

# Relationship between workload and obesity among dentists in Regional Health No.8, Northeastern, Thailand

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Satianpong Gaysorn and Sathirakorn Pongpanich

*College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand*

Received July 2018

Accepted August 2018

## Abstract

**Purpose** - This research sought to examine the workload of dentists and to establish the nature of links between obesity and observed workload.

**Design/methodology/approach** - A cross-sectional method was to describe a cohort dentists based in Health Region No.8 area which is a part of the northeastern region of Thailand. There were 209 participants participated in the study. A questionnaire was designed to evaluate the workload of dentists adapted from existing model. Standardized questionnaires were used to assess health-related behaviors and characteristics. Data was analyzed using Spearman correlation analysis, Mann-Whitney U test, and Kruskal-Wallis test with the 0.05 level of statistical significance.

**Findings** - There was a little positive correlation of BMI and the total time spend working and time spend working in office hours. Dentists who had feeling of being overworked from all appointment requests had an increased probability of becoming obese and exhibiting abdominal obesity.

**Originality/value** - This research can be used as a guideline to design suitable policy for dentistry profession in order to increase their quality of life.

**Keywords** Thai dentists, Obesity, Workload, Thailand

**Paper type** Research paper

## Introduction

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer [1]. Many research studies and medical textbooks explain the relationship between obesity and various diseases deep into the mechanism level [2-4]. There is very strong epidemiological evidence that links to health status [5]. For example, one study published in Nature Journal shows the mechanism linking obesity with cardiovascular disease, whereby adipose tissue releases bioactive mediators that affect body weight homeostasis and insulin resistance and also alter lipids, blood pressure, coagulation, fibrinolysis and inflammation, linking to endothelial dysfunction and atherosclerosis [6]. Obesity was once considered a problem only in high-income countries, but the problem is now dramatically on the rise in low- and middle-income countries, particularly in urban settings. In 2014, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million adults were obese. Overall, about 13% of the world's adult population were obese in 2014. In 2014, 39% of adults aged 18 years and above were overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014 [7]. Body mass index (BMI) and waist circumference are the gold standard for measuring obesity in public health (note: not in medical evaluation) because not only are they easy to measure but according to Waist Circumference and Waist-Hip Ratio: Report of a WHO Expert Consultation, combining BMI with waist circumference gives the best results in predicting various diseases. In 1<sup>st</sup> year Pakistani dental students, the obese group are likely to skip breakfast, eat snacks regularly, watch TV longer, and show more physical inactivity than the group which is not obese. Excess weight and obesity prevalence is high among postgraduate (PG) trainee doctors. Obesity predictors among PG trainee

doctors in one hospital in Pakistan are taking lunch outside the home, eating snacks and drinking tea between meals, longer training, obesity history in the family, male gender, and insufficient physical activity [8]. In Lithuania, most dentists (69.8%) worked more than 33 hours per week (legal limit), 7.9% more than 50 hours and 0.4% of them worked more than 60 hours per week. Fully 94.2% of respondents indicated that long working hours affected their general health with as many as 41.7% of them reporting experiencing the hazardous effects of working long hours on a frequent or very frequent basis [9]. A systematic review of the Medline and Embase original articles published up to September 2012 with a total of 39 articles found that about 70% of studies show a positive relationship between long working hours and weight-related indications. This systematic review concluded that there are weak relationships between psychological factors such as work hours/working overtime, and weight gain, especially in men [10]. News relating to three Thai doctors who died with overworking being one of the causes has surfaced in public [11]. For medical doctors, there are recommendations governing how long they can work within one week (Thailand's guidelines are based on the USA's ACGME). The recommendation has been violated frequently in Thailand [12]. According to Evaluation & Operational Policies & Procedures by the Commission on Dental Accreditation, American dentist recommendations are the same as those for medical doctors. There are no recommendations for Thai dentists as of now, but the Thai Dental Council encourages those working more than 30 hours per week to receive scores from the Continuing Dental Education Center. Given that the public has become aware of the need to address healthcare workers' own health due to unrelated news on doctors' deaths from various causes, all linked to overwork, it is important to look for relationships between workload and obesity. The primary objective of this study is to find a relationship between dentists' workloads and obesity in Thailand's Health Region No.8, while the secondary objective is to find the relationships between other independent factors and obesity.

## **Methodology**

### *Study setting and study population*

The study area covers Ministry of Public Health (MOPH) hospitals in Health Region No.8 which is selected because it has the highest ratio of population to dentists by network health service according to the Report on Public Health Resources 2013 [13]. The study population is all active MOPH dentists in Health Region No.8 comprising Udon Thani, Nong Khai, Nong Bua Lamphu, Nakhon Phanom, Sakon Nakhon, Bueng Kan, and Loei. The database currently list 365 dentists in this area. The sample of this research is calculated by using Taro Yamane's (1973) formula with a 95% confidence level. From this formula the sample size needed is 191 out of 365 dentists in the population, to compensate for the chance of missing data since this might be as high as 45% according to the French E3N Cohort. Due to the nature of mailed questionnaires, the survey was therefore sent to all eligible participants.

### *Instruments*

The questionnaire has 8 parts.

1. The dental workload questionnaire was adapted from the American Dental Association (ADA), University of Iowa, Utah Dentist Workforce, and the Guideline of Oral Diagnosis 2016, Chiang Mai University. The questionnaire was validated by three experts in public health, family medicine, and dentistry. The IOC (Index of item Objective Congruence) calculated from those three are 1.0 overall with every question (10 items) scoring 1.0. The test-retest reliability Cronbach's alpha of overall items in the dental workload

- part is 0.828, which can be interpreted as 'Good' [14].
2. Physical activity used the WHO GPAQ Thai version by the Bureau of Health Promotion, MOPH [15].
  3. Alcohol drinking used the WHO Audit Thai version by the WHO [16].
  4. Tobacco smoking used the WHO MPower Thai version by the Bureau of Tobacco Control, MOPH [17].
  5. Stress level used ST5 by the Department of Mental Health, MOPH [18].
  6. Sleeping duration used the sleep questionnaire by Ramathibodi Hospital Sleep Disorder Center, Mahidol University [19].
  7. Food consumption used the food consumption behavior questionnaire by the Bureau of Nutrition, MOPH [20].
  8. The body measurement part used the hospitals' body weight and height measurement tool. The measurement technique was added to the recommendation part for hospital staff who will measure for dentists.

#### *Ethical considerations*

Before collecting the data, the author obtained ethical approval from Kasetsart University, Sakon Nakhon Campus, No. KUCSC.HE-61-007.

#### *Data collection*

All questionnaires were sent to all MOPH hospitals within Health Region No.8. A postage-paid return envelope was provided with each questionnaire to allow each participant or hospital staff member to return the questionnaire to the author without any fee.

#### *Data analysis*

The data were cleaned and typed into SPSS 22 (licensed by Chulalongkorn University). Neither BMI nor waist circumference were normally distributed so the Mann-Whitney U test, Spearman correlation, and Kruskal-Wallis test were used accordingly at the statistical significance level of <0.05 with correlation interpretation from Hinkle, Wiersma and Jun in 2003 [21].

BMI classification was classified as underweight <18.5, normal 18.5-22.99, overweight  $\geq 23$ , pre-obese 23-24.99, obesity class I 25-29.99, obesity class II  $\geq 30$ . Waist circumference  $\geq 90$  in men and  $\geq 80$  in women were classified as abdominal obesity [22]. Physical activity was classified to <600 MET for 'Not Meet WHO Recommendation' and  $\geq 600$  MET for 'Meet WHO Recommendation' [23]. Alcohol drinking was classified as 0-7 for 'Low risk drinker', 8-15 for 'Hazardous drinker', 16-19 for 'Harmful use', and more than 20 for 'Alcohol dependence' on the AUDIT score [16]. Sleeping duration was classified as 7-9 for 'Recommended level of sleep',  $\geq 10$  and  $\leq 6$  for 'Not recommended level of sleep' [24]. Stress level was classified to score 0-4 for 'Low stress', 5-7 for 'Moderate stress', 8-9 for 'High stress', and 10-15 for 'Highest stress' [18]. Food consumption was classified as 100% (score 70) for 'Very good food consumption behavior', 80-99% (score 56-69) for 'Good food consumption behavior', 60-79% (score 42-55) for 'Normal food consumption behavior', and less than 60% (score 41 or less) for 'Food consumption behavior needs improvement' [25].

## **Results**

The majority of participants who sent questionnaires back were female (56.5%) while males were slightly fewer (43.5%). More than half (52.6%) were aged between 20 and 29 years old. Sakon Nakhon and Nong Khai sent back the most questionnaires (each 17.2%). For income, the group with income of 25,001-50,000 baht was the largest group with 44%, Table 1.

Table 1. Description of general characteristics

Characteristics	n=209	%
<b>Gender</b>		
Male	91	43.5
Female	118	56.5
<b>Age (Years)</b>		
20-29	110	52.6
30-39	50	23.9
40-49	38	18.2
50-59	11	5.3
<b>Province</b>		
Udon Thani	32	15.3
Nong Bua Lamphu	29	13.9
Sakon Nakhon	36	17.2
Loei	28	13.4
Nong Khai	36	17.2
Nakhon Phanom	24	11.5
Bueng Kan	24	11.5
<b>Income (Baht)</b>		
≤25,000	6	2.9
25,001-50,000	92	44.0
50,001-75,000	47	22.5
75,001-100,000	48	23.0
>100,000	16	7.7

Table 2. Distribution of respondents by health-related behaviors and characteristics

Characteristics	n=209	%
<b>BMI classification</b>		
Underweight	21	10
Normal	120	57.4
Pre-obese	18	8.6
Obesity class 1	43	20.6
Obesity class 2	7	3.3
<b>Waist circumference classification</b>		
Normal	185	88.5
Abdominal obesity	24	11.5
<b>Physical activity</b>		
<600 MET (Not Meet WHO Recommendation)	66	31.6
≥600 MET (Meet WHO Recommendation)	143	68.4
<b>Current smoking</b>		
Daily	0	0.0
Less than daily	0	0.0
Not at all	209	100.0
<b>Past smoking</b>		
Daily	0	0.0
Less than daily	10	4.8
Not at all	199	95.2
<b>Alcohol drinking</b>		
Low risk drinker	209	100.0
Hazardous drinker	0	0.0
Harmful use	0	0.0
Alcohol dependence	0	0.0
<b>Sleeping hours in work days</b>		
≤6	66	31.6
7-9 (Recommended by National Sleeping Foundation)	143	68.4
≥10	0	0.0

(continued)

Table 2. (continued)

Characteristics	n=209	%
<b>Sleeping hours in off days</b>		
≤6	22	10.5
7-9 (Recommended by National Sleeping Foundation)	165	79.0
≥10	22	10.5
<b>Stress level</b>		
Low	132	63.2
Moderate	77	36.8
High	0	0.0
Highest	0	0.0
<b>Food consumption behavior</b>		
Very good	0	0.0
Good	95	45.5
Normal	109	52.2
Needs improvement	5	2.4

Table 3. Distribution of respondents by workload characteristics

Characteristics	n=209	%
<b>Off days per week</b>		
1	108	51.7
2	101	48.3
<b>Perceived workload in office hours</b>		
Practice limited, no new patients taken	8	3.8
Not busy enough, would have liked more patients	4	1.9
Provided care to all requesting it, but did not feel overworked	110	52.6
Provided care to all requesting it, but felt overworked	59	28.2
Too busy to treat all requesting appointments	28	13.4
<b>Perceived workload outside office hours</b>		
Practice limited, no new patients taken	28	13.4
Not busy enough, would have liked more patients	17	8.1
Provided care to all requesting it, but did not feel overworked	110	52.6
Provided care to all requesting it, but felt overworked	33	15.8
Too busy to treat all requesting appointments	21	10.0

Table 4. Means and standard deviation of workload

Type of work	Number of patients per week		Time (Hours) per week	
	In office hours	Out of office hours	In office hours	Out of office hours
Overall	Overall 53.17 ± 26.57		Overall 39.99 ± 15.47	
	41.77±17.75	11.40±13.47	31.56±11.81	8.43±7.75
Surgery	18.07±16.40	2.54±4.53	11.47±10.55	2.04±2.91
Periodontal	7.21±6.11	2.73±4.41	4.45±3.99	2.38±3.05
Orthodontics	0.38±1.33	0.08±0.44	0.38±1.33	0.38±1.33
Prosthetics	4.64±3.77	2.06±4.65	4.85±3.81	1.40±2.57
Endodontics	1.28±1.00	0.79±1.17	1.53±1.64	1.10±1.58
Operative	8.23±6.35	3.00±4.31	5.09±4.43	2.00±4.31
Other			5.16±7.14	1.95±3.10

Almost one third of dentists were overweight, while 23.9% of dentists were classified as obese. Dentists who have abdominal obesity comprised 11.5%, Table 2.

For perceived workload for both inside and outside office hours, dentists answered 'Provided care to all requesting it, but did not feel overworked' the most (52.6%), Table 3.

**Table 5.** Association between factors and BMI and waist circumference

Behavior	BMI	BMI	Waist circumference	Waist circumference
	Mean rank	p-value	Mean rank	p-value
<b>Perceived workload in office hours</b>				
Too busy	76.66		120.32	
Treat all felt overworked	145.24		136.80	
Treat all not overworked	96.18	<0.001 <sup>b</sup>	91.62	<0.001 <sup>b</sup>
Not busy enough	40.88		45.63	
No patients	60.81		30.50	
<b>Perceived workload outside office hours</b>				
Too busy	70.93		118.26	
Treat all felt overworked	125.88		134.20	
Treat all not overworked	100.82	<0.001 <sup>b</sup>	91.41	<0.001 <sup>b</sup>
Not busy enough	93.76		86.03	
No patients	129.20		125.55	
<b>Off days per week</b>				
1	109.62	0.254 <sup>a</sup>	111.31	0.117 <sup>a</sup>
2	100.06		98.25	

Note: a: Man-Whitney U-Test; b: Kruskal–Wallis H test

**Table 6.** Correlation between factors and BMI and waist circumference by Spearman's Rho

Characteristics	BMI	BMI	Waist circumference	Waist circumference
	correlation	p-value	correlation	p-value
Sedentary time	-0.228	0.001	-0.256	0.010
Overall time	+0.189	0.006	+0.144	0.038
Overall patients	+0.074	0.289	-0.011	0.872
Overall time in office hours	+0.239	0.001	-0.530	0.448
Overall time outside office hours	+0.970	0.164	+0.108	0.119
Overall patients in office hours	+0.360	0.602	+0.120	0.865
Overall patients outside office hours	+0.470	0.497	+0.010	0.987
Surgery (time)	+0.431	<0.001	+0.540	<0.001
Surgery (patients)	+0.262	<0.001	+0.277	<0.001
Periodontics (time)	-0.259	<0.001	-0.910	0.190
Periodontics (patients)	-0.275	<0.001	-0.990	0.153
Orthodontics (time)	+0.189	0.006	+0.411	<0.001
Orthodontics (patients)	+0.193	0.005	+0.363	<0.001
Prosthetics (time)	+0.270	<0.001	+0.363	<0.001
Prosthetics (patients)	+0.255	<0.001	+0.312	<0.001
Endodontics (time)	-0.25	0.721	+0.217	0.002
Endodontics (patients)	+0.061	0.377	+0.272	<0.001
Operative (time)	+0.351	<0.001	+0.279	<0.001
Operative (patients)	+0.167	0.015	+0.052	0.452
Other (time)	+0.423	<0.001	+0.424	<0.001

For working time, the average working time in office hours in this study was 31.56 hours per week. For outside office hours, the average working time was 8.43 hours per week. For number of patients, the average number of patients in office hours in this study was 41.77 patients per week. For outside office hours, the average number of patients was 11.4 patients per week. (Table 4)

In the perceived workload part, the group that answered, 'Provided care to all requesting it, but felt overworked' had the statistically significant highest mean rank compared to other groups in both BMI (145.24) and waist circumference (136.80) in office hours (both had  $p$ -value<0.001) and waist circumference (134.20) outside office hours ( $p$ -value<0.001). (Table 5)

The correlation of overall working time (+0.189) and working time in office hours (+0.239) to BMI was statistically significant ( $p$ -value=0.006 and 0.001), though at a little positive level. Overall working time was also statistically significant ( $p$ -value=0.038) to waist circumference with little positive correlation (+0.144). Surgery treatment had statistically significant moderate correlation (+0.540) to waist circumference based on time spent in surgery ( $p$ -value<0.001), Table 6.

## Discussion

Overall working time and working time in office hours were little positive yet statistically significant to BMI. A study that used data from the U.S. Census Bureau showed that for workers in non-strenuous jobs, 10 additional hours per week spent working were associated with an increase in BMI of 0.424 for women and 0.197 for men. This study failed to find the relationship between working time and BMI in workers in strenuous jobs [26]. A longitudinal U.S. survey that estimated workplace sitting time that was linked from an external database (Occupational Information Network) showed that longer sitting times were significantly associated with higher BMI for the overall sample ( $\beta = 0.054$ ;  $p < 0.05$ ) [27]. One explanation might be that with longer working times, dentists leaned toward unhealthy convenience foods as substitutes for healthy meals which in turn influenced their weight [28]. Another study found that working hours tended to be longer among dentists than the standard working week, or around 35 hours per week [29]. The working hours might have increased from what was reported to be an average working week for dentists more than 30 years ago [30].

In the perceived workload aspect, the group that answered, 'Provided care to all requesting it, but felt overworked' had the statistically significant highest mean rank compared to other groups in both BMI and waist circumference in office hours, and in waist circumference outside office hours. A study that used a systematic search from Medline from 1966 onwards and PsycINFO from 1989 found no associations between psychological workload and either general or abdominal obesity, although it remarked that some elements of psychological workload had weak positive association with overall excess weight [31]. It gave one explanation on positive relationships in that a number of studies had suggested that a stressful job might promoted unhealthy behaviors and that such behaviors were different for men and women [32, 33]. Some women might react to stress by overeating, which subsequently resulted in a high BMI [34]. For instance, when feeling stressed, more women than men seemed to react by overeating. On the other hand, men might increase their alcohol use when feeling overloaded [35].

In the subcategory of type of work, only the group of dentists that spent more time doing surgery moderately correlated to higher waist circumference in a positive direction. This might be due to the fact that the force that is used to push and pull the teeth for extraction (around 1 bar per one incisive tooth) was not vigorous enough to meet minimum physical activity movement recommendations [36]. Another explanation could be that the nature of the surgery work required waiting for local anesthetic substances to suppress the patient's sensations for at least 8 minutes or longer [37]. Surgery hours were also reported to be one of the agents that induced stress among dentists [38].

The limitation of this study is that while the questionnaire instruction did tell the participants to use the hospital's tools and staff for measurement, the author was not present in person while measurements were taken, so the data might deviate from the actual true values. The questionnaire was also self-reported which was another limitation. This study only covered Health Region No.8, which might not represent the overall condition of Thai dentists or dentists in different areas to the study. One

possible solution to the limitation was to create a survey booth in an annual dental association conference where dentists from all over the country participated in the conference, so that the weight, height, and waist circumference could be measured directly by the researcher's team. In future the author will likely conduct this research in a different population area or expand the study to the national level.

### Conclusion

Dentists who spent more overall time per week at work had higher BMI and waist circumference. Dentists who perceived themselves as overworked in office hours also had higher BMI and waist circumference. In the treatment subcategory, dentists who spent more time performing surgery were moderately linked to increased waist circumference. The author recommended a new policy helping dentists' quality of life (which did not yet exist in Thailand) constructed based on the new found evidence in Thailand. If the policy was based on this research data, to reduce the chance of exceeding BMI and waist circumference, clear cut working hours for dentists or better management of patient appointment system should be introduced.

### Acknowledgments

The author would like to thank and respect also to thesis committees and also to Pirunee Sappaso, M.D., Diploma of the Thai Board of Family Medicine and Kittipun Janthawongunsak, D.D.S. for their help in developing the questionnaire for this research. In addition, thanks go to Songphol Sangngam, D.D.S, for co-ordinating with dentists all around Health Region No.8 to participate in this research. Lastly, thanks to all participants in this research.

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**Corresponding author**

Sathirakorn Pongpanich can be contacted at: [Sathirakorn.P@Chula.ac.th](mailto:Sathirakorn.P@Chula.ac.th)