Original Article

Unhealthy Lifestyle Predisposed Shiraz Healthcare Workers to Metabolic Diseases

Abstract

Background: Poor health condition may increase the risk of occupational problems and reduces an organization's productivity. Also, there is a direct, bilateral relationship between occupation and health. **Objective:** To evaluate the health status of health care workers (HCWs) in the largest tertiary general and teaching hospital in southern Iran. **Methods:** This cross-sectional study (Sep2014-Dec2016) was conducted on HCWs, who were referred to Prevention and Health Promotion Clinic of Shiraz Namazee hospital. The participants' health status was assessed and after the risk assessments and necessary physical examinations, the laboratory and para clinic tests were requested. Using descriptive and analytical tests, all data were analyzed. **Results:** Totally, 963 HCWs were enrolled, that 64.4% were women, with mean ± SD age of 35.51 ± 8.9 years. Eighty-eight percent and 77.4% of the participants had history of ergonomic and psychological exposures. Impaired glucose tolerance and abnormal serum cholesterol were seen in 13.6% and 29.9%, respectively. Body mass index was a predictive factor for abnormal blood pressure (OR: 1.12; 95%CI: 1.02-1.22), impaired glucose tolerance (OR: 1.08; 95%CI: 1.01-1.16), and abnormal serum cholesterol (OR: 1.17; 95%CI: 1.10-1.25), respectively. Male gender (OR: 1.83; 95%CI: 1.08-3.03) was a predictive factor for abnormal serum cholesterol. **Conclusions:** The health status of HCWs is not good enough in Iran. They did not have an appropriate lifestyle. They were exposed to different occupational hazards. The prevalence of chronic diseases was notable. Overweight, obesity, and inactivity were the most important causes of metabolic diseases.

Keywords: *Health personnel, health promotion, health status*

Razieh Sadat Mousavi-Roknabadi, Mina Danaei[1], Mehrdad Askarian[2]

Department of Community Medicine, Student Research Committee, Shiraz University of Medical Sciences, Shiraz, IR, [1]Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, [2]Department of Community Medicine, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran, Health Behavior Science Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Introduction

According to the definition provided by the World Health Organization (WHO), health is not just limited to a lack of disease but also involves proper physical, psychological, and social status.[1] There is a reciprocal relationship between health and occupation. Poor health conditions can increase the risk of occupational problems and reduces an organization's productivity. Moreover, occupational problems can lead to workers' physical and mental disorders. The human workforce providing healthcare plays a significant role in society's health. One of the strategies to improve the quality of services is to maintain and improve health in this population.[2]

Health promotion, established in the Ottawa Charter in 1986, was defined as: "the process of enabling people to increase control over, and to improve, their health". Hospitals play a fundamental role in health promotion, disease prevention, and the provision of rehabilitation services. The Health Promotion in Hospitals (HPH) program, developed and designed by WHO, includes five standards, one of which is promoting a healthy workplace to have a healthy staff. Furthermore, the organization needs to create and implement necessary policies to provide a healthy and safe environment that can ensure the staff's occupational health.[3]

Various studies from all around the world have focused on the health status of healthcare workers (HCWs).[4-8] For example, Hadi and Barazandeh evaluated the nurses' lifestyle in Iran, and they found that 60.3% of them had moderate physical activity, 62% had got poor grades in disease prevention activities, and 96.3% did not smoke.[5] Jonsdottir *et al.* evaluated the participation of HCWs in the lifestyle promotion program. They found that only 21% of them participated, especially those who were sedentary before this program.[6]

Address for correspondence:
Prof. Mehrdad Askarian, Department of Community Medicine, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran; Health Behavior Science Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. E-mail: askariam@sums.ac.ir

How to cite this article: Mousavi-Roknabadi RS, Danaei M, Askarian M. Unhealthy lifestyle predisposed Shiraz healthcare workers to metabolic diseases. Int J Prev Med 2021;12:175.

HCWs are a more knowledgeable group comparing to the society as a whole and are considered as role models for other individuals in the community.[8] due to the importance of HCWs' health status and the increasing usage of the HPH program in hospitals worldwide, the Namazee hospital of Shiraz has been able to acquire the certificate for this program. In line with this program, we decided to evaluate the health status and lifestyles of employees at this center, be able to use the results to develop and design respective interventions aimed at the control and prevention of changeable risk factors in high-risk groups.

Methods

Study design and participants

This cross-sectional study was conducted between September 2014 and December 2016, in Shiraz, Iran. Nemazee hospital is the largest university-affiliated health-promoting hospital in southern Iran. The target population of this project was a total of 2400 staff of the hospital who had been worked in any clinical, non-clinical (managing and administrative division) and services fields. Among all staff, who were referred to the Prevention and Health Promotion Clinic of the hospital were recruited to the study, using the census method. Staff who signed written informed consent were included in the study and their medical files were completed.

Study protocol

The participants' health status was assessed by all Community Medicine residents of Shiraz University of Medical Sciences under the supervision of the head of the clinic who is the Professor of Community Medicine [MA]. The data collecting form, which was designed according to updated evidence-based databases was used, which included: demographic information, occupational hazard exposure, physical activity status, vaccination status, history of experimental smoking, complete physical examinations, as well as laboratory and para clinic tests. All residents were trained equally, and they used similar equipment during participants' examinations, as well as considering medical principles. Each visit lasted 20-45 minutes. After the risk assessments and necessary physical examinations, the laboratory and para clinic tests were requested, according to each participants' conditions and risk factors. All the participants were referred to a specific laboratory to perform biochemical and cellular tests.

Definitions

According to WHO, body mass index (BMI) is defined as the weight in kilograms divided by the square of the height in meters (kg/m2). The classification is underweight (BMI < 18.5), normal (18.5–24.99), overweight (25–30), obesity class I (30–34.99), obesity class II ($35 \leq$ BMI < 40), and obesity class III (BMI $\geq$ 40).[9]

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured using a mercury sphygmomanometer after taking a history (about 20 minutes after arrival). Abnormal blood pressure was defined as blood pressure $\geq$ 120/80 mmHg.[10]

According to American Diabetes Association (ADA), impaired glucose tolerance was considered as high fasting plasma glucose (FPG) $\geq$100, and diabetes mellitus was considered as FPG $\geq$ 126. Abnormal serum cholesterol was defined as total cholesterol $\geq$ 200 mg/dl.[11]

Appropriate physical activity was defined as having moderate physical activity at least 30 minutes per day or 150 minutes per week,[12] so we asked the participants that if they had this amount of activity or not.

Eligibility for colonoscopy, occult blood test, mammography, and Pap smear test was considered according to Iran's Package of Essential Non-communicable (PEN) disease.[13] Also, occupational exposures such as physical, chemical, biological, ergonomic, and psychological were defined for the participants and asked them to answer if they had these exposures or not.

Statistical analysis

Using the SPSS IBM statistics software (IBM Corp., New York, USA) for Windows version 22.0, data were analyzed. Results are presented as mean ± standard deviation (SD) for continues variables and summarized in number (percentage) for categorical ones. Univariate (crude odds ratio) and multivariate (adjusted odds ratio) logistic regression tests (Forward: conditional) were used for determining the predictive factors. Two-sided *P* value < 0.05 with confidence interval (CI) of 95% were considered as statistically significant.

Results

Totally, 963 staff were enrolled, that 618 (64.4%) were women, with mean ± SD age of 35.51 ± 8.9 years. All 61.2% were married, and most of them had Bachelor's degree (61.1%). All 62.4% had inadequate physical activity, 5.1% had experimental cigarette smoking, and 2.3% experimented the waterpipe smoking. Moreover, 75.5% and 80.8% of them had positive history of diphtheria-tetanus (Td) and hepatitis B virus (HBV) vaccination [Table 1].

As was shown in Table 2, 763 (88.0%) and 673 (77.4%) of the participants had history of ergonomic and psychological exposures. Also, 307 (33%) and 73 (7.8%) suffered from overweight and obesity. Abnormal blood pressure was found in 144 (17.2%). Moreover, impaired glucose tolerance, diabetes mellitus, and abnormal serum cholesterol were seen in 124 (13.6%), 17 (1.9%), and 269 (29.9%), respectively.

Totally, 612 (63.5%) used the recommended personal protective equipment (PPE) in their workplace. But only

2 (2.5%) and 32 (41.0%) from 78 eligible participants did the colonoscopy and stool occult blood as colorectal cancer screening tests. From 618 eligible women for clinical breast examination and breast self-exam, only 238 (38.5%) and 232 (37.5%) performed these tests. 35/161 (21.7%) and 75/317 (23.3%) did mammography and Pap smear [Table 3].

Table 4 summarizes the results of simple and multiple logistic regression analysis. Considering the results of multiple logistic regression analysis, every one-year increase in age, the odds of having abnormal blood pressure and abnormal serum cholesterol increased by 1.08 (95%CI: 1.05, 1.12) and 1.07 (95%CI: 1.04, 1.10), respectively. BMI was a predictive factor for abnormal blood pressure (OR: 1.12; 95%CI: 1.02, 1.22), impaired glucose tolerance (OR: 1.08; 95%CI: 1.01, 1.16), and abnormal serum cholesterol (OR: 1.17; 95%CI: 1.10, 1.25), respectively. Inactive participants were 1.84 times more likely (95%CI: 1.01, 3.34) to have impaired glucose tolerance than active ones. Male gender (OR: 1.83; 95%CI: 1.08, 3.03) was a predictive factor for abnormal serum cholesterol. On the other hand, having under the diploma level of education was a protective factor (OR: 0.44; 95%CI: 0.26, 0.78).

Discussion

Findings of this survey indicated that 62.4% of the participants had inadequate physical activity. Nearly, 33% and 7.8% of the employee had overweight and obesity, and 5.1% had experimental cigarette smoking. Results from another study in Sweden showed that out of the 3185 HCWs, 15% had sedentary behavior.[6] The prevalence of appropriate physical activity of nurses working at university hospitals in Shiraz was reported as 60.3% in another study. Also, about 67% of the nurses had normal BMI, and 3.7% expressed that they were smokers.[5] Results of another study showed that 59% of the Swedish HCWs had normal BMI.[6] Alzeidan *et al.* reported that more than 75% of the Saudi staff were either overweight or obese.[4] The results of a meta-analysis estimated the prevalence of tobacco use among HCWs as 21%.[14] HCWs are role models for patients. They should have good health to have the ability to provide perfect health services. HCWs lifestyle was not appropriate in this study. Conducting innovative educational programs for HCWs is an essential step to improve current situations.

Table 1: Demographic, medical history, and lifestyle characteristics of participants

Variable	Frequency	Percent
Demographic variables		
Gender		
Woman	618	64.4
Man	345	35.6
Education status		
≤ High school diploma	147	32.2
Bachelor's degree	280	61.4
> Bachelor's degree	29	6.4
Marital status		
Single	372	38.8
Married	586	61.2
Vaccination history		
Diphtheria-tetanus (Td)	632	75.5
MMR	267	37.1
HBV	664	80.8
Influenza	193	24.5
Unhealthy Lifestyle		
Inadequate physical activity	597	62.4
Experimental Cigarette smoking	49	5.1
Experimental Waterpipe smoking	20	2.3

HBV=Hepatitis B virus, MMR=Measles, Mumps, and Rubella

Table 2: Occupational history of hazardous exposures and abnormal physical exam or para-clinic findings in participants

Variables	Yes		No	
	Frequency	Percent	Frequency	Percent
Occupational exposure history				
Physical	582	66.8	289	33.2
Chemical	447	51.4	422	48.6
Biological	580	67.0	286	33.0
Ergonomic	763	88.0	104	12.0
Psychological	673	77.4	197	22.6
Abnormal physical exam findings				
Overweight	307	33	623	67
Obesity	73	7.8	857	92.2
Abnormal blood pressure	144	17.2	695	82.8
Abnormal para-clinic findings				
Impaired glucose tolerance	124	13.6	788	86.4
Diabetes mellitus	17	1.9	895	98.1
Abnormal serum cholesterol	269	29.9	632	70.1
Anemia	153	16.1	800	83.9
Abnormal urine analysis	203	32.5	422	67.5

Table 3: Frequency of adherence to recommended screening and protective methods in participants

Adherence to Recommended methods	Eligible person Number	Adherence Frequency	Percent
Using recommended PPE in workplace	963	612	63. 5
Colorectal cancer screening			
Colonoscopy	78	2	2. 5
Stool occult blood	78	32	41.0
breast cancer screening			
Clinical breast exam	618	238	38. 5
Breast self-exam	618	232	37. 5
Mammography	161	35	21.7
Cervical cancer			
Pap smear	317	75	23.3

PPE=Personal protective equipment

Table 4: Prognostic factors of metabolic disorders in participants

Variables	Abnormal blood pressure		Impaired glucose tolerance		Abnormal serum cholesterol	
	OR (95%CI)					
	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
Age	1.09 (1.07,1.12)	1.08 (1.05,1.12)	1.05 (1.02,1.07)	-	1.08 (1.06,1.10)	1.07 (1.04,1.10)
BMI	1.17 (1.11,1.22)	1.12 (1.02,1.22)	1.11 (1.06,1.16)	1.08 (1.01,1.16)	1.19 (1.14,1.24)	1.17) 1.10, 1.25)
Gender				1		
Man	2.14) 1.49,3.07)	-	1.43 (0.97, 2.11)	-	1.44) 1.07, 1.93)	1.83) 1.08, 3.03)
Woman	1	-	1	-	1	1
Marital status						
Single	0.37 (0.24,0.57)	-	0.69 (0.46,1.04)	-	0.42 (0.30,0.58)	-
Married	1	-	1	-	1	-
Education status						
≤High school diploma	0.54 (0.29,0.97)	-	1.05 (0.59,1.85)	> Bachelor's degree -	0.87 (0.55,1.38)	0.44 (0.26,0.78)
≥ Bachelor's degree	1	-	1	-	1	1
Tobacco smoking						
Yes	1.32 (0.66, 2.65)	-	1.44 (0.72,2.86)	-	0.86 (0.48,1.53)	-
No	1	-	1	-	1	-
Inactivity						
Yes	1.35 (0.92, 1.98)	-	1.52 (1.01,2.30)	1.84 (1.01,3.34)	1.08 (0.81,1.46)	-
No	1	-	1	1	1	-

BMI=body mass index

We found that more than 75% of the participants performed Td and HBV vaccination. A study in 21 American states showed that 42.7% of the HCWs were vaccinated for Tdap, and this rate was higher among the physicians and nurses.[15] Results from a systematic review and meta-analysis revealed that about two-thirds of Iranian physicians and nurses are fully covered for HBV vaccination.[16] Also, it was showed that HBV vaccination coverage is lower in Iranian HCWs comparing to European countries.[17] Since HCWs are considered a high-risk group, we need to design and implement a vaccination surveillance system in order to better manage and cover vaccination.

The HCWs at the hospital under study suffered from ergonomic and psychological problems, which seem to be related to occupational conditions. Heavy and dangerous physical activities in the workplace can lead to lost years of good health, chronic disease, and reduction of quality of life.[18] Various occupations exposed workers to different hazards. HCWs are among high-risk groups for these hazards.[19] It would be helpful to design and implement a hazard surveillance system that includes needle stick injuries and biological exposures, as well as other chemical, ergonomic, and psychological exposures.

The prevalence of abnormal blood pressure, impaired glucose tolerance, diabetes mellitus, and abnormal serum cholesterol were 17.2%, 13.6%, 1.9%, and 29.9%, respectively. One study among HCWs in India estimated the prevalence of hypertension as 29.4% among doctors and 13.7% among nurses. Nearly 25.4% of doctors and 5.6% of nurses had diabetes mellitus.[20] One study in Tehran, Iran, estimated the frequency of metabolic syndrome in HCWs as 22.4%.[21] Another study in Ghana

estimated the prevalence of hypertension, and dyslipidemia as 16.07%, and 26.79% among HCWs, respectively.[22] Metabolic disorders are strong risk factors for premature deaths. Implementing effective screening programs for early diagnosis and treatment of these diseases in HCWs is very important for their health protection.

It was found that only 38.5% and 37.5% of eligible women performed clinical breast examination and breast self-exam, respectively, and 23.3% did mammography. The incidence rate and the consequent mortality of breast cancer are increasing in Iran; however, less than one-fifths of the patients are identified in the primary stages.[23] Mammography rates depend on various factors, including access to facilities, social influences, occupational conditions, self-efficacy and beliefs.[24] It was revealed in an American study that female HCWs are getting less mammograms than the general population; that study reported a frequency of 79%,[8] which was higher than our results.

On the other hand, 23.3% of the women employee in the current study, performed the Pap smear test. Similar to the current study, Hadi and Barazandeh's reported that only 26.3% of the qualified nurses had done a Pap smear test and 40.1% had never gotten this test before.[5] It was reported in a systematic review that <45% of the qualified women in Iran are getting Pap smear test.[25] This test had a rate of 82% amongst HCWs in the US, which is higher than the general population.[8] As an increasing prevalence of cervical cancer amongst Iranian women and the female staff in the current study do not have a favorable condition in doing this test; it is recommended to employ educational programs, vaccination and especially screening to prevent this disease.[26]

In the present study, only 2.5% and 41.0% of eligible participants did the colonoscopy and stool occult blood as colorectal cancer screening tests; however, the frequency of colonoscopy was reported as 64% amongst HCWs in the US.[8] In addition to further studies aimed at finding the causes of this issue and efforts to improve the attitude of them in this regard, it is also necessary to implement more serious cancer screening programs for this group.

Considering social determinants of health; factors including aging, obesity, inactivity, low educational level are predictive factors for metabolic disorders in HCWs, in this study. Similar to the results of this study other studies emphasized the etiologic role of aging, inactivity and obesity on metabolic diseases.[27,28] To have healthy HCWs it needs to provide essential services for promoting their lifestyle. Workplace healthy nutrition programs and workplace physical activity programs should be conducted in hospitals.

Limitation and suggestions

Despite all efforts, we were faced with a lot of limitations in this survey. Certain information was based on our participants' disclosure, such as cigarette and water-pipe smoking, and they might have provided false answers, since they could have been afraid of retribution, being wrongfully judged or losing their jobs. Moreover, we wanted to refer all participants to a specific laboratory, but some of them refused; so, there were certain differences in laboratory kits and normal ranges. Also, despite all problems with insurances and payments, some of them refused to do the required tests. Moreover, the hospital staff were periodically transferred to different departments every few months, which made it difficult to accurately schedule the visit program.

The following suggestions are made to improve this program:
1. Designing a HCWs' health status web-based software to record the data, with the ability to analysis in accordance
2. Raising the awareness of senior administrators regarding the importance of HPH program and encouraging the staff to refer this clinic
3. Evaluating the knowledge and attitudes of the staff toward screening programs, designing relative educational programs and announcement them.

Conclusions

The results of this study showed that the health status of HCWs is not good enough in Iran. They did not have an appropriate lifestyle. They were exposed to different occupational hazards. The prevalence of chronic diseases was notable. Overweight, obesity, and inactivity were the most important causes of metabolic diseases. Designing and implementing workplace healthy lifestyle interventions could promote the current situation.

Ethical statements

The study was approved by Shiraz University of Medical Sciences ethics committee (IR.sums.med.rec. 1398.539).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Acknowledgements

on performing this survey. Also, we thank the Research Consultant Center (RCC) at Shiraz University of Medical Sciences for statistical consults, and editing this manuscript.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. Constitution of WHO: Principles. 2006. [Internet] Available from: http://www.who.int/about/mission/en/. [Last accessed on 2020 Jul].

2. Kamali Dehkordi F, Maghsoudi S, Emami Sigaroudi A, Kazemnejad Leili E. Study of Predictive factors of public health based on job satisfaction in employees of Rasht city Health Service Centers. J Holistic Nurs Midwifery 2015;25:110-7.

3. World Health Organization. Standards for health promotion in hospitals. [Internet] Available from: http://www.euro.who.int/__data/assets/pdf_file/0006/99762/e82490.pdf. [Last accessed on 2020 Jul].

4. Alzeidan R, Rabiee F, Mandil A, Hersi A, Fayed A. Non-communicable disease risk factors among employees and their families of a Saudi University: An epidemiological study. PLoS One 2016;11:e0165036. doi: 10.1371/journal.pone. 0165036.

5. Hadi N, Barazandeh F. Lifestyle of nurses working in Shiraz University hospitals. Hayat 2007;13:43-53.

6. Jonsdottir IH, Börjesson M, Ahlborg G Jr. Healthcare workers' participation in a healthy-lifestyle-promotion project in western Sweden. BMC Public Health 2011;11:448. doi: 10.1186/1471-2458-11-448.

7. Mion D Jr, Pierin AM, Bambirra AP, Assunção JH, Monteiro JM, Chinen RY, *et al*. Hypertension in employees of a University General Hospital. Rev Hosp Clin Fac Med Sao Paulo 2004;59:329-36.

8. Helfand BK, Mukamal KJ. Healthcare and lifestyle practices of healthcare workers: Do healthcare workers practice what they preach? JAMA Intern Med 2013;173:242-4.

9. World Health Organization. BMI classification. [Internet] Available from: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html. [Last accessed on 2020 Jul].

10. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, *et al*. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: The JNC 7 report. JAMA 2003;289:2560-71.

11. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2014;37(Suppl 1):S81-90.

12. World Health Organization. Physical activity. [Internet] Available from: https://www.who.int/news-room/fact-sheets/detail/physical-activity. [Last accessed on 2020 Jul].

13. Kusha A, Najmi M, Mahdavi Hazaveh A, Mogheci A, Ghanbari Motlagh A, Yarahmadi SH, *et al*. Package of Essential Noncommunicable Diseases in Iran's Primary Health Care System "Irapen". 1st ed. Tehran: Mojasameh Publisher; 2017. p. 1-6.

14. Nilan K, McKeever TM, McNeill A, Raw M, Murray RL. Prevalence of tobacco use in healthcare workers: A systematic review and meta-analysis. PLoS One 2019;14:e0220168. doi: 10.1371/journal.pone. 0220168.

15. O'Halloran AC, Lu PJ, Meyer SA, Williams WW, Schumacher PK, Sussell AL, *et al*. Tdap vaccination among healthcare personnel-21 states, 2013. Am J Prev Med 2018;54:119-23.

16. Azami M, Borji M, Ghanbari F, Nikpay S, Sayehmiri K. Hepatitis B vaccination coverage of physicians and nurses in Iran: A systematic review and meta-analysis study. J Birjand Univ Med Sci 2015;22:304-15.

17. Sayehmiri K, Azami M, Nikpey S, Borji M, Sayehmiri F. Hepatitis B vaccination coverage in health personnel of Iran: A systematic review and meta-analysis study. Iran J Epidemiol 2015;11:1-10.

18. Platts LG, Head J, Stenholm S, Singh Chungkham H, Goldberg M, Zins M. Physical occupational exposures and health expectancies in a French occupational cohort. Occup Environ Med 2017;74:176-83.

19. Aluko OO, Adebayo AE, Adebisi TF, Ewegbemi MK, Abidoye AT, Popoola BF. Knowledge, attitudes and perceptions of occupational hazards and safety practices in Nigerian healthcare workers. BMC Res Notes 2016;9:71.

20. Hegde SK, Sathiyanarayanan S, Venkateshwaran S, Sasankh A, Ganeshkumar P, Balaji R. Prevalence of diabetes, hypertension and obesity among doctors and nurses in a medical college hospital in Tamil Nadu, India. World 2015;1:4.

21. Niazi E, Saraei M, Aminian O, Izadi N. Frequency of metabolic syndrome and its associated factors in health care workers. Diabetes Metab Syndr 2019;13:338-42.

22. Osei-Yeboah J, Kye-Amoah KK, Owiredu WK, Lokpo SY, Esson J, Bella Johnson B, *et al*. Cardiometabolic risk factors among healthcare workers: A cross-sectional study at the Sefwi-Wiawso Municipal Hospital, Ghana. BioMed Res Int 2018;2018. doi: 10.1155/2018/8904548.

23. Mahdavifar N, Pakzad R, Ghoncheh M, Pakzad I, Moudi A, Salehiniya H. Spatial analysis of breast cancer incidence in Iran. Asian Pac J Cancer Prev 2016;17:59-64.

24. Mousavi SM, Montazeri A, Mohagheghi MA, Jarrahi AM, Harirchi I, Najafi M, *et al*. Breast cancer in Iran: An epidemiological review. Breast J 2007;13:383-91.

25. Majidi A, Majidi S, Salimzadeh S, Khazaee- Pool M, Sadjadi A, Salimzadeh H, *et al*. Cancer screening awareness and practice in a middle income country; A systematic review from Iran. Asian Pac J Cancer Prev 2017;18:3187-94.

26. Khorasanizadeh F, Hassanloo J, Khaksar N, Mohammad Taheri S, Marzaban M, Rashidi BH, *et al*. Epidemiology of cervical cancer and human papilloma virus infection among Iranian women-analyses of national data and systematic review of the literature. Gynecol Oncol 2013;128:277-81.

27. Vigna L, Brunani A, Brugnera A, Grossi E, Compare A, Tirelli AS, *et al*. Determinants of metabolic syndrome in obese workers: Gender differences in perceived job-related stress and in psychological characteristics identified using artificial neural networks. Eat Weight Disord 2019;24:73-81.

28. Zhao Y, Yan H, Yang R, Li Q, Dang S, Wang Y. Prevalence and determinants of metabolic syndrome among adults in a rural area of Northwest China. PLoS One 2014;9:e91578.