| Eating behavior | | | | | |
| Fair to good | 101 | 31 (30.69) | 1 | | |
| Poor | 68 | 37 (54.41) | 3.22 | 1.46 to 7.08 | 0.01* |

OR=odds ratio; CI=confidence interval

* $p<0.05$, statistical significance

being male is a significant factor that increased the risk by 5.99 times compared to female. Additionally, medical personnel in the age range of 30 to 39 years old had a significant increased risk by 2.98 times compared to those under 30. The occupation of nurse, physician, and allied health science were found to be a significant protective factor, reducing the risk by 0.19, 0.16, and 0.12, respectively, compared to other occupations such as doctor, nursing assistant, or dental assistant. Job position as the subordinate staff was another significant factor, increasing the risk by 5.70 times when compared to the position of chief. Poor eating behavior was also identified as a significant factor, increasing the risk by 2.70 times when compared to individuals with fair to good eating behavior. Lastly, the study reveals that medical personnel who have less than six hours/shift of body movement while performing their duties face a significant risk increase of 2.61 times of those who had six hours/shift or more of body movement as shown in Table 2.

### The multivariate analysis factors for obesity

The multivariate analysis of factors for obesity revealed that after adjusting confounding factors at the confidence level of 95%, male gender (AOR 7.99, 95% CI 2.74 to 23.25), age 30 to 39 years old (AOR 4.04, 95% CI 1.42 to 11.47), age 40 to 49 years old (AOR 3.49, 95% CI 1.15 to 10.65), age 50 to 58 years old (AOR 17.48, 95% CI 2.30 to 133.04), nurse (AOR 0.39, 95% CI 0.17 to 0.91), allied health science (AOR 0.10, 95% CI 0.01 to 0.75), subordinate staff (AOR 16.02, 95% CI 1.85 to 138.91), and poor eating behavior (AOR 3.22, 95% CI 1.46 to 7.08), were associated with obesity as shown in Table 3.

## Discussion

The present study results indicated that 14.79% of individuals fell into the overweight category (BMI of 23.0 to 24.9 kg/m$^2$), while 40.24% were classified as obese (BMI of 25.0 kg/m$^2$ or more). In terms of waist circumference, 49.11% of adults had measurements exceeding the thresholds for belly obesity (90 cm or more for men and 80 cm or more for women). Furthermore, 46.75% of adults had neck circumferences that indicated overweight or obesity (38 cm or more for men and 33 cm or more for women). This was high compared to a relevant study conducted in Thailand. When comparing these findings with studies conducted in sub-district health-promoting hospitals in Sakon Nakhon Province, it was observed that 17.72% of health personnel were overweight, and 25.32% were classified as obese[23]. This is consistent with the previous study

of abdominal obesity in personnel of Phrachomklao Hospital, Phetchaburi province, where the abdominal obesity was 16.5%[24]. These results suggested that medical personnel in hospitals were at a higher risk of being overweight and obese[25]. The increased prevalence identified in the current study may be attributed to factors related to obesity, including male gender, older age, poor dietary habits, specific job roles, and less than six hours of physical activity while working.

The gender, of the present study, indicates that males were significantly more obese than females, being approximately eight times (AOR 7.99, 95% CI 2.74 to 23.25). In the previous study, the prevalence of abdominal obesity was higher among males compared to females. This gender disparity was that males tend to be less health-conscious than females and are more accepting of obesity[26]. Various situations influence the difference in food consumption between genders, with women frequently prefer consuming more nutritious food. Worldwide gender disparities in overweight and obesity prevalence were reported by the World Bank. The mean percentages of overweight and obesity were greater in males than in females in high-income countries[27]. Additionally, it is worth noting that males are more likely to be overweight or obese due to their higher consumption of high-calorie beverages like alcohol and prolonged periods of sedentary behavior[28].

The present research revealed that being older increases the risk of developing obesity. This finding was supported by a study showing that older individuals had a greater likelihood of having metabolic syndrome[24,29,30]. Additionally, aging was commonly linked to obesity, a significant factor contributing to insulin resistance and the development of metabolic syndrome[31]. Moreover, there was an imbalance between the calories consumed from food and the amount of energy expended daily[32].

There was no significant relationship between family status and obesity[33]. However, this finding contrasts with other studies. Married couples were twice as likely to be obese compared to singles. Furthermore, the risk of obesity tends to increase with the duration of married life[34]. However, another study showed a tendency among single individual to have unhealthy habits because they do not have the financial obligations or expenses associated with supporting a family[35].

Occupations such as doctors, nurses, and allied health professionals still face the risk of gaining excess weight and becoming obese, albeit to a lesser extent compared to other occupational groups. Nurses who derive satisfaction from their jobs may experience lower levels of stress, allowing them to have more energy for exercise and sufficient time to prepare and consume a healthy diet[36]. Research indicated that the medical profession had a lower prevalence of overweight and obesity than the general population. Moreover, those who perceive their overall health as good were more likely to be overweight with a lower likelihood of obesity compared to those who reported poor health[37]. Nevertheless, these findings contrast with a study conducted at King Mongkut's Hospital, which identified nurses as the risk group for abdominal obesity, particularly among those over the age of 45. However, the proportion of the obese nurse group was still smaller than that observed among medical professionals, radiologists, and physiotherapists, who had the highest obesity rates[24].

Total current income was not correlated with a higher incidence of obesity. This was consistent with other studies that income factors were related to being overweight. The population had a low average monthly income, which necessitated home-cooked meals rather than eating out. Consequently, this group had limited access to restaurants or convenience stores, reducing their chances of engaging in unhealthy eating habits[34,38].

It was discovered that the operational position in Nopparat Rajathanee Hospital was a role in the elevated risk of obesity. A strong correlation between the type of work performed and the risk of obesity was discovered ($p<0.05$). Healthcare workers working in the office and support services were more obese than those working in the medical service department[25]. Another study suggested that people who worked in management or chief positions had more self-protective behaviors from obesity. There were less overweight and obese than those who worked in patient care or subordinate staff[24].

People with obesity had lower knowledge, attitudes, and healthy eating behaviors than those without obesity[35]. Another study supports this relationship between eating behavior and BMI. Eating behavior has surfaced as the notable lifestyle-associated element that contributes to the risk of being overweight or obese. Individuals who engaged in overeating more than twice a week faced a threefold increase in the likelihood of being overweight. Similarly, individuals who consumed their meals quickly also had a threefold higher risk of being overweight[16,39]. The present study found a significant association between dietary factors and

the occurrence of metabolic syndrome. Specifically, consuming sugary and fatty foods such as tea, coffee, soft drinks, fried foods, and coconut milk regularly contributes to obesity due to their high sugar and fat content[40]. Moreover, a study conducted in Samut Prakan Province examined factors associated with obesity among adults. The findings revealed that eating behavior was a significant factor in relation to obesity. The quantity, type, number of meals, and eating duration all have an impact on obesity[41].

In the total number of days shifts per month, it was found that medical personnel who had less than 12-day shifts per month were not at a higher risk of being obese than the total number of shifts per month at 12 shifts or more. This caused more inappropriate health behaviors[42]. In the case of health providers working in day or morning shifts, both less than 12 and 12 shifts or more per month, there may be more hours of work in the afternoon shift, and night shifts too. Due to working night shifts, lifestyle patterns can change, especially the shorter duration of sleep that can cause an increase in BMI[43]. Therefore, shift work was not associated with obesity. The present study found that shift work with BMI was not statistically negative. This is because obesity is influenced by other factors such as heredity, gender, age, socio-economic conditions, consumption, and exercise[16]. The present study found no significant correlation between shift work and an increase in BMI[44].

Overall physical activity MET minutes/week was not associated with obesity. Specifically, a study conducted at King Mongkut's Hospital revealed that exercise had no impact on abdominal obesity. Additionally, the study found that a majority of hospital personnel had low exercise participation, with a small proportion, at 13.2%, engaging in appropriate exercise at least two to three times a week, while the majority (54.3%) reported not exercising at all. However, these exercise behaviors had no significant relation to obesity[24]. Another study also found no association between exercise behavior and obesity, which can be attributed to the low levels and irregularity of exercise among the majority of participants[38].

Sedentary behavior was not associated with obesity. However, other studies have shown that workers with less than four hours of free time per day, who spend less time sitting, have a lower risk of being overweight and obese. These findings were significant, with a relative risk (RR) of 0.93 (95% CI 0.88 to 0.97) for less than four hours of sitting per day and an RR of 0.77 (95% CI 0.69 to 0.87) for more than four hours of sitting per day[37]. The increased prevalence of technology has led to greater comfort and reduced physical activity, which can contribute to weight gain and eventually lead to obesity[45].

## Limitation

The participants in the present study were responsible for reporting their own data, which introduces the possibility of intentional or unintentional misreporting by the participants. Eating behavior, GPAQ scores, and body movement during work were all estimated by the participants themselves, which may not provide precise or accurate measurements, and the present study was conducted in a rural area, so the findings may not be representative of all public health personnel in the country, as the characteristics and circumstances of public health personnel in urban areas or different regions could differ significantly. Additionally, the sample size studied was small. Therefore, the comparative study between subgroups may cause bias in data analysis because the data may not be normal curves.

## Conclusion

Compared to previous studies in Thailand, medical personnel in the present study had a higher prevalence of overweight and obesity. The present research identified factors associated with overweight and obesity among this group. These factors included being male, advancing age, poor eating habits, specific job roles, and engaging in less than six hours of physical activity while on duty. Therefore, there should be practical policies to solve the problem of obesity in hospitals by increasing the promotion of healthy eating habits and exercise campaigns for the hospital personnel.

## What is already known in this topic?

These findings highlight the health challenges faced by medical professionals, whose lifestyles and work environments differ from other occupations. It emphasizes the crucial need to support health promotion initiatives that ensure the well-being and sustainability of healthcare professionals. The implications for healthcare involve raising awareness about overweight and obesity and the associated factors among healthcare personnel in hospitals. This can be achieved through collaboration with government and private sectors to develop policies and strategies, such as promoting education on healthy eating behaviors, campaigns for healthier

food options in hospital cafeterias, establishing appropriate shift assignments per month, and motivating physical activity during work duties.

## What does this study add?

There should be a research study on the energy value used for physical activity in each type of different worker to cover more occupations because each person may have different exertion in work. Thus, the total energy used is different. The information obtained will be more useful in organizing physical activities for medical personnel. Next, the GPAQ should be used with careful interview methods because the questionnaire provided examples of the same types of physical activity in each activity. Body movements while performing duties should be measured in a concrete form, for example, having participants wear a digital smartwatch to count calories while working to reduce discrepancies in answering the questionnaire.


## Acknowledgement

The authors would like to thank the executive, director of human resource management, and participating medical personnel in the present study area setting.

## Funding disclosure

Phramongkutklao College of Medicine, Bangkok, Thailand financially supported the present work.


## Conflicts of interest

The authors declare no conflict of interest.

## References


1. Supanchaimat R. Thais becoming sedentary, need more exercise, study finds. Bangkok Post [Internet]. 2023 [cited 2023 Mar 28]. Available from: https://www.bangkokpost.com/thailand/general/2537019.
2. Karnik S, Kanekar A. Childhood obesity: a global public health crisis. Int J Prev Med 2012;3:1-7.
3. Pulgarón ER. Childhood obesity: a review of increased risk for physical and psychological comorbidities. Clin Ther 2013;35:A18-32.
4. World Obesity Federation. World obesity atlas. London: Ludgate House; 2022.
5. Aekplakorn W. Overweight and obesity. In: Aekplakorn W, editor. Overweight and obesity report of the Thai health survey on physical examination, no. 5. Bangkok: Thai Health Promotion Foundation; 2014. p. 135-41. [in Thai]
6. Viruhagarun T. All about obesity – The uninvited enemy. Bangkok Post [Internet]. 2020 [cited 2022 Sep 24]. Available from: https://www.bangkokpost.com/thailand/pr/2540490/all-about-obesity-%E2%80%93-the-uninvited-enemy.
7. Somnuk K, Saytichai K, Ounkeaw K, Siriphonphaibool R, Thongkonghan A. Prevalence and factors related to metabolic syndrome in personnel of Somdejphrajaotaksinmaharaj hospital. Vajira Med J: J Urban Med 2021;65:27-36. [in Thai]
8. Saiphiroonthong W, Choaksuwankij C, Chaimanee A. The association between sedentary work and obesity among medical personnel in Nopparat Rajathanee hospital. Public Health J Burapha Univ 2015;10:34-43. [in Thai]
9. Kunyahamu MS, Daud A, Jusoh N. Obesity among health-care workers: Which occupations are at higher risk of being obese? Int J Environ Res Public Health 2021;18:4381.
10. Kirkendoll K, Clark PC, Grossniklaus D, Igho-Pemu P, Mullis R, Dunbar SB. Metabolic syndrome in African Americans: views on making lifestyle changes. J Transcult Nurs 2010;21:104-13.
11. El Kabbaoui M, Chda A, Bousfiha A, Aarab L, Bencheikh R, Tazi A. Prevalence of and risk factors for overweight and obesity among adolescents in Morocco. East Mediterr Health J 2018;24:512-21.
12. Qin X, Chen L, Liu X, Zheng S, Wang X. Factors affecting body mass index in overweight/obese university students, Gansu, China: A cross-sectional study. Southeast Asian J Trop Med Public Health 2018;49:685-95.
13. Puntiya P. Obesity in physician. J Health Syst Res 2020;14:19-25.
14. Chaimanee A, Jiamjarasrangsi W. Prevalence and associated factors of metabolic syndrome among nurses in King Chulalongkorn memorial hospital. J Saf Health 2009;2:40-9. [ in Thai]
15. Kongjarern S. Obesity: Silent killer in the digital era. EAU Herit J Sci Technol 2017;11:22-29.
16. Sadsuwon J, Waywa N, Somsri N, Deesuwun P, The relationship between shift work and overweight in medical personnel in Phrae hospital. J Phrae Hosp 2020;28:106-23. [ in Thai]
17. Cohen, J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates Publishers;1988.
18. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. Behav Res Methods 2009;41:1149-60.
19. Intarakamhang U, Macaskill A. Multi-group causal model of health literacy and behaviors on family well-being among Thai adults at risk of non-communicable diseases (NCDs). J Res Health Sci 2018;18:e00429.
20. Army Medical Research Institute, Thailand. BMI/ABSI/WC: Which value should be used to assess the appropriate body proportions of Army personnel? AFRIMS [Internet]. 2019 [cited 2022 Sep 24];2(10):1-5. Available from: https://www.afrims.go.th/main/

download/upload/document-20210831192536.pdf. [in Thai]
21. World Health Organization. Global physical activity questionnaire (GPAQ) analysis guide. Geneva: WHO; 2005.
22. Armstrong T, Bull F. Development of the world health organization global physical activity questionnaire (GPAQ). J Public Health 2006;14:66-70.
23. Chalao P, Loahasiriwong W, Udompanich S, Prachuntasen K. Situations and factors related to overweight and obesity among health personnel of sub-district health promoting hospitals, Sakonnakhon Province. J Baromarajonani Coll Nurs, Nakhonratchasima 2017;23:5-17. [ in Thai]
24. Linlawan S. Incidence and risk factors of metabolic syndrome in personnel of Phrachomklao hospital. Region 4-5 Med J 2011;30:249-59.
25. Wiphasiri S, Charas C, Aurapan C. The association between sedentary work and obesity among medical personnel in Nopparat Rajathanee Hospital. Public Health J Burapha 2015;10:34-43. [ in Thai]
26. Ninphupataweechot S, Panyathorn K, Tanglakmankhong K, Trongsri C. The metabolic syndrome among health care providers in Fort Hospital, Udonthani province. Udonthani Hosp Med J 2021;29:61-9. [ in Thai]
27. Kanter R, Caballero B. Global gender disparities in obesity: a review. Adv Nutr 2012;3:491-8.
28. Na-Wichian N, Pasunon P, Chantuk H. Factors that affect the obesity of personnel in the air technical training school, directorate of education and training, The Royal Thai Air Force. J Nurs Health Care 2018;36:58-68. [ in Thai]
29. Mummery WK, Schofield GM, Steele R, Eakin EG, Brown WJ. Occupational sitting time and overweight and obesity in Australian workers. Am J Prev Med 2005;29:91-7.
30. Larsson I, Lissner L, Naslund I, Lindroos AK. Leisure and occupational physical activity in relation to body mass index in men and women. Scand J Nutr 2004;48:165-72.
31. National Institute of Health. The practical guide: Identification, evaluation, and treatment of overweight and obesity in adults. Bethesda, MD: NIH Publication, NHLBI Obesity Education Initiative; 2000.
32. Tanathakorn N, Kanokthet T. Obesity in the elderly: Evaluation and prevention. EAU Herit J Sci Technol 2019;13:16-26. [ in Thai]
33. Choosorn P, Sanchaisuriya P. Prevalence and factors related to obesity among working age (15-59 Years) in Kud Chap District, Udonthani Province. KKU J Public Health Res 2020;13:26-35. [in Thai]
34. Ravinit P, Sattam A. Factor associated with the metabolic syndrome in Chamab Sub-district, Wang Noi District, Ayutthaya Province. APHEIT J 2016;5:33-47. [ in Thai]
35. Prasertjit P, Limpaseni W. Sumanasrethakul C. Lifestyle factors associated with obesity in urban workers: A case Study of faculty of medical personnel, Vajira hospital. Vajira Med J 2020;64:71-84. [ in Thai]
36. Ross A, Yang L, Wehrlen L, Perez A, Farmer N, Bevans M. Nurses and health-promoting self-care: Do we practice what we preach? J Nurs Manag 2019;27:599-608.
37. Puma JL, Szapary PO, Maki KC. Predictors of physician overweight and obesity in the USA: An empiric analysis. Nutr Food Sci 2005;5:315-9.
38. Mek-a-kat C, Kitreerawutiwong N, Pattanathaburt P. Factors influencing with abdominal obesity among village health volunteers in Sukhothai Province. J Nurs Health Sci 2018;12:47-57. [in Thai]
39. Lee HA, Lee WK, Kong KA, Chang N, Ha EH, Hong YS, et al. The effect of eating behavior on being overweight or obese during preadolescence. J Prev Med Public Health 2011;44:226-33.
40. Rattanahiransak C, Pakdevong N, Binhosen V. Association between health behaviors and metabolic syndrome of the employee in one private hospital. APHEIT J (Science and Technology) 2015;4:64-74. [ in Thai]
41. Pudcharakuntana P, Khungtumneam K, Durongritichtichai V. The factors associated to the prevalence of obesity in adults in Bang Sao Thong Municipality, Samuth Prakan Province. J R Thai Army Nurs 2015;16:131-139. [ in Thai]
42. Phutharangsi S, Boonto C, Chaleoykitti S, Mangklakeeree N, Kaoaium H. Health behaviors, health workplace and happy life among healthcare providers in the 21st century. J R Thai Army Nurs 2015;16:8-14. [ in Thai]
43. Chapman IM. Obesity in old age. Front Horm Res 2008;36:97-106.
44. Huth JJ, Eliades A, Handwork C, Englehart JL, Messenger J. Shift worked, quality of sleep, and elevated body mass index in pediatric nurses. J Pediatr Nurs 2013;28:e64-73.
45. Chawrai T, Suksai T. The prevention of obesity and chronic degenerative disease by exercise and weight control. Christian Univ Thai J 2017;23:511-20. [in Thai]