Original Article

Prevalence of obesity and behaviors associated with the development of metabolic disease among medical practitioners in Jordan

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ABSTRACT

Background: The health status of medical practitioners can potentially impact their ability to counsel patients. The purpose of the study was to examine the prevalence of obesity and behaviors associated with the development of metabolic disease among medical practitioners in the country of Jordan. **Materials and Methods:** The participants were 748 (male $n = 285$, 32.3 years ± 7.3, female $n = 463$, 29.7 years ± 5.7) randomly selected pharmacists, nurses, physicians, medical lab technicians, and radiation specialists from a variety of medical institutions in Jordan. A short 25-item validated instrument was chosen for this investigation. After the survey was administered and data were tabulated, one-way analysis of variance and Pearson's Chi-square analysis were conducted to examine differences in reported risk behaviors (low physical activity [PA], smoking) and obesity by gender, age and medical specialty. **Results:** Descriptive analysis revealed that 20.9% of the participants self-reported as smokers of cigarettes, 47.9% were either overweight or obese, and 52.9% reported no days of planned PA on average per week. The results suggested a difference in body mass index (BMI) classification ($F = 17.9$, $P \leq 0.001$) and smoking ($F = 5.33$, $P = 0.021$) by age. Mean age associated with being underweight was 26.4 years for normal weight 29.3 years for overweight 31.6 years and finally for obese was 34.5 years. Chi-square test resulted in differences by gender ($\chi^2 > 50$, $P \leq 0.001$) for BMI (males: 26.4 ± 3.7; females: 24.6 ± 3.7), PA (males no planned PA 61.1%, females 47.9%) and smoking (males 43.1% smokers, females 7.1%). Researchers discovered that medical specialty was related to differences in reported smoking ($\chi^2 = 26.5$, $P \leq 0.001$) and days of planned PA ($\chi^2 = 24.2$, $P = 0.019$). **Conclusions:** Within the population of medical practitioners there is still a high incidence of obesity and risk behaviors associated with metabolic diseases. It also appears that these incidence rates are greater among men, with increasing age, and among certain medical specialties.

Key words: Medical practitioners, obesity, overweight, physical activity, smoking

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INTRODUCTION

Physical inactivity is increasing globally. The increase in obesity, preventable (metabolic) disease, and the number of individuals experiencing declining wellness has reached an all-time high.[1] Many experts contribute these changes

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to a lack of physical activity (PA).[2,3] Generally speaking, overall medical and insurance costs will decrease as a result of a higher level of public awareness regarding risk factors that lead to metabolic disease.[4-6] Risk factors of metabolic disease include obesity, high body fat rates, smoking, lack of PA, Hyperlipoproteinemia, high low-density lipoprotein-cholesterol, low rate of the high-density lipoprotein-cholesterol (HDL-C), as well as the high rate of hyperhomocysteinemia.[7-10] Metabolic syndrome is a combination of interrelated metabolic risk factors that predispose the development of or presence of coronary heart disease (cardiovascular disease). Metabolic syndrome is diagnosed when a patient exhibits three of the following: Elevated waist circumference (>40 inches), elevated triglycerides (>150 mg/dL), low HDL-C (<40 mg/dL), elevated blood pressure (130/85 or higher), and elevated fasting glucose (fasting glucose > 100 mg/dL).[11] A diagnosis of metabolic syndrome has many sources of defining criteria; the International Diabetes federation, National Cholesterol Education Program, World Health Organization (WHO), European Group for the Study of Insulin Resistance and the American Heart Association use slightly different criteria.

Unhealthy eating habits increase the likelihood of obesity and a decline in wellness. Additionally, there is a link between smoking behavior, overweight and obesity. A recent study involving a large cross-sectional cohort (40,036) identified associations between a long active habit of smoking (>20 years) and being overweight (body mass index [BMI] >25).[12] Additionally, this study found that in younger adults and adolescents (16–24 years of age), a pattern of smoking was associated with overweight and obesity (BMI > 30). A substantial increase in fat mass can lead to chronic health consequences later in life and obesity-related illnesses like type 2 diabetes.[13-16] Not all fat mass carries the same risk for the development of metabolic disease. Abdominal or visceral fat is of greater concern because it is linked to metabolic disturbance.[17] Visceral fat lies deep within the abdominal cavity and accumulates around the organs, especially the liver. The relationship between visceral fat distribution, metabolic abnormalities and disease is well recognized.[17] Individuals with more visceral fat are prone to metabolic syndrome and the development of diabetes and coronary heart disease.[18]

Recently, the body mass of the Jordanian community has significantly increased.[19,20] Studies indicate that obesity and being overweight are more prominent in different segments of the community. Overweight and obesity ranges are determined using height and weight to calculate a BMI. An adult with a BMI between 25 and 29.9 is considered overweight, and an adult with a BMI of 30 or higher is considered obese. In 2010, Al-Arjan found that 50.4% of Jordanian males ages 20–83 were obese, and 29.11% were overweight.[19] Another study reported that the obesity amongst males and females ages 25–29 was 17.8% and 25.9% respectively.[20] A 2004 survey of Jordanians ages 18–65 found that the obesity rate in males was 21.1% and 41.5% for females.[21] In 2004, Shehab *et al.* found that the male obesity rate was 10.3% and 16.2% for females, while the overweight rate was 36.0% for males and 27.8% for females.[22] An investigation in 2000 found that 42.2% had a BMI > 30.0 kg/m^2.[23] While another report indicated that 27% of Jordanian females were overweight, and 6.9% were obese.[24]

To further complicate the rise in obesity in Jordan, the WHO in a 2008 study indicated that there are >1 billion smokers around the world and that 80% of them live in countries of modest living conditions. The WHO estimates that nearly 5.4 million people die annually from smoking-related diseases.[25] Additionally, tobacco use, in all forms and types, is causing higher world death rates than HIV, substance addictions, traffic accidents, or violent crimes.[26] Smoking in combination with obesity compounds the effects of both. In addition, tobacco use can increase blood sugar levels and lead to insulin resistance. The more one smokes, the greater the risk of type 2 diabetes.[27,28] Data suggest the prevalence of smoking is increasing in the Jordanian community, reaching 19.9% in the year 2000.[23] More recently, the percentage of smokers increased to 29.8% in 2002 with 50.5% of males and 8.3% of females reporting actively smoking.[22] In 2004, the rate of smokers was 22.8% and increased even further to 37.7% in 2005.[21,29]

Medical practitioners in Jordan may encourage their patients to engage regular exercise (PA) and avoid unhealthy practices like smoking; yet they may not be heeding their own advice. According to findings, the rate of PA declines with increasing age while the prevalence of cardiovascular disease increases. It has also been noted in a recent study that physicians who smoke and consume more alcohol offer less advice relevant to the prevention of cardiovascular risk factor to patients.[30]

The aforementioned studies provide critical data regarding obesity and smoking in different Jordanian demographic groups. However, risk factors amongst the medical practitioners in Jordan are still unclear. This lack of data hinders efforts in promoting PA as a preventative reduction to metabolic disorders and cardiovascular disease. Statistical data regarding risk related behaviors will provide a foundation for the development of preventative programming and better influence the life-style choices of medical practitioners and the general population. It is important to thoroughly investigate the leading causes of risk factors amongst a sample of medical occupations and practitioners in Jordan. The purpose of this study was to examine the prevalence of obesity and behaviors associated with the development of metabolic disease among medical practitioners in Jordan.

MATERIALS AND METHODS

Prior to conducting the study, the researchers obtained approval from Institutional Review Boards at the Red Crescent Hospital and Prince Rashid Military Hospital to gather information from their medical staff members. One

hospital is in a major metropolitan center, the other in a smaller boarder city thus representing both urban and rural hospital settings. The respondents included a total sample of 748 of doctors, pharmacists, nurses, lab technicians, and X-ray specialists that were randomly selected from the total population of employees at the above mentioned private and public entities. The final sample resulted in a random selection of males and females employed in a variety of medical professions in both private/public and urban/rural institutions. The participants provided informed written consent prior to any data collection. In order to gather the anthropometric data, the participant's weight was measured using a physician's triple beam balance scale (OHAUS Corporation, Parsippany, NJ) with readings possible to the nearest 0.1 kg, and height was measured using the stadiometer to the nearest cm (Health-O-Meter, Bedford Heights, OH USA). The BMI was calculated using the equation (mass/height^2) which was broken down into eight categories: Severe thinness (≤16.0), Moderate thinness (16.00–16.99), Mild thinness (17.00–18.49), Normal range (18.5–24.99), overweight (25–29.99), Obese class I (30.00–34.99), Obese class II (35.00–39.99), and Obese class III (≥40.00).[31] A 10-item survey instrument was developed to collect data regarding health risk-related behaviors. Prior to data collection, content area experts reviewed the survey for face validity. Minor revisions were made according the feedback from an expert review process. This survey was developed by the researchers and reviewed by experts in the area of health and fitness for face and content validity. The 25-item survey asked for basic demographic information and had items to address smoking behavior, PA behavior, and BMI. The questionnaire required no > 10 min to fill out, and used closed-ended responses to items. To test the reliability of the instrument, the researchers applied the test on a pilot sample that consisted of professionals in the medical field. In pilot testing, both the smoking and physical fitness scores were not significantly different pre to post in a large sample test-retest reliability study ($n = 198$, $P > 0.05$) that examined the stability of the survey after a 1-month time period. The correlation ($r > 700$) was then calculated according to each question and in the total of all questions between the 1st and 2nd applications. Given the correlations between two separate administrations, it appears that the instrument had satisfactory reliability. This instrument demonstrated low item to total correlations ($r < 19$), suggesting that items were measuring different constructs as was the intention when the survey was designed. The data collection period spanned 30 days. PA data collected by the survey instrument demonstrated adequate internal consistency, $\alpha = 674$. BMI and BMI classification had high internal consistency ($\alpha = 992$). Smoking history could not be evaluated as the item had a binary response, but data were comparable to previously published norms.[32]

To analyze the data, descriptive statistics were calculated for the overall variables. A one-way analysis of variance and Pearson's Chi-square analysis were conducted to examine the difference in reported risk behaviors (low PA, smoking) and obesity by gender, age, and medical specialty. Statistical significance was set *a priori* at $P < 0.05$. All statistical analysis were performed using a modern statistics software package (SPSS version 20.0, International Business Machines, Chicago, IL).

RESULTS

Descriptive analysis revealed that 20.9% of the participants self-reported as smokers of cigarettes, 47.9% were either overweight or obese, and 52.9% reported no days of planned PA on average per week. Further descriptive information is shown in Table 1.

The results suggested difference in BMI classification ($F = 17.9$, $P \leq 0.001$), smoking ($F = 5.33$, $P = 0.021$) by age. Mean age associated with being underweight ($n = 5$) was 26.4 years (95% confidence interval [CI]: 24.7–28.1), for normal weight ($n = 385$) range was 29.3 years (95% CI: 28.8–30.0), for overweight ($n = 276$) was 31.6 years (95% CI: 30.7–32.3) and finally for obese ($n = 82$) was 34.5 years (95% CI: 32.9–36.0) [Figure 1]. The mean age for smokers ($n = 156$) was 31.7 years (95% CI: 30.7–32.8) and nonsmokers ($n = 592$) was 30.4 years (95% CI: 29.8–30.9) [Figure 2].

Pearson's Chi-square analysis revealed difference by gender for BMI ($\chi^2 = 43.8$, $P \leq 0.001$), smoking ($\chi^2 = 138.7$, $P \leq 0.001$) and PA ($\chi^2 = 13.1$, $P = 0.004$). Within the female participants ($n = 463$), there were 0.8% underweight, 60.7% normal weight, 30.2% overweight, and 8.2% obese [Figure 3]. As compared to male participants ($n = 285$) who were 0.02% underweight, 36.5% normal weight, 47.7% overweight and 15.4% obese. Male participants also reported a higher rate of smoking behavior with 43.1% smokers versus 7.1% among females. The prevalence of planned days of PA per week among male participants was 61.1% no days, 15.1% 1 day/week, 15.1% 2 days/week and 8.7% for 3 days/week. Among the female participants these results were respectively, 47.9% no days, 22.9% 1 day/week, 17.5% 2 days/week, 11.6% for 3 days/week.

Table 1: Descriptive characteristics of participants given as count and percentage

Variable	Groups	Count	Percentage
Gender	Male	285	38.10
	Female	463	61.90
Smoking	Smoker	156	20.90
	Nonsmoker	592	79.10
BMI	Underweight	5	0.70
	Normal weight	385	51.50
	Overweight	276	36.90
	Obese	82	11.00
Medical specialty	Physician	162	21.70
	Pharmacist	154	20.60
	Nurse	200	26.70
	Medical lab technician	146	19.50
	Radiation specialist	86	11.50

BMI=Body mass index

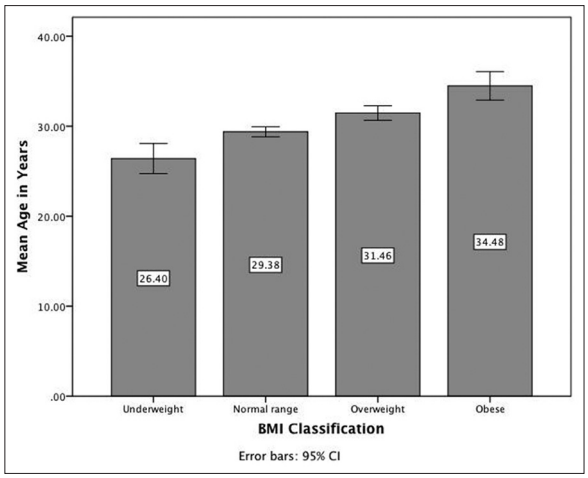

Figure 1: Age and body mass index

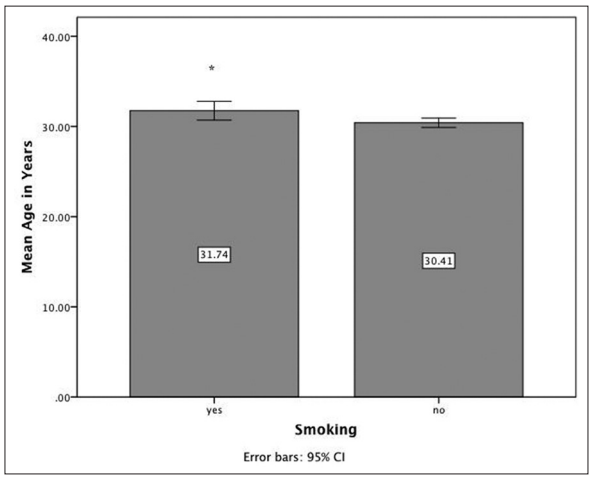

Figure 2: Age and smoking

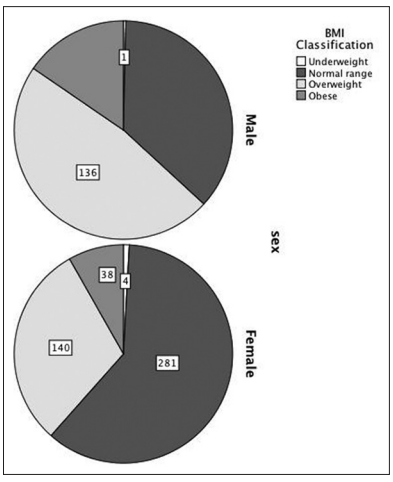

Figure 3: Gender and body mass index

It was found that medical specialty was related to differences in reported smoking ($\chi^2 = 26.5$, $P \leq 0.001$) and days of planned PA ($\chi^2 = 24.2$, $P = 0.019$). Among medical specialties, Physicians reported the highest prevalence of smoking (34.0%) followed by Radiation Specialists (22.1%), Nurses (20.0%), Pharmacists (16.2%) and Medical Lab Technicians (11.6%). Reports of no days of planned PA were highest among Radiation Specialists (66.3%) followed by Pharmacists (55.2%), Physicians (51.2%), Nurses (50.5%) and lastly, Medical Lab Technicians (47.9%). (see Figure 6).

DISCUSSION

There is a dearth of scholarly information examining the prevalence of obesity and behaviors associated with the development of metabolic disease among medical practitioners in Jordan. Understanding the prevalence of obesity and healthy behaviors among this group of practitioners may impact not only their own health, but also the health of those who receive wellness counseling from them. Engaging in these risk-related behaviors may reduce or weaken the legitimacy of the medical practitioner's wellness counseling, as the patient may believe that actions speak louder than words. For these reasons, the following results warrant increased attention from professionals in the fields of health education, fitness, and physical education.

The aforementioned conclusions show a low prevalence of underweight women (0.86%) as compared to men (0.35%). Obesity averaged 10.96% for all participants; 15.43% for males and 8.20% for females. The percentage of obese and overweight individuals averaged 47.86%; 63.15% for males and 38.44% for females. Comparatively, a report issued in 1998 indicated that the general rate of obesity prevalence in Jordan was 49.7% distributed between 32.7% for males and 59.8% for females.[20] The prevalence of obese and overweight individuals among the medical workforce in Jordan is comparatively less than other sectors of the community.

Comparing results obtained from the medical workforce in Jordan with synonymous studies in other countries in the Middle East yielded similar findings. The prevalence of obesity and rates of overweight physicians in Bahrain was 44.3%, for natural weight rate was 47.5% and 45.3%, and the underweight rate was 8.2% and 32.1% female to male respectively.[33] Another study sampled female nursing students in Saudi Arabia, the prevalence of obesity was 26.1% of obese class I with a rate of 4.5% of obese class II.[34] A survey of the Faculty of Nursing students in Kuwait indicated men and women categorized underweight was 3.8% and 12.6% respectively, the rate of regular weight was 11.6% and 37.7%, the overweight rate was 8.9% and 17.7%, and the obesity prevalence rate was 3.9% and 0.0% respectively.[35] In a similar study of medical practitioners in Italy age and gender were associated with tobacco use.[36]

With respect to BMI classification per age category, results show a decrease in the normal weight rate and an increase in the rates of obese and overweight individuals as age advances in the present study. Such a trend is problematic for the overweight and obese individuals as the possibility of cardiovascular disease increases with age.[19-25,29,31,33-35,37] The health status of these practitioners can potentially

impact their ability to counsel patients in regard to weight management.

Smoking prevalence among Jordanian medical sector averaged 20.85%, with 43.15% of males smoking and 7.12% of females. Such rates are comparative to the rate in the Jordanian community. Belbeisi *et al.* (2009), indicated that the smoking rate in men among the Jordanian community was 48.2% and 5.1% among women.[32]

Comparing these data with other studies conducted in Jordan, as well as on other medical communities, the rate of smoking amongst students of the University of Jordan in 2009 reached 26.0% for men and 7.0% for women. The study also found that there are variations in the smoking rate of 1st and 4th year students.[38] Smoking rates among medical and engineering students at Jordan Yarmouk University were 28.6%.[39]

A 2009 study illustrates the prevalence of smoking by medical professionals in Arab countries, specifically physicians, where 24.0% were current smokers and 10.0% of them were past smokers.[40] A 1999 study among physicians in Bahrain reported a smoking rate of 26.6%.[41] While a study conducted on the students of Faculty of Medicine at the city of Jerusalem in 1985 indicated, the smoking rate was 18.4% for men and 12.5% for women.[42] Comparatively, another survey study conducted on the students of Faculty of Medicine in Pakistan in 2005, found that among the students of Agakhan University in Karachi the average smoking rate was 14.4% where 22.0% of men and 3.3% of women reported smoking.[43]

A 2009 study of the faculty of medicine in Punjab indicated the average rate of smoking was 9.1% (men 23.2% and women 1.3%).[44] A study focused on the male medical science students at Semnan Medical Science University in Iran indicated smoking prevalence was 14.4% with 45.6% of these men having started smoking during between 18 and 20 years old.[45]

In comparison, the rate of smoking in the current survey study was less than the rate found among physicians in Bahrain.[40,41] The prevalence of smoking among physicians in the current study increased with age similar to most previous studies.[40-46] This indicates that smoking rates of physicians increases with age and that the older generations of practitioners in Jordan have the highest rates of tobacco consumption. Given the rates overall, this trend may be a limiting factor for practitioners in Jordan to promote healthy behaviors in regard to smoking. Physician education on tobacco counseling is associated to increased comfort and practice in advising patients who smoke. Tobacco cessation training might increase the success rate of helping patients quit smoking.[36,47]

Lack of PA is a trend that is expanding across age brackets globally. Recently a great deal of focus has been placed on studying the lack of PA and obesity among children in countries around the world. At the other end of the lifespan, obesity, smoking, and lack of PA have been linked to numerous medical complications and cognitive decline. The present study indicates that the percentage of medical practitioners who do not participate in PA was 52.94% (61.5% for men and 47.94% for women). Also, the rate of women participating in PA once a week or more, was greater than in men. This supports the lower prevalence of obesity among women, though several prior studies have concluded the obesity is higher among women in other locales.[20-22]

It is important to analyze the various elements that contribute to the difference in PA patterns. Such facts may be explained by determining the socioeconomic level of the women working in a medical occupation as some studies indicate that women's socioeconomic level positively correlates with increased PA and is inversely related with obesity prevalence amongst women, while the opposite is exhibited for men.[48,49]

Physical activity tends to decrease with age. This is apparent among medical practitioners sampled in the present study where PA decreases as age increases. This reduction in PA and increase in body mass correlates with an increased likelihood of developing cardiovascular disease and positive indicators for metabolic syndrome.[11] The benefits of PA are well known and accepted.[50,51] Considerable research has been conducted in the area of exercise behavior change and data suggest that exercisers progress through a set of identifiable stages before reaching a maintenance stage where exercise is fully integrated as part of their daily lives.[52] It is imperative to provide PA information that will motivate and enable people to change behaviors and to maintain those changes over time.

The demonstrated findings with respect to the relatively high rate of obese, and overweight individuals, prevalence of smoking, and lack of PA among a sample of the medical practitioners in Jordan, creates a challenge to media campaigns and programming presented by the Ministry of Health. These programs are designed to address the high rate of dangerous risk factors, leading to metabolic disease. The results of the present study warrant future investigation as such risk-related behaviors among Jordanian medical professionals may weaken the legitimacy of wellness counseling and campaigns to increase healthy living.

The risk-related behaviors associated with medical professionals in Jordan warrants an increase in preventive consideration. Recognition of problems associated with lack of PA and obesity is easily accepted intellectually, however; the practicalities of solving the problem have not been realized. Therefore, the medical leadership in Jordan must create various programs and approaches to alleviate the prevalence of such risk factors among the medical community. Medical professionals at risk for metabolic syndrome must be counseled on the related risks and educated about lifestyle choices that may decrease this risk. There must be a strong partnership between doctors, nurses, athletic trainers, counselors, sport nutritionists, sport psychologists and strength and

conditioning specialists to collaborate and formulate a wellness-training program. The physical and cognitive benefits of PA are well known and accepted. Providing PA information that will motivate and enable people to change behavior and maintain that change over time is the key. To achieve the desired reduction of health risks and reduce the prevalence of preventable disease, the medical community in Jordan must lead by example.

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