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ORIGINAL ARTICLE

Lifestyle habits and well-being among primary health physicians in western Saudi Arabia

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Abstract

Aim This study aimed to assess the lifestyle habits and well-being of primary healthcare physicians working at the Ministry of National Guard Health Affairs in western Saudi Arabia.

Subjects and methods This cross-sectional study was conducted at the primary healthcare centers affiliated with the National Guard Health Affairs in western Saudi Arabia. A self-administered questionnaire was applied. The questionnaire included the demographic information, medical history, physical activity, and food and smoking habits. The stress level was assessed using the 10-cm visual analog scale. Descriptive statistics were performed.

Results Participants' mean (± SD) age was 39.3 ± 12.3 years, and 51.9% of them were female. More than half of the studied physicians were either overweight or obese. In the past 6 months, 40.6% of the participants had followed a diet to reduce their weight and 35% practiced sports 3–4 days/week. Reported chronic diseases were hyperlipidemia, hypertension, bronchial asthma, and diabetes. General health was identified as fair by 15.6%, good by 54.4%, and excellent by 30% of the participants. A moderate-high stress level was perceived by 77.5% of the participants.

Conclusion Health and well-being promotion programs should be established for physicians in primary care centers coinciding with regular check-ups and screenings for early detection and intervention to reduce the burden of lifestyle-associated diseases among primary care physicians.

Keywords Lifestyle · Well-being · Primary care physicians

Introduction

Non-communicable diseases (NCDs) kill 38 million people yearly worldwide, and 16 million deaths happen before the age of 70 years old. Cardiovascular diseases are on top of the list of disease-specific mortality with 17.5 million annual deaths. Cancers come second with 8.2 million annual deaths and respiratory diseases third, followed by diabetes mellitus, which accounts for 1.5 million annual deaths. These four diseases together are responsible for 82% of all the deaths from NCDs (WHO 2017). Lifestyle modification is a fundamental strategy for long-term prevention of such diseases. For example, cardiovascular diseases are associated with several modifiable risk factors such as obesity, tobacco consumption, physical inactivity, and diabetes and hypertension (Memish et al. 2014).

In Saudi Arabia, cardiovascular-related mortality is the main cause of death and represents 46% of all-cause mortality related to NCDs (WHO 2014, Memish et al. 2014).

Previous data on the prevalence of obesity in Saudi Arabia were 24.1%, but in 2013 it reached 28.7%, which means 3.6 million of the population are obese. In the same study, researchers found a decrease in fruit and vegetable consumption with almost half of males and 75.1% of females demonstrating low or no physical activity (Grandes et al. 2009, WHO 2017).

Primary care physicians are trained to provide comprehensive primary care services to a defined population of patients and take continuing responsibility for health promotion and well-being (AAFP 2017). Adapting healthy lifestyle habits by physicians will improve their own health and influence patients' health as well (CDC 2016).

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Studies in other countries have confirmed the effectiveness of physicians' advice on lifestyle habits for inducing and maintaining positive behavior changes in patients (CDC 2016, Rose et al. 2013). Studies that assess lifestyle habits and general health among physicians are scanty (Frank and Segura 2009). However, data on the well-being of primary healthcare physicians in Saudi Arabia are inadequate. The current study aims to address this important issue among primary healthcare physicians with assessment of a wide range of well-being and lifestyle factors (i.e., diet, exercise, sleep hours, smoking, and perceived general health and stress levels).

Methods

This cross-sectional study was conducted from April–September 2016 among physicians working at primary healthcare centers (PHCs) at the Ministry of National Guard-Health affairs (MNG-HA) in Jeddah, Saudi Arabia. The study was conducted in the three PHCs that belong to MNG-HA in Jeddah (AlWaha, AlIskan, and Bahra). The total number of physicians in the primary healthcare centers in Jeddah was 214. All physicians were invited to complete a pre-designed self-administered questionnaire that included demographic information on age, gender, and job title. Body mass index, medical conditions, perception of one's own physical health, physical activity, food habits, smoking, and time spent on computers and TV screens were assessed. The stress level was measured using a 10-cm visual analog scale. The questionnaire was adopted with permission from a previous study that assessed well-being and lifestyle habits of primary care physicians in Bahrain (Borgan et al. 2015, Alzayani 1970). A pilot study was conducted with minor modifications; however, pilot data were not included in the analysis.

Approval from the IRB office of King Abdullah International Medical Research Center (KAIMRC) was obtained, and all data were kept confidential. Physicians were requested to complete the questionnaire and hand it to the investigator in a sealed envelope.

Statistical analysis

Data were analyzed using IBM SPSS version 22. Continuous variables were presented as mean and standard deviation (SD) and categorical variables as frequency and percentage.

Results

The overall response rate was 73.7% ($n = 160$). Almost a fourth of the participants (24.4%) were < 30 years old. Females constituted 51.9%, and most of the participants (76.3%) were married. About two thirds of the study sample (64.4%) were Saudi. Family medicine specialists and consultants represent 40.6% of the participants (Table 1).

Overweight was reported among 36.9% of the participants, and 26.3% were obese. Mean body mass index (± SD) was 27.2 ± 5.1 kg/m^2. Among participants, 23.8% had hyperlipidemia, 16.3% were hypertensive, 7.5% had bronchial asthma, and 6.9% were diabetic. Hospital admission during the past 6 months was reported by 5.6% of the participants. Fair general health was perceived by 15.6%, and a moderate-high stress level was perceived by 77.5% of the participants (Table 2).

More than a third of the participants reported sports practice (35%); among them, 44.6% reported 3–4 days per week and 28.6% > 4 days per week. About a fourth of the participants (23.8%) watch TV for 3 h or more, and more than a third (36.6%) use computers for 3 h or more per day. Regarding hours of sleep per day, 26.9% reported < 6 h and 62.5% reported 6–8 h per day. Cigarette smoking was reported by 5% of the participants and shisha smoking by 8.1% (Table 3).

During the past 6 months, 40.6% of the participants had followed a diet to lose weight, and 12.5% had used weight-lowering medications. Almost three-fourths of the participants (74.4%) usually eat breakfast, and 68.1% usually eat dinner; 56.2% eat red meat, 64.4% eat chicken, and 27.6% eat fish

Table 1 Demographic characteristics of the study participants ($n = 160$)

Characteristics	No.	%
Age		
• < 30 years	39	24.4
• 30–50 years	86	53.8
• > 50 years	35	21.9
• Mean ± SD	39.3 ± 12.3 years	
Gender		
• Male	77	48.1
• Female	83	51.9
Marital status		
• Single	31	19.4
• Married	122	76.3
• Divorced	7	4.4
Nationality		
• Saudi	103	64.4
• Non-Saudi	57	35.6
Profession		
• Resident	35	21.9
• General practitioner	44	27.5
• Family medicine specialist	37	23.1
• Family medicine consultant	28	17.5
• Others	16	10.0

Table 2 Overweight/obesity, chronic diseases, and perception of general health and stress among the study participants ($n = 160$)

Characteristics	*n* (%)
Body mass index	
Normal (< 25 kg/m^2)	59 (36.9)
Overweight (25–29.9 kg/m^2)	59 (36.9)
Obese (≥ 30 kg/m^2)	42 (26.3)
Mean ± SD (kg/m^2)	27.2 ± 5.1
Hyperlipidemia	38 (23.8)
Hypertension	26 (16.3)
Bronchial asthma	12 (7.5)
Psychiatric problems	12 (7.5)
Diabetes	11 (6.9)
Blood diseases	6 (3.8)
Heart diseases	5 (3.1)
Hospital admission during the past 6 months	9 (5.6)
Perception of general health	
Fair	25 (15.6)
Good	87 (54.4)
Excellent	48 (30)
Perception of stress level	
Low	36 (22.5)
Moderate	111 (69.4)
High	13 (8.1)

Table 3 Physical activity, sleep hours, and smoking behavior among the study participants ($n = 160$)

Characteristics	*n* (%)
Practicing sports	56 (35)
Days of sports practice	
< 3 days	15 (9.4)
3–4 days	25 (15.4)
> 4 days	16 (10)
Hours of watching TV per day	
< 3 h	122 (76.3)
3–5 h	32 (20)
> 5 h	6 (3.8)
Hours of using computers per day	
< 3 h	100 (62.5)
3–5 h	50 (31.3)
> 5 h	10 (6.3)
Hours of sleep per day	
< 6 h	43 (26.9)
6–8 h	100 (62.5)
> 8 h	17 (10.6)
Cigarette smoking	
Current smoker	8 (5)
Ex-smoker	4 (2.5)
Never smoked	148 (92.5)
Shisha smoking	
Current smoker	13 (8.1)
Ex-smoker	5 (3.1)
Never smoked	142 (88.8)
Use of psychoactive medications in the past 6 months	6 (3.8)

three times or more per week. Also, 56.9% eat fresh fruits and 61.3% eat fresh vegetables three times or more per week. Eating fast food three times or more per week was reported by 13.1% of the participants. The majority of the participants (85.1%) reported drinking caffeinated beverages and 15.7% reported drinking power drinks once or twice per day (Table 4).

Discussion

Physicians' healthy lifestyle habits are of special concern since they affect their own health and patients' consultations as well (Vickers et al. 2007). Nevertheless, there has been very little research on lifestyle behaviors and preventive healthcare among physicians (Tyzuk 2012).

This study showed that more than a third of primary care physicians were overweight and a quarter of them were obese. These findings are in agreement with Alzahrani et al. (2016) in southern Saudi Arabia, who reported that overweight and obesity rates were 36% and 23.2%, respectively. In Bahrain, Borgan et al. reported that 39.4% were overweight, and 33.1% were obese. In India, Ramachandran et al. (2003) reported that 61% of the studied physicians had a BMI > 25 kg/m^2. In Pakistan, Mahmood et al. (2010) reported that the prevalence of obesity was 28.2% among postgraduate trainee physicians at a tertiary care hospital in Karachi. Obesity is a growing public health crisis that requires immediate focus not only on patients but also on physicians, who are considered by some researchers as the worst patients, neglecting their own health in favor of their professional and personal obligations (Tyzuk 2012).

Almost half of the participants in the current study had chronic diseases, mainly hyperlipidemia, hypertension, asthma, and diabetes. In Riyadh, Saudi Arabia, Al-Alwan et al. (2013) reported that 8% of physicians had hypertension, 2% had diabetes, and 8% hyperlipidemia. In India, Ramachandran et al. (2003) reported that 35.6% had hypertension and 13.3% diabetes. In Taiwan, Kao et al. (2016) reported that physicians had a significantly increased prevalence of hypertension, hyperlipidemia, and asthma. Borgan et al. (2015) reported that only 3 out of 152 physicians had seen a doctor in the previous 6 months to check for chronic diseases. Variations in reported rates of chronic diseases among physicians may be explained by differences in study participants' demographic characteristics or lifestyles habits or disparity in physicians' reporting of their chronic diseases (Ünal et al. 2013).

Similar to our findings, Tyzuk stated that most physicians do not meet the recommended guidelines for physical activity,

Table 4 Dietary habits among the studied participants ($n = 160$)

Characteristics	*n* (%)
Following a diet in the past 6 months	65 (40.6)
Taking weight-lowering medications in the past 6 months	20 (12.5)
Usually have breakfast	74.4
Usually have lunch	86.3
Usually have dinner	68.1
Eating red meat	
1–2 times per week	58 (36.3)
3–5 times per week	65 (40.6)
6–7 times per week	25 (15.6)
Eating chicken	
1–2 times per week	50 (31.3)
3–5 times per week	81 (50.6)
6–7 times per week	22 (13.8)
Eating fish	
1–2 times per week	88 (55.0)
3–5 times per week	38 (23.8)
6–7 times per week	6 (3.8)
Eating fresh fruits	
1–2 times per week	55 (34.4)
3–5 times per week	63 (39.4)
6–7 times per week	28 (17.5)
Eating fresh vegetables	
1–2 times per week	46 (28.8)
3–5 times per week	53 (33.1)
6–7 times per week	45 (28.1)
Eating fast food in the past week	
1–2	106 (66.3)
3–4	18 (11.3)
5–7	2 (1.8)
Drinking caffeinated beverages per day	
Once	64 (40)
Twice	46 (28.8)
Three times or more	20 (16.3)
Drinking power drinks per day	
Once	23 (14.4)
Twice	2 (1.3)

150–300 min of moderate-to-vigorous physical activity per week (Tyzuk 2012). Al-Alwan et al. (2013) in Riyadh reported that 40% of physicians do not exercise regularly, and among those who do, 60% exercise for less than 3 h per week. Banday et al. (2015) reported that 34.8% of primary healthcare physicians were physically inactive in northern Saudi Arabia. Physicians' physical inactivity has been attributed to increased workloads and long hospital shifts (Kosteva et al. 2012); too much time is required for exercise, along with the time for family responsibilities, and places to exercise are too few or far away, weather conditions can be unfavorable, and some feel embarrassed about exercising (Steen and Prebtani 2015). Tyzuk suggested that simple modifications to the workplace can be adopted to promote exercise among physicians, e.g., having exercise and shower facilities on site and encouraging team entries to events such as local walks or runs (Tyzuk 2012).

Healthy nutrition was not followed by most participants in the current study in concordance with similar studies in Saudi Arabia and other countries. Al-Alwan et al. (2013) reported that 51 and 68% of physicians rarely consume vegetables and fruits, and regular intake of protein, fatty food, and highly processed food was 77%, 33%, and 18%, respectively. The study by Giesinger et al. (2015) in Switzerland reported that doctors, especially those who work for long hours, frequently depend on the stimulation of coffee to perform at their best. In Makkah, western Saudi Arabia, Alsharif et al. (2016) reported that caffeine consumption among physicians, especially medical interns, is high. They noted that physicians consume more caffeine during examination periods and on-call times.

Factors responsible for lack of healthy nutrition among physicians include unavailability of food storage facilities, lack of access to healthy food during work shifts (Lemaire et al. 2010; Lemaire et al. 2011), limited cafeteria/restaurant opening hours, and lack of breaks (Winston et al. 2008).

Sleep deprivation among physicians is a common outcome of long working hours, shift work, and on-call duties (Philibert 2005). Half of the general physicians have sleep difficulties, and almost two-thirds of them complain of fatigue or sleepiness at least 3 days per week (Philibert 2005). Sleep deprivation among physicians, heavy workloads, and work shifts of up to 36 h augment the risk of decreased cognitive performance, increased likelihood of medical errors, and higher instances of self-injury, e.g., needle puncture injuries (Fletcher et al. 2004, Baldwin and Daugherty 2004). Other factors associated with decreased sleep hours included increased levels of stress, conflicts in the workplace, and taking medications to stay awake (Baldwin, Staiger et al. 2010).

The smoking rate among primary care physicians in the present study is lower than that reported in southern Saudi Arabia, where 26.3% of healthcare workers were smokers (Mahfouz et al. 2013), and in Bahrain, where about 25% of physicians were smokers, as reported by two studies in 1991 and 2009 (Hamadeh 1999; Fadhil 2009). Smoking cessation programs should be tailored to healthcare workers parallel to national public programs. Moreover, such interventions should begin early in the basic medical education and be applied continually during medical careers (Mahfouz et al. 2013).

This study showed that one fifth of physicians watch TV for 3–5 h daily, while about one third of them use computers for 3–5 h daily. Mortazavi et al. (2007) noted that an increasing number of people sustain subjective symptoms to a wide variety of electromagnetic sources including TV and computer monitors (Mortazavi et al. 2007, Anisimov et al. 1997).

Controversial findings were reported on the effects of increased exposure to EMFs, including neuropsychological (Hakansson et al. 2003) and ophthalmological manifestations (Balci et al. 2009, Ozquner et al. 2006).

Stress has been reported among physicians during and beyond training (Shanafelt et al. 2010). One-third of physicians in the US have experienced stress at certain points throughout their careers (Shanafelt et al. 2012), and in Germany, De Oliveira et al. (2011) reported that 22% of doctors have stress or "job strain." Stress is linked to medical errors (West et al. 2006) and affects physicians' personal safety (West et al. 2012), including increased risk of committing or barely avoiding motor vehicle crashes (Barger et al. 2005).

This study has limitations related to the self-reporting of data and cross-sectional study design where follow-up of participants was limited. Although the study purpose was explained and confidentiality assured to each physician, 26.3% of the physicians submitted incomplete data or did not fill out the questionnaire. Some physicians reported they did not have enough time to complete the questionnaire. The non-response rate is another limitation that might affect the generalizability of information.

In conclusion, the current study provided an overview of general health and lifestyle habits among primary care physicians in western Saudi Arabia. More than half of the participants are either overweight or obese, physical inactivity is common, most do not get proper nutrition, and more than one fourth do not get sufficient sleep. A moderate-to-high stress level was reported by the majority of participants.

Healthy lifestyle habits should be promoted among physicians in primary care centers with an emphasis on a healthy diet, physical activity, and stress management. Regular lunch breaks and access to food services and physical exercise facilities should be enhanced in all primary healthcare facilities.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

The authors have no disclosure to make related to the content of this manuscript.

Ethical approval This study was approved by the Institutional Review board (IRB) of King Abdullah International Medical Research Center (KAIMRC). All procedures in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

This article does not contain any studies with animals performed by any of the authors.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

Al-Alwan I, Badri M, Al-Ghamdi M, Aljarbou A, Alotaibi H, Tamim H (2013) Prevalence of self-reported cardiovascular risk factors among Saudi physicians: a comparative study. Int J Health Sci (Qassim) 7(1):3–13

Alsharif MH, Bardisi MM, BazAhmad A, EidMahmoud A, Kinsara AF, Almdani MZ, Alserifi MM, Tawakkul QA (2016) Caffeine consumption among medical interns and association with GPA in Makkah region. Int J Med Res Health Sci 5(12):23–25

Alzahrani AA, Al-Khaldi YM, Alsamghan AS (2016) Prevalence of obesity among Saudi board residents in Aseer region, Saudi Arabia. Saudi J Obesity 4(1):13–19

Alzayani S (1970) Lifestyle and wellbeing of AGU medical students: identifying areas for intervention. MSc thesis. Kingdom of Bahrain: Arabian Gulf University

American Academy of Family Physicians (AAFP) (2017) http://www.aafp.org/about/policies/all/primary-care.html. Accessed September 2017

Anisimov VN, Arutiunian AV, Burmistrov SO, Zabezhinskii MA, Muratov EL, Oparina TI, Popovich IG, Prokopenko VM, Frolova EV (1997) Effects of radiation from video display terminals of personal computers on free radical processes in rats. Biull Eksp Biol Med 124:192–194

Balci M, Namuslu M, Devrim E, Durak I (2009) Effects of computer monitor-emitted radiation on oxidant/antioxidant balance in cornea and lens from rats. Mol Vis 15:2521–2525

Baldwin DC Jr, Daugherty SR (2004) Sleep deprivation and fatigue in residency training: results of a national survey of first- and second-year residents. Sleep 27:217–223

Banday AH, Want FA, Alris FF, Alrayes MF, Alenzi MJ (2015) A cross-sectional study on the prevalence of physical activity among primary health care physicians in Aljouf region of Saudi Arabia. Mater Sociomed 27(4):263–266

Barger LK, Cade BE, Ayas NT, Cronin JW, Rosner B, Speizer FE, Czeisler CA, Harvard Work Hours, Health, and Safety Group (2005) Extended work shifts and the risk of motor vehicle crashes among interns. N Engl J Med 352(2):125–134

Borgan SM, Jassim GA, Marhoon ZA, Ibrahim MH (2015) The lifestyle habits and wellbeing of physicians in Bahrain: a cross-sectional study. BMC Public Health 15(1):655

Center of Disease Control (CDC) (2016) Health-related quality of life, well-being concepts. http://www.cdc.gov/hrqol/wellbeing.htm. Accessed September 2017

De Oliveira GS Jr, Ahmed S, Stock MC, Harter RL, Almeida MD, Fitzgerald PC, McCarthey RJ (2011) High incidence of burnout in academic chairpersons of anaesthesiology: should we be taken better care of our leaders? Anesthesiology 114:181–193

Fadhil I (2009) Tobacco education in medical schools: survey among primary care physicians in Bahrain. East Mediterr Health J 15(4): 969–975

Fletcher KE, Davis SQ, Underwood W, Mangrulkar RS, McMahon LF Jr, Saint S (2004) Systematic review: effects of resident work hours on patient safety. Ann Intern Med141:851–857

Frank E, Segura C (2009) Health practices of Canadian physicians. Can Fam Physician 55(8):810–811

Giesinger K, Hamilton DF, Erschbamer M, Jost B, Giesinger JM (2015) Black medicine: an observational study of doctors' coffee purchasing patterns at work. BMJ 351:h6446

Grandes G, Sanchez A, Sanchez-Pinilla RO, Torcal J, Montoya I, Lizarraga K, Serra J, PEPAF Group (2009) Effectiveness of physical activity advice and prescription by physicians in routine primary care: a cluster randomized trial. Arch Intern Med 169(7):694–701

Hakansson N, Gustavsson P, Sastre A, Floderus B (2003) Occupational exposure to extremely low frequency magnetic fields and mortality from cardiovascular disease. Am J Epidemiol 158:534–542

Hamadeh RR (1999) Smoking habits of primary health care physicians in Bahrain. J R Soc Promot Health 119(1):36–39

Kao L, Chiu Y, Lin H, Lee H, Chung S (2016) Prevalence of chronic diseases among physicians in Taiwan: a population-based cross-sectional study. BMJ Open 6:e009954

Kosteva AR, Salata BM, Krishnan SM, Howe M, Weber A, Rubenfire M, Jackson EA (2012) Physician variation in perceived barriers to personal health. Int J Gen Med 5:53–57

Lemaire JB, Wallace JE, Dinsmore K, Lewin AM, Ghali WA, Roberts D (2010) Physician nutrition and cognition during work hours: effect of a nutrition based intervention. BMC Health Serv Res 10:241

Lemaire JB, Wallace JE, Dinsmore K, Roberts D (2011) Food for thought: an exploratory study of how physicians experience poor workplace nutrition. Nutr J 10:18

Mahfouz AA, Shatoor AS, Al-Ghamdi BR, Hassanein MA, Nahar S, Farheen A, Gaballah II, Mohamed A, Rabie FM (2013) Tobacco use among health care workers in southwestern Saudi Arabia. BioMed Research Internnational 2013, ID 960292

Mahmood S, Najjad MK, Ali N, Yousuf N, Hamid Y (2010) Predictors of obesity among post graduate trainee doctors working in a tertiary care hospital of public sector in Karachi, Pakistan. J Pak Med Assoc 60(9):758–761

Memish ZA, El Bcheraoui C, Tuffaha M, Robinson M, Daoud F, Jaber S, Mikhitarian S, Al Saeedi M, AlMazroa MA, Mokdad AH, Al Rabeeah AA (2014) Obesity and associated factors—Kingdom of Saudi Arabia. Prev Chronic Dis 11:E174140236. https://doi.org/10.5888/pcd11.140236

Mortazavi SM, Ahmadi J, Shariati M (2007) Prevalence of subjective poor health symptoms associated with exposure to electromagnetic fields among university students. Bioelectromagnetics 28:326–330

Ozguner F, Bardak Y, Comlekci S (2006) Protective effects of melatonin and caffeic acid phenethyl ester against retinal oxidative stress in long-term use of mobile phone: a comparative study. Mol Cell Biochem 282:83–88

Philibert I (2005) Sleep loss and performance in residents and nonphysicians: a meta-analytic examination. Sleep 28:1392–1402

Ramachandran A, Snehalatha C, Satyavani K, Sivasankari S, Vijay V (2003) Metabolic syndrome in urban Asian Indian adults—a population study using modified ATP III criteria. Diab Res Clin Prac 60:199–204

Rose SA, Poynter PS, Anderson JW, Noar SM, Conigliaro J (2013) Physician weight loss advice and patient weight loss behavior change: a literature review and meta-analysis of survey data. Int J Obes (Lqnd) 37(1):118–128

Shanafelt TD, Balch CM, Bechamps G, Russell T, Dyrbye L, Satele D, Collicott P, Novotny PJ, Sloan J, Freischlag J (2010) Burnout and medical errors among American surgeons. Ann Surg 251(6):995–1000

Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, West CP, Sloan J, Oreskovich MR (2012) Burnout and satisfaction with work-life balance among US physicians relative to the general US population. Arch Intern Med 172(18):1377–1385

Staiger DO, Auerbach DI, Buerhaus PI (2010) Trends in the work hours of physicians in the United States. JAMA 303:747–753

Steen O, Prebtani APH (2015) Physical activity patterns among resident and staff physicians in Hamilton teaching hospitals. Can J Gen Intern Med 10(1):29–33

Tyzuk K (2012) Physician health: a review of lifestyle behaviors and preventive health care among physicians. BCMJ 54(8):419–423

Ünal B, Ergör G, Horasan GD, Kalaça S, Sözmen K (2013) Chronic diseases and risk factors survey in Turkey. Republic of Turkey, Ministry of Health, Turkish Public Health Institution, Ankara

Vickers KS, Kircher KJ, Smith MD, Petersen LR, Rasmussen NH (2007) Health behavior counseling in primary care: provider-reported rate and confidence. Fam Med 39(10):730–735

West CP, Huschka MM, Novotny PJ, Sloan JA, Kolars JC, Habermann TM, Shanafelt TD (2006) Association of perceived medical errors with resident distress and empathy: a prospective longitudinal study. JAMA 296(9):1071–1078

West CP, Tan AD, Shanafelt TD (2012) Association of Resident Fatigue and Distress with occupational blood and body fluid exposures and motor vehicle incidents. Mayo Clin Proc 87(12):1138–1144

Winston J, Johnson C, Wilson S (2008) Barriers to healthy eating by National Health Service (NHS) hospital doctors in the hospital setting: results of a cross-sectional survey. BMC Res Notes. https://doi.org/10.1186/1756-0500-1-69

World Health Organization–Non-communicable Diseases (NCD) Country Profiles , 2014. http://www.who.int/nmh/countries/sau_en.pdf. Accessed: September 2017. Accessed: September 2017. Accessed 20 May 2017

World Health Organization, Health impact assessment, The determinant of Health (2017) http://www.who.int/hia/evidence/doh/en/. Accessed: September 2017. Accessed 20 May 2017