BALTIC JOURNAL OF HEALTH AND PHYSICAL ACTIVITY

Evaluation of Global Physical Activity Questionnaire (GPAQ) among Healthy and Obese Health Professionals in Central India

Author's Conrtibution
A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

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Key words: *obesity, sedentary lifestyle, dental professionals, physical activity.*

Abstract

Background: *To assess physical activity using the Global Physical Activity Questionnaire (GPAQ) among healthy, overweight and obese Indian health professionals.*

Materials and methods: *The Global Physical Activity Questionnaire (GPAQ) was used to assess physical activity among 324 dental health care professionals (third-year students, final-year students, interns, and faculty). Metabolic Equivalents (MET) were used to express the intensity of physical activities, and are also used for the analysis of GPAQ data. The analysis of Variance (ANOVA) was used to compare the mean physical activity scores among dental health care professionals. The Chi Square test was used to compare categorical risk indicators and obesity (BMI). Kendall's test was used to compute the correlation between physical activity categorical indicator (CI), obesity and sedentary behaviour. The logistic regression analysis was performed to determine the importance of the factors associated with obesity. Odds ratio was calculated for all variables with 95% confidence intervals.*

Results: *Total physical activity measured in mean MET minutes per week was 625.6, 786.3, 296.5, and 296.5 for third-year students, final-year students, interns, and faculty respectively ($p \leq 0.05$). Total energy expenditure of 0 MET minutes per week was calculated as 32.2%, 10.3%, 17.9% and 44.9% of third-year students, final-year students, interns, and faculty, respectively. Of the 211 health care professionals in high risk group 28.9% were in the third year, 19.9% in the final year, 20.4% were interns and 30.8% were faculty members. Obesity was calculated in 22.4% third-year students, 16.3% final-year students, 20.4% interns and 40.8% of faculty members. Overweight problems were seen in 19.7%, 24.7%, 24.7% and 30.8% of third-year students, final-year students, interns, and faculty members respectively ($p \leq 0.001$).*

Conclusions: *A significant correlation was seen between physical activity categorical indicator and BMI. A significant negative correlation was noted between physical activity categorical indicator and sedentary behaviour. A significant correlation was also noted between BMI and sedentary behavior. Physical activity is a positive health behavior with so much potential to improve public health and so few risks that it deserves to be central to any future public health strategy.*

Word count:	4475		
Tables:	7	**Received:**	October 2010
Figures:	0	**Accepted:**	March 2011
References:	30	**Published:**	March 2011

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Introduction

Regular physical activity is well recognized as a lifestyle behavior important for the development and maintenance of individual and population health and well-being [1,2]. Our modern way of living has largely eliminated physical activity from our lives as one of the fundamental stimuli. Physical inactivity has become a major risk factor for chronic non-communicable diseases in populations. Epidemiological research has proven that 15–20% of the overall risk for coronary heart disease, type 2 diabetes, colon cancer, breast cancer, musculoskeletal diseases and psychological disorders is attributable to physical inactivity [3]. Physical inactivity also reflects poor self-esteem and a lower health-related quality of life.

In 1997, World Health Organization declared obesity a global epidemic with major health implications. Physical activity is one of the keys to counteracting the current epidemic of overweight and obesity. Physical activity is defined as “any force exerted by skeletal muscles that results in energy expenditure above resting level” [4].

Active living is a way of life that integrates physical activity into daily routines. The goal for the general adult population is to accumulate at least half an hour of activity each day [5]. Physical activities can vary widely in intensity. Intensity varies according to the type of activity and the capacity of the individual.

In the 21st century, everyday life offers fewer opportunities for physical activity, and the resultant sedentary lifestyles have serious consequences for public health. A sedentary lifestyle plays a significant role in obesity [3]. Worldwide there has been a large shift towards less physically demanding work, and currently at least 60% of the world’s population gets insufficient exercise [6]. Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country’s population [7]. According to the 1999–2000 National Health and Nutrition Examination Survey, the prevalence of overweight or obesity in children and youth in the United States is over 15%, a value that has tripled since the 1960’s [8].

Physical inactivity is a state of relatively complete physical rest, which does not provide sufficient stimulus for human organs to maintain their normal structures, functions and regulations. In the 2002 World Health Report, the proportion of deaths attributable to physical inactivity in the European Region was estimated to be 5–10% [9]. Based on actual rates of disease and death of physically inactive and active people in the Danish population, a change from inactivity to activity from the age of 30 up to the age of 80 would translate into a gain in life expectancy of between 2.8 and 7.8 years for men and between 4.6 and 7.3 years for women, depending on the degree of activity increase [10]. Another Danish study shows that physically inactive people can expect between 8 and 10 fewer life years without a major disease than physically active people [11]. The economic costs attributable to physical inactivity are enormous. The health impacts and their related costs could be reversed by increasing levels of physical activity. Regular moderate physical activity is a very cost-effective way of improving and maintaining people’s health. The promotion of physical activity should therefore be a fundamental component of public health work.

Monitoring of the population levels of physical activity using a standardized protocol is a core part of a public health response to current concerns regarding levels of physical inactivity and obesity [12]. The Global Physical Activity Questionnaire (GPAQ) was developed by WHO for physical activity surveillance in various countries. It collects information on physical activity participation in three settings (or domains) as well as sedentary behaviour, comprising 16 questions. The 3 domains of the questionnaire are: activity at work, travel to and from places and recreational activities [13].

Health professionals often focus their efforts on providing care for their patients, without taking proper care of themselves. When combined with work that causes them to repeatedly strain their muscles, tendons, and other body tissues, this physical stress can promote the development of musculoskeletal disorders through muscle tension, restricted movement, and pinched nerves.

Sedentary work, like that performed in dentistry, concentrates work stress onto certain muscles and builds tension in bodies. Dentists and hygienists in particular are at risk for developing musculoskeletal diseases because of the prevalence of awkward postures in dental procedures, repetitive work, prolonged static and unsupported sitting, extended workdays, and the impact of working with thin instruments in overextended positions throughout the day.

Participation in physical activity throughout life can increase and maintain musculoskeletal health, or reduce the decline that usually occurs with age in sedentary people [14]. Recognizing the importance of physical activity among health professionals, the present study aims to examine physical activity using the Global Physical Activity Questionnaire (GPAQ) among healthy, overweight and obese Indian health professionals. An additional aim of the study was to correlate physical activity with obesity among dental professionals.

Material and Methods

Study Population

The Global Physical Activity Questionnaire (GPAQ) was used to assess physical activity among dental health care professionals in a dental school in Bhopal city, Central India. The sample size comprised 324 dental health care professionals; inclusive of 90 third-year dental students, 87 final-year ones, 78 interns and 69 faculty members. Interns are graduates from the same school, with postings equally distributed in respective departments during the stipulated one year. Dental health care professionals responding to the questionnaire for third-year students, final-year students, interns and faculty was 90%, 89%, 87% and 76% respectively.

GPAQ Instrument

GPAQ comprises 16 questions grouped to capture physical activity undertaken in different behavioral domains, namely work, transport and discretionary activity (also known as leisure or recreation). Within the work and discretionary domains, questions assess the frequency and duration of 2 different categories of activity defined by the energy requirement or intensity (vigorous- or moderate-intensity). In the transport domain, the frequency and duration of all walking and cycling for transport is captured, but no attempt is made to differentiate between these activities. One additional item is collected, i.e. time spent in sedentary activities.

Metabolic Equivalents (MET) are commonly used to express the intensity of physical activities, and are also used for the analysis of GPAQ data. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. For the analysis of GPAQ data, existing guidelines have been adopted: it is estimated that, compared to sitting quietly, a person's caloric consumption is four times higher when being moderately active, and eight times higher when being vigorously active. Therefore, when calculating a person's overall energy expenditure using GPAQ data, 4 METs get assigned to the time spent in moderate activities, and 8 METs to the time spent in vigorous activities.

To assess physical activity MET scores were calculated separately for individual domains and sub domains. For the calculation of a categorical indicator, the total time spent on physical activity during a typical week, the number of days as well as the intensity of physical activity are taken into account. The three levels of physical activity suggested for classifying students are low, moderate, and high. The criteria for these levels are:

- high: 7 or more days of any combination of walking, moderate- or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes per week;
- moderate: 5 or more days of any combination of walking, moderate- or vigorous intensity activities achieving a minimum of at least 600 MET-minutes per week;
- low: A person not meeting any of the above mentioned criteria falls in this category.

Informed consent and university clearance were taken for the study. The questionnaire was pre-tested on a random sample of dental health care professionals to ensure practicability, validity and interpretation of responses.

Body Mass Index (BMI)

Methods of estimating body composition include measuring weight and weight for height, body mass index (BMI), waist circumference, skinfold thickness, and ponderal index [15]. Of these, perhaps the most convenient is BMI, which can be calculated according to the following formula: BMI = weight (kg)/(height) (m^2)

Body Mass Index (BMI), a measurement which compares weight and height, defines people as underweight, normal weight, overweight (pre-obese) and obese. The WHO regards a BMI of less than 18.5 kg/m^2 as underweight, which may indicate malnutrition, an eating disorder, or other health problems, while a BMI greater than 25 kg/m^2 is considered overweight and above 30 kg/m^2 is considered obese [6].

Statistical Analysis

The validity of the questionnaire was assessed using Cronbach's alpha internal consistency coefficient. Mean MET scores of physical activity and inactivity were calculated for individual domains and sub-domains. The analysis of variance (ANOVA) was used to compare the mean physical activity scores among dental health care professionals. The chi square test was used to compare categorical risk indicators and obesity (BMI) among dental professionals. Kendall's test was used to compute the correlation between physical activity categorical indicator (CI), obesity and sedentary behaviour. The logistic regression analysis was performed to determine the importance of the factors associated with obesity. Odds ratio was calculated for all variables with 95% confidence intervals. The statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software for Windows version 13. For all statistical analyses $p \leq 0.05$ was considered significant.

Results

A questionnaire study was conducted among dental health care professionals in a dental school in Bhopal city. Out of the 324 professionals examined, 143 (44.1%) were males and 181 (55.9%) were females. No significant difference was noted between males and females. Distribution of dental health care professionals in the dental school is depicted in Table 1.

Table 2 portrays physical activity among the dental professionals. Information on physical activity participation was calculated in three settings (or domains). The 3 domains of the questionnaire were: activity at work, travel to and from places and recreational activities. The intensity of physical activity was calculated in mean metabolic equivalents (MET) minutes per week. Activity at work was further classified in 2 sub-domains: vigorous and moderate. Total mean activity at work for third-year students, final-year students, interns, and faculty were 195.8, 400.9, 163.5, and 57.4 MET minutes per week respectively. Significant differences were noted for activity at work between the various groups (third-year students, final-year students, interns and faculty) ($p \leq 0.05$). Mean MET minutes per week for travel to and from places was 212.9, 185.2, 167.2, and 69.4 for the various dental health professional groups. Differences between the groups were also noted in the travel to and from places domain ($p \leq 0.05$). Recreational activities were further classified in 2 sub-domains: vigorous and moderate. MET scores were calculated separately for individual sub-domains. Significant differences were noted between the groups for energy expenditure in recreational activities (p aculty respectively. Significant differences were noted between the various groups ($p \leq 0.05$).

Tab. 1. Distribution of dental health care professionals

Dental Professionals	**Gender**		**Total**
	Male	**Female**	
Third-year students	32 (22.3 %)	58 (32%)	90 (27.8%)
Final-year students	35 (24.5%)	52 (28.7%)	87 (26.9%)
Interns	31 (21.7%)	47 (26%)	78 (24%)
Faculty	45 (31.5%)	24 (13.3%)	69 (21.2%)
Total	143 (44.1%)	181 (55.9%)	324

Tab. 2. Physical activity among dental health care professionals

Physical Activity		**Mean Metabolic Equivalents (MET) minutes per week (SD)**				
Domains	Sub-Domains	Third-year Students	Final-Year Students	Interns	Faculty	Total
Activity at work	Vigorous	0	14 (58.4)	17.2 (67.6)	8.7 (50.7)	9.7 (50.9)
	Moderate **	209.1 (321.6)	376.6 (546.7)	153.2 (270.8)	78.3 (161)	212.8 (312.3)
Total Activity at work**		195.8 (317.5)	400.9 (886.6)	163.5 (283)	57.4 (150.2)	213.6 (525.6)
Travel to and from places**		212.9 (307.4)	185.2 (340.5)	167.2 (201.6)	69.4 (155.6)	163.9 (272.7)
Recreational Activities	Vigorous	129.7 (530)	297 (981.6)	271.8 (696.5)	40.4 (126.2)	189.8 (683.8)
	Moderate	111.4 (279.1)	165.7 (400)	171.3 (340.7)	111.9 (181.3)	140.5 (315.4)
Total Recreational Activities*		260.9 (682.4)	546.7 (1146.1)	533.1 (973.2)	160.3 (209.9)	381.7 (860.5)
Total Physical Activity**		625.6 (890.4)	786.3 (995.7)	296.5 (995.7)	296.5 (363.7)	724 (988.4)

** p = ≤ 0.001, ** p = ≤ 0.05*

Tab. 3. Physical inactivity among dental health care professionals

Physical Inactivity (0 MET minutes per week)		**Number of subjects (%)**				
Domains	Sub-Domains	Third-year Students	Final-year Students	Interns	Faculty	Total
Activity at work = 0 MET	Vigorous	90 (100)	81 (93.1)	73 (93.6)	67 (97.1)	311
	Moderate	51 (56.7)	28 (32.2)	38 (48.7)	48 (69.6)	165
Total Activity at work = 0 MET		**53 (58.9)**	**31 (35.6)**	**40 (51.2)**	**53 (76.8)**	**177**
Travel to and from places = 0 MET		**51 (56.7)**	**48 (55.1)**	**32 (41)**	**48 (69.6)**	**179**
Recreational Activities = 0 MET	Vigorous	81 (90)	74 (85)	61 (78.2)	58 (84)	274
	Moderate	71 (78.9)	65 (74.7)	48 (61.5)	45 (65.2)	229
Total Recreational Activities = 0 MET		**67 (74.4)**	**51 (58.6)**	**42 (53.8)**	**36 (52.1)**	196
Total Physical Activity = 0 MET		**29 (32.2)**	**9 (10.3)**	**14 (17.9)**	**31 (44.9)**	**83**

Table 3 depicts physical inactivity among dental health care professionals under the 3 domains of the questionnaire i.e., activity at work, travel to and from places and recreational activities. It includes a number of subjects with energy expenditure of 0 MET minutes per week. Total energy expenditure at work of 0 MET was reported by 58.9%, 35.6%, 51.2% and 76.8% health care professionals in the third year, the final year, interns, and faculty groups respectively. Energy expenditure of 0 MET in travel to and from places was reported by 56.7%, 55.1%, 41% and 69.6% of the various dental health care professional groups. Total energy expenditure of 0 MET in recreational activities was reported by 74.4%, 58.6%, 53.8% and 52.1% dental health professionals in the various groups respectively. Total energy expenditure of 0 MET minutes per week was calculated in 32.2%, 10.3%, 17.9% and 44.9% of third-year students, final-year students, interns, and faculty respectively.

Table 4 shows the categorical risk indicator for dental health care professionals. The three levels of physical activity for classifying dental health care professionals are low, moderate, and high. Of the 211 health care professionals in the high risk group, 28.9% were in the third year, 19.9% in the final year, 20.4% were interns and 30.8% were faculty members. In the moderate risk group 33.3% subjects were in the third year, 40% in the final year, 26.7% interns and 6.7% were faculty members. As low as 17% subjects in the third year, 47.2% in the final year and 35.8% interns were in the low risk group. Surprisingly, none of the faculty members were present in the low risk group. Significant differences were noted between the various risk categories for dental health care professionals ($p \leq 0.001$).

Table 5 depicts obesity (as per Body Mass Index) and sedentary behaviour among dental health care professionals. Obesity was calculated in 22.4% third-year students, 16.3% final-year students, 20.4% interns and 40.8% of faculty members. Overweight problems were seen in 19.7%, 24.7%, 24.7% and 30.8% of third-years, final-years, interns and faculty members respectively. Significant differences were noted between the various groups of health care professionals ($p \leq 0.001$). Sedentary behaviour was calculated in mean MET minutes per week. The maximum sedentary behaviour of 4047 mean MET minutes per week was calculated in the faculty members. Significant differences were noted between faculty members and various other dental health care professional groups ($p \leq 0.001$).

The logistic regression analysis was employed to determine the contribution of batch, gender, physical activity, and sedentary behaviour as independent variables to obesity. The results of logistic regression showed that all independent variables were significantly related to obesity. Males were more likely to be obese when compared to females (OR = 2.42; $p = 0.001$). Faculty and interns were more prone to obesity as compared to third and final-year dental students (OR = 2.04; $p = 0.001$). Physically inactive subjects had an odds ratio of 3.37 of developing obesity as compared to those physically active. Dental health professionals with sedentary behaviour (> 2000 MET min/week) were more likely to be obese (OR = 1.18; $p = 0.001$) (Table 6).

A significant correlation was seen between the physical activity categorical indicator and BMI ($r = 0.209$; $p \leq 0.001$). A significant negative correlation was noted between the physical activity categorical indicator and sedentary behaviour ($r = -0.111$; $p \leq 0.01$). A significant correlation was also noted between BMI and sedentary behaviour ($r = 0.135$; $p \leq 0.01$) (Table 7).

Tab. 4. Categorical risk indicator in dental health care professionals

Dental Professionals	**Category Indicator**		
	Low Risk (>3000 MET min/week)	**Moderate Risk** (600–3000 MET min/week)	**High Risk** (<600 MET min/week)
Third-year students	9 (17%)	20 (33.3%)	61 (28.9%)
Final-year students	25 (47.2%)	24 (40%)	42 (19.9%)
Interns	19 (35.8%)	16 (26.7%)	43 (20.4%)
Faculty	0	4 (6.7%)	65 (30.8%)
Total	**53**	**60**	**211**

* $p \leq 0.001$, $x^2 = 46.5$

Tab. 5. Obesity (as per Body Mass Index) and sedentary behaviour among dental health care professionals

Dental Professionals	**Body Mass Index**			**Sedentary Behaviour** Mean MET min/ week
	Normal (< 25 kg/m^2)	**Overweight** (25 - 30 kg/m^2)	**Obese** (> 30 kg/m^2)	
Third-year students	61 (31.8)	16 (19.7)	11 (22.4)	1715.8 (1542.2)
Final-year students	59 (30.7)	20 (24.7)	8 (16.3)	1707.5 (1443.1)
Interns	49 (25)	20 (24.7)	10 (20.4)	1204.7 (1565.7)
Faculty	25 (12.5)	25 (30.8)	20 (40.8)	4047.1 (1925.8)
Total	**194**	**81**	**49**	2288.3 (1852.8)

* $p \leq 0.001$, $x^2 = 52.2$

Tab. 6. Logistic regression analysis with obesity as dependent variable {Absence of obesity; BMI (<25 kg/m^2) vs presence of obesity (>25 kg/m^2)} and batch, gender, physical activity and sedentary behaviour as independent variables

Variables	B	SE B	P	OR (95%CI)
Gender	1.89	0.298	0.01	2.42 (3.83, 1.99)
Batch	0.71	0.294	0.01	2.04 (3.63, 1.49)
Physical activity	1.21	0.481	0.01	3.37 (5.16, 2.76)
Sedentary behaviour	0.170	0.316	0.01	1.18 (2.20, 0.63)

Variables - Gender: Male and Female, Batch: Students (Third year and final year) and Graduates (Faculty and Interns), Physical activity: Low risk and Risk group (Moderate and High); Sedentary behaviour: < 3000 MET min/week and >3000 MET min/week.

Tab. 7. Correlation between the physical activity Categorical Indicator (CI), Body Mass Index (BMI) and sedentary behaviour

Variables	Correlation coefficient	p value
Physical activity (CI) – BMI	0.209	<0.001
Physical activity (CI) – Sedentary behaviour	- 0.111	<0.01
BMI – Sedentary behaviour	0.135	<0.01

Discussion

Physical activity is a fundamental means of improving the physical and mental health of individuals. The findings from this study indicated that the level of physical activity was very low in the majority of dental professionals, when assessed using multi-domain GPAQ. Sedentary work, like that performed in dentistry, exerts work stress onto certain muscles thus building tension in the body. Hence, it appears that total physical activity remains insufficient to ensure energy balance and prevent obesity. During the past few decades physical activity levels among both adults and children in developed countries have declined steadily [16-17].

Using the logistic regression model, it was noted that male physically inactive faculty and interns with sedentary behaviour (> 3000 MET min/week) were more likely to be obese. Faculty and interns were more prone to obesity as compared to third and final-year dental students (OR = 2.04; p = 0.001). The finding could be attributed to declining levels of physical activity among faculty and interns.

Data from three national surveys among Iranian adults have shown that more than 80% of the Iranian population is physically inactive [18]. The physical activity level of 198 Estonian family doctors was assessed by Suija et al. in 2010 using the International Physical Activity Questionnaire (IPAQ). Analysis revealed no statistically significant relationship between the level of physical activity and general characteristics (age, living area, body mass index [BMI], time spent sitting) [19]. In 1996 Ching et al. examined relationships between nonsedentary activity level, the time spent watching television and risk of overweight among male health professionals in a 2-year follow-up study. Odds of being overweight were 50% lower for men. Among men watching 41 or more hours of television per week, the odds of being overweight were 406 times greater than those for men watching no more than 1 hour per week. The study concluded that sedentary and nonsedentary activities represent separate domains, each with independent risks for overweight [20].

In 2008 Frank et al. assessed physical activity levels of 2,316 U.S. medical students. More than half (61%) of the students had the level of physical activity higher than those of age-matched peers in the general population, thus showing that promotion of adequate physical activity habits during medical education may be an important step to improve the physical activity in future clinicians [21]. In a survey on physical activity conducted by Hensrud et al (1992) on physicians of the Minnesota Medical Association, the prevalence of physical activity was higher compared with the general population. Overall, 65.6% of the 393 respondents reported performing regular exercise, while 38.2% participated in exercise vigorous enough to be of cardiovascular benefit. Men reported significantly higher prevalence of regular exercise and cardiovascular exercise than women did [22]. Lobelo et al. (2009) conducted a study to assess how physical activity habits of doctors and medical students influence their counselling practices. They concluded that medical schools need to increase the proportion of students adopting and maintaining regular physical activity habits to increase the rates and quality of future physical activity counselling delivered by doctors [23].

In 2009 Fretts et al. examined the association between total physical activity (leisure-time plus occupational ones) and diabetes incidence among 1,651 American Indians who participated in the Strong Heart Study for a period of 10 years. Compared with participants who reported no physical activity, those who reported any physical activity had a lower risk of diabetes [24]. Physical activity was also found to reduce the risk of periodontitis in a study on male health professionals. The results suggest that engaging in the recommended level of exercise is associated with lower periodontitis prevalence, especially among never and former smokers [25].

Total energy expenditure of 0 MET in recreational activities in the present study was reported by 74.4%, 58.6%, 53.8% and 52.1% of dental health professionals. Total energy expenditure of 0 MET minutes per week was calculated in 32.2%, 10.3%, 17.9% and 44.9% of third-year students, final-year students, interns, and faculty respectively. Beside the costs in terms of mortality, morbidity and quality of life, inactivity exacts high financial costs. For example, the annual costs in England – including those to the health system, days of absence from work and loss of income due to premature death – have been estimated to be €3–12 billion. This excludes the contribution of physical inactivity to overweight and obesity, whose overall cost might run to €9.6–10.8 billion per year [26]. Similarly, a Swiss study estimated the direct treatment costs of physical inactivity at €1.1–1.5 billion. On the basis of these two studies, physical inactivity can be estimated to cost a country about €150–300 per citizen per year. Increasing current levels of activity could significantly reduce the costs to society, but even maintaining them can result in savings. For example, the Swiss study estimated the savings on direct treatment costs for the physically active at about €1.7 billion [27].

Almost 2 million deaths per year are attributable to inactivity leading to physical activity being described as the ‘best buy in public health’ [28]. Despite the global concern about non-communicable diseases in low and middle income countries, increasing obesity and rapid changes in the pattern of work, transport and recreation, physical activity surveillance and monitoring are only carried out in few countries [29]. Addressing this societal issue is not the task of public health professionals and politicians alone. It requires action from and partnership across a broad range of sectors and professions, many of which do not have physical activity as a core element of their missions.

Regular physical activity is recommended for all, including dental health care professionals. It is associated with an increase in self-esteem and self-concept and a decrease in anxiety and depression. In addition, physical activity is one of the keys to counteracting the current epidemic of overweight and obesity that is posing a new global challenge to public health. It is also suggested in advocating physical activity in other sectors and providing them with the tools to facilitate its integration in a range of policies. Physical activity is a positive health behavior with so much potential to improve public health and so few risks that it deserves to be central to any future public health strategy.

We acknowledge that certain factors might have influenced the findings of the present study, such as the potential recall bias in the process of recalling and recording physical activity and inactivity. Because the BMI is dependent only upon weight and height, it makes simplistic assumptions about the distribution of muscle and bone mass, and thus may overestimate adiposity in those with more lean body mass (e.g. athletes) while underestimating adiposity in those with less lean body mass (e.g. the elderly).

A daily routine of exercise is recommended for oral health care providers in order to prevent musculoskeletal work-related disorders. Exercise increases agility, decreases stress and improves overall mental and physical health. Warm-up stretching exercises can easily be performed at chair side or in between patients to help reduce pain, increase limberness, and muscle flexibility. Daily in-office exercises should be accompanied by routine physical activity and stress reduction regimens outside the workplace. Weight training will reduce tension and stress and help achieve a pain-free practice and improve the body's ability to resist strain injuries. Education must be offered to all oral health care providers on the risk of musculoskeletal injuries to enable them to prevent or alleviate muscular tension and work-related pain, which are common to dental health care professionals [30].

Conclusion

The majority of dental professionals appeared to undertake very little physical activity, when assessed using multi-domain GPAQ. Obesity was calculated in 22.4% third-year students, 16.3% final-year students, 20.4% interns and 40.8% of faculty members. Of the 211 health care professionals in the high risk group 28.9% were in the third year, 19.9% in the final year, 20.4% were interns and 30.8% were faculty members. Physically inactive male faculty and interns from among health professionals with sedentary behaviour were more likely to develop obesity. A significant correlation was seen between the physical activity categorical indicator and BMI. A significant negative correlation was noted between the physical activity categorical indicator and sedentary behaviour. A significant correlation was also noted between BMI and sedentary behavior. The sedentary lifestyle of dental health care professionals is one of the major threats to the present and future health of this vulnerable group and is likely to make the community prone to an epidemic of chronic diseases.

Acknowledgement

The authors would like to acknowledge the support extended by the participants and People's College of Dental Sciences, Bhopal.

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Source of funding: People's College of Dental Sciences & Research Centre