ORIGINAL ARTICLE

Association between shift work and extended working hours with burnout and presenteeism among health care workers from Family Medicine Centres

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ABSTRACT

Aim To investigate the influence of irregular shifts on increased emotional, physical, and cognitive exhaustion and decreased working performance expressed by the phenomenon of presenteeism.

Methods The study sample of 405 healthcare workers from Family medicine centres completed questionnaires in two measurement time points, in 2014 (TP1) and repeated in 2019 (TP2), when 301 respondents remained in the study. Healthcare workers completed questionnaires assessing demographics, work schedules, job burnout, and presenteeism.

Results Repeated long-term exposure to rotating day-evening shifts was a significant risk for increased presenteeism (OR=1.689, 95%CI 1.042-2.739; p=0.001) and burnout (OR=1.705, 95%CI 1.237-2.352; p=0.001). Extended working hours are a predictor of presenteeism (OR=1.989, 95%CI 1.042-2.739; p=0.008).

Conclusion The adverse effects of rotating day-evening shifts on burnout and presenteeism among healthcare workers in a family medicine centre was little researched, particularly the issue of managing the risks of exposure to rotating day-evening shifts and extended working hours. This study reflects a situation of uncertainty, in which the logic of precaution is imposed on mental health, and keeps working engagements in health care workers. Appropriate management of shift work and better organization of work schedules in the primary healthcare sector protects the well-being of healthcare workers and patients, efficient work, and quality of health care, and invites for future research on better working schedules and introducing preventive interventions with available flexibility of working times.

Key words: emotional, physical and cognitive exhaustion, irregular working shift, primary healthcare workers

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INTRODUCTION

New work arrangements and non-standard work schedules (NSWS) can be associated with psychosocial pressures, presenteeism, health, work performance, and safety culture risk factors at a workplace (1). Poor work organization characteristics and insufficient workers were associated with adverse effects of irregular work schedules on health and work performance (2). Research on this association has primarily focused on physiological mechanisms generated by circadian disruption of sleep rhythm and insufficient sleep (3). Findings of a study by Winkler et al. suggest that workers with non-standard work schedules experience an increased risk for behaviour change and health (4). That inconsiderable difference in risks exists between the types of non-standard shifts. Employees exposed to night work are at increased risk of sleep disorders (5).

Non-standard working schedules are common in the European Union. Work involving extended hours or abnormal night-day schedules has existed for centuries. Burnout is high among healthcare workers and correlates with presenteeism scores (6). Today, about one in five workers in Europe perform work according to shift work involving night work, and over one in 20 work extended hours. Shift systems include 6–12 hours of teamwork alternating on two, three, or four shifts in any 24 hours. According to Eurostat, it was estimated that in 2015, about twenty-seven percent of all employed persons usually worked on Saturdays, fifteen percent usually worked on Sundays, and sixteen percent regularly worked in the evening (7).

The so-called non-standard working hours associated with shift work also exist independently from it and include long, irregular, and unpredictable working hours: working for more than 40 hours during the week, working in the evenings, at night, and weekends, and on-call work or standby duties (8). Shift work has become increasingly common due to recent changes in the workplace and public service activity trends. Overtime is a form of extended daily or weekly work (9).

A large majority of workers involved in rotating shift work are subjected to continuous stress to adjust as quickly as possible to the variable working times, which are partially and invariably frustrated by the continuous changeovers, whereas permanent night workers may adjust almost completely, provided that they continue to maintain their inverted sleep/wake cycle also on their days off duty (10). The negative outcome of exposure to shift work and tolerance to that exposure is a complex appearance, related to several aspects concerning different domains, personal characteristics and coping strategies, family and social conditions, and working situations (9). Shift work, which can involve day, night, and long duration shifts and long working during weeks, rotating, fixed, and irregular shift schedules, are a great source of burnout and presenteeism (11). The harmonized definition of occupational burnout from a study in 29 countries may help resolve burnout as depression overlaps (12).

Extended working hours produce adverse reactions such as increased stress, fatigue, sleeping disorders, irregular diet, and lack of exercise (13). Shift work in healthcare is associated with work-related stress and occupational burnout (14). Shift schedules may affect social and family life, depending on a degree of social desynchronization they initiated. Studies have found an association between overtime and extended work schedules with an increased risk of stress, decreased job satisfaction, fatigue, depression, musculoskeletal pain, and general health complaints (15).

Physicians often report that the working time coincides with the family-founding life stage leading to the work-family conflict. Very little research has addressed the relationship between non-standard work schedules and burnout, presenteeism, and their consequences among healthcare workers in family medicine departments in public health institutions (16).

This study aimed to assess the association between irregular working schedules with extended working hours and burnout and presenteeism among healthcare workers from family medicine centres at two points in time, in 2014 and 2019.

METHODS

Participants and study design

A longitudinal study was conducted and encompassed healthcare workers of two-family medicine centres in Tuzla (1169 inhabitants per one family doctor) and Zenica (1427 inhabitants per one family doctor) in Bosnia and Herzego-

vina (B&H) over two time periods, time point 1 (TP1), 2014 and time point 2 (TP2), 2019 year. The total sample of the study in 2014 (time point 1) included 405 out of 480 (76%) healthcare workers of family medicine centres, and the response rate (RR) was 84%. A total of 301 out of 480 of the same respondents in 2019 consented to participate - RR was 63%. Two respondents did not complete all the response questions of the questionnaire. Therefore, a total of 405 respondents (TP1) participated in the analysis. Of those, 305 (74%, TP2) healthcare workers in family medicine completed the Time 2 questionnaire.

Non- standardized working schedules. Health standardized working hours mean a working day with hours left for recreation and rest, 8-hours daily work from 7.00 and 15.00 o'clock (the first schedule) and unstandardized is the second schedule of working hours with two variants: from 11.00 and 19.00 o'clock and the schedule from 13.00 and 21.00 o'clock. Sixty-two percent of cases in family medicine centres work from 8 to 12 hours of alternating two shifts in three variants in any 24-hour rotation every week. They work on holidays, Saturdays, and Sundays, too. Extended working hours represented exposure to long working hours, more than 40 per week among 552 (78%) of our respondents, and night shifts among 77 (11%) (7).

Respondents' survey information contained basic information about the research, purpose, procedure, confidentiality, rights, and voluntariness. The subjects left the envelopes in unmarked boxes in the nursing room and handed the boxes to a researcher. The participation of all respondents was voluntary and anonymous throughout the collection of study data, in the part of questionnaire surveys.

Data were collected from anonymous and voluntary participation and with a written informed consent of each participant in the study. This study received written approval from the Ethics Committee of the Health Centre in Tuzla and the Ethics Committee of the Health Centre in Zenica, as well as from the authorized managers of both Health Centres for conducting research in those institutions.

Methods

Measures. The respondents completed questionnaires assessing demographics, work schedules, job burnout, and presenteeism. Following demographic characteristics, non-standard work schedules and their outcomes were measured: age in five age subgroups (20-30, 31-40, 41-50, 51-60, and +61 years); gender in two (male and female); data about education-level and marital status; working history data; length of working service (in five subgroups: below 5, 6-15, 16-25, 26-30, and over 31 years); and occupation in a family medicine team (medical doctor or nurse); type of working schedules (the standard eight-hour working day from 7-15 hours, shift work with night work, day-evening shift without night work, extended working hours (very similar characteristics at the research site).

Self-assessment questionnaire for detection of burnout (exhaustion). The questionnaire for determining job burnout, and emotional or/ and physical exhaustion, is based on knowledge of the main four overload factors - chronic lack of time, excessive responsibility, support, and excessive expectations of yourself and your environment (17). The questionnaire consisted of ten questions by one of the answers offered, which scored: almost always - 4 points; often - 3 points; rarely - 2 points; and seldom - 1 point. The maximum score was 40, and internal consistency was satisfactory, with Cronbach's alpha for the first and second measures being 0.8.

Stanford Presenteeism Scale (SPS-6). The Stanford Presenteeism Scale (SPS-6) was used to examine presenteeism through 6 statements. The SPS-6 questionnaire was developed by Koopman et al. (18), and measures the perception of the ability to overcome physical and/or psychological problems and having enough energy to finish them. The score range was from 6 to 30. The result indicates the presence or absence of presenteeism in the subjects. Presenteeism was determined by the interquartile set in the lower quartile 18 and below. The limit for determining presenteeism was 18 (18,19). The internal consistency was satisfactory (Cronbach's alpha over 0.70), test-retest reliability (ICC over 0.4), and construct validity - convergent achieved.

Statistical analysis

The descriptive data were means, standard deviations (SD), or relative numbers and percentages for categorical data. Kolmogorov-Smirnov test assessed data distribution according to

the perceived results. To determine differences between the participants of each shift and long working hours, Spearman's correlation test and Fisher's exact test were used. The mean differences between paired observations for age, length of service, burnout, and presenteeism and two-time points T1 and T2 with the paired sample t-test were analysed. The presentation of burnout and presenteeism in two-time with Box and Whisker's plots (Figure 1 and Figure 2) was obtained. For analysis of correlation relationships between NSWSs scales and burnout and presenteeism at T1 and T2 were used. The dependent variables were burnout and presenteeism, which were dichotomized into not confirmed and yes confirmed. Multiple logistic regression analyses of independent variables (working schedules and hours: day-evening shift, extended working hours, night shift) predict the outcome variable (dependent variable) burnout and presenteeism, that is, the models began with one of three independent variables. The odds ratio (OR) with confidence intervals presented the results.

RESULTS

Sixty-two percent (n=434) work in a day-evening shift; 79% (n=552) among all respondents on extended working hours, including work on the weekend- days; and only 11% (n=77) of participants work rotating shifts with night work (in urgent service) (Table 1).

Health care workers who were on a day-evening schedule most often suffered burnout. The prevalence of presenteeism was 89.5% (n=563). Presenteeism was found more frequently among health care workers on the day shift, 397 (91.5%), and extended working hours, 503 (91.5%), than those who worked in the night shift, 8 (10.4%).

As expected, the age mean was higher in 2019 than the mean age in 2014, 44.17±10.54 and 42.11±9.01respectively (p=0.005). The mean values of burnout were higher after five years (but not statistically significant) 32.92±10.0 and 33.16±9.94), respectively (p=0.756). There were significant differences between paired observation scores in twice-time points of presenteeism, (p=0.043) (Figures 1 and 2).

Table 1. Sociodemographic and occupational health characteristics of health care workers in Family Medicine Centres according to exposure to irregular working schedule types (n=706)

Characteristics	No (%) in the group					
	Day evening shift (N=434)	**Non-day-evening shift** (N=272)	**Extended hours** (N=552)	**Non-extended hours** (N=154)	**Night work** (N=77)	**Non-work night** (N=629)
Age (years)						
20-30	50(11.6)	45 (16.5)	64 (11.6)	31 (20.1)	5 (6.4)	90 (14.3)
31-40	131(30.1)	84 (30.9)	169 (30.6)	46 (29.8)	24 (31.2)	191 (30.4)
41-50	130(29.9)	80 (29.4)	171 (31.0)	39 (25.3)	25 (32.5)	185 (29.4)
51-60	115(26.6)	60 (22.1)	139 (25.2)	36 (23.4)	21 (27.3)	154 (24.5)
>60	8 (1.8)	3 (1.1)	9 (1.6)	2 (1.3)	2 (2.6)	9 (1.4)
p	16.221	0.003	8.079	0.089	4.158	0.385
Gender						
Male	167(38.5)	83 (30.5)	216 (39.1)	34 (22.1)	30 (39.0)	220 (35.0)
Female	267(61.5)	189 (69.5)	336 (60.9)	120 (77.9)	47 (61.0)	409 (65.0)
p	4.637	0.035	15.309	0.001	0.476	0.528
Marital status						
Single	69 (15.9)	55 (20.2)	94 (17.0)	29 (18.8)	8 (10.4)	115 (18.3)
Married	365 (84.1)	17 (79.8)	458 (60.9)	125 (81.2)	69 (89.6)	514 (91.7)
p	3.475	0.176	0.542	0.736	3.115	0.211
Education level						
Secondary school	271(62.4)	174 (64.0)	442 (80.0)	47 (30.5)	46 (59.7)	399 (63.4)
High school	163(37.6)	98 (36.0)	110 (20.0)	107 (69.5)	31 (40.3)	230 (36.6)
p	16.221	0.003	14.532	0.001	2.683	0.612
Burnout						
Not found	250 (57.6)	190 (70.0)	337 (61.1)	103 (67.0)	44 (57.1)	396 (35.0)
Burnout	184 (42.4)	82 (30.0)	215 (38.9)	51 (33.0)	33 (42.9)	233 (37.0)
p	10.683	0.001	1.744	0.221	0.988	0.322
Presenteeism						
Not found	37 (8.5)	37 (13.6)	49 (8.9)	25 (16.2)	69(89.6)	563 (89.5)
Presenteeism	397 (91.5)	235 (86.4)	503 (91.1)	129 (83.8)	8 (10.4)	66 (10.5)
p	4.594	0.032	6.946	0.008	0.001	0.978

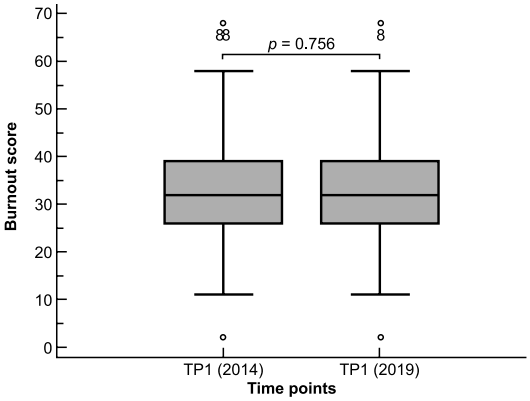

Figure 1. The box and Whisker's plots for burnout score compared between TP1 and TP2

Table 2. The relationship between paired observations by using paired samples t-test for burnout and presenteeism at two different times among healthcare workers in family medicine practice in the years 2014 and 2019*

Variables	Mean (SD) TP1 (N=405)	Mean (SD) TP2 (N=301)	df	95% CI	p
Age (years)	42.11 (9.01)	44.17 (10.54)	2.06	0.62-3.51	0.005
Length of service (years)	19.84 (10.39)	19.17 (11.00)	0.67	3.19-0.93	0.413
Burnout score	32.92 (10.01)	33.16 (9.94)	0.24	1.26-1.73	0.756
Presenteeism score	16.8 (4.73)	16.86 (3.94)	0.68	0.02-1.34	0.043

*Paired sample t-tests used to test differences (df) between two time points, and to test differences between two measurements expressed as mean and standard deviation (Mean± SD), differences (df), 95% Confidence interval (95%, CI), and p
TP1, time point 1 2014; TP2, time point 2 2019

The significant correlation coefficients between exposure to day-evening shift and burnout (rho= 0.123; p=0.001) and presenteeism (rho=0.081; p=0.032) were found (Table 3). Burnout correlated with a day-evening shift in time points 1 and 2 (2014 and 2019), too. No significant correlation between day-evening shift and presenteeism in time point 1 (2014) was found.

Burnout negatively correlated with extended working hours as in time point 2 (rho=-0.930; p=0.013, and rho=-0.113; p=0.022, respectively). There was a significant correlation between day-evening shifts and extended working hours, rho=0.329; p=0.001. There was a significant correlation between night shift work and extended working hours, rho=0.108; p=0.004, too.

The exposure to rotating day-evening shifts in family medicine practitioners develops a higher risk of presenteeism (OR=1.689, 95%CI, 1.042-2.739) and burnout (OR=1.705, 95% CI, 1.237-2.352). The exposure to extended working hours is associated with presenteeism (OR=1.989, 95% CI, 1.184-3.343) (Table 4).

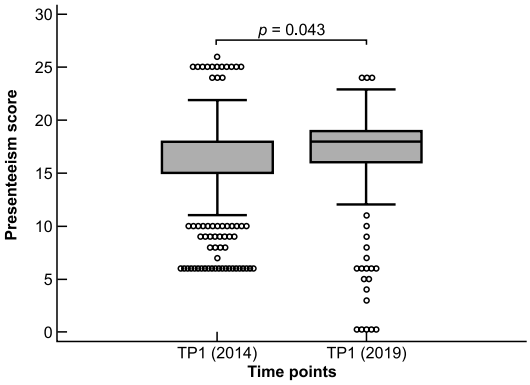

Figure 2. The box and Whisker's plots for presenteeism score compared between TP1 and TP2

Table 3. The correlative relationship between rotating day-evening shift, night shift, and extended working hours with burnout and presenteeism

Possible outcomes of exposure to NSWSs	NSWS: Day shift -evening shift Rho	p	Extended working hours Rho	p	Night shift work Rho	p
TP 1 (N=405)						
Burnout	0.119	0.039	-0.065	0.260	0.035	0.543
Presenteeism	-0.33	0.574	-0.001	0.992	0.444	0.451
TP2 (N=301)						
Burnout	0.120	0.016	-0.113	0.022	0.039	0.433
Presenteeism	0.123	0.013	-0.035	0.712	-0.021	0.673
Total						
Burnout	0.123	0.001	-0.930	0.013	0.037	0.321
Presenteeism	0.081	0.032	-0.026	0.496	0.001	0.978
Day-evening shift	1.0	-	0.329	0.001	0.025	0.509
Extended working hours	0.329	0.001	1.0	-	0.108	0.004
Night shift work	0.025	0.509	0.108	0.004	1.0	-

NSWS, non-standard work schedules; Rho, Spearman's rank correlation coefficient; TP1, time point 1 2014; TP2, time point 2 2019

Table 4. The association of a day-evening shift, a night shift and exposure to extended working hours with burnout and presenteeism among health care workers in Family Medicine Centres assessed by Odds Ratio (OR)

Various types of NSWSs	OR	95% CI	p
Day- evening shift			
Burnout	1.705	1.237-2.352	0.001
Presenteeism	1.689	1.042-2.739	0.032
Night Shift Work			
Burnout	1.275	0.789-2.059	0.320
Presenteeism	1.011	0.504 - 2.023	0.978
Extended Working Hours			
Burnout	1.288	0.884-1.878	0.064
Presenteeism	1.989	1.184-3.343	0.008

NSWS, non-standard work schedules; CI, Confidence Interval

DISCUSSION

This study examined how shift work schedules and extended working hours, burnout, and presenteei-

sm relates over time. The central assumption was that rotational day-evening shifts and extended working hours lead to presenteeism and burnout. The hypothesis is that burnout and presenteeism experience intensify in the long run. Family medicine health workers usually work more than 40 hours per week and work during the weekends in the rotational day-evening working shift, and nights when on-call. The frequency of burnout was higher in those exposed to the day-evening schedule than non-exposed healthcare workers working 8 hours in regular day shifts every day. These findings are consistent with other authors' results who studied the relationship between shift work and burnout among healthcare workers (19-21). There was a significant correlation between day-evening schedule and burnout in all exposed healthcare workers in both time points and between day-evening working hours and presenteeism among all exposed healthcare workers exposed in 2019. Furthermore, some authors report the opposite findings, a low level of burnout in rotating shift schedules (22).

Burnout among family medicine healthcare workers correlates with presenteeism scores. We found that the prevalence of presenteeism in our respondents is generally high, but it is statistically significantly higher in healthcare workers working on a day-evening shift schedule of 91.5%. There was a significant correlation between day-evening shift and burnout in all exposed healthcare workers in both time points and between day-evening working hours and presenteeism among all exposed and health care workers exposed in 2019. We did not find similar research to compare these results with ours.

Irregular shift schedules are a great source of burnout and presenteeism (19,21,22). The work process daily has more intensity than during the night (12,23,24,25). We found that the most common type of working schedule was fifty-eight percent of the rotating day-evening shift in 2014. This working schedule has an increasing trend of 66% in 2019 among our healthcare workers. Exposure to day-evening shift work causes a perception of a high level of work-related stress and is associated with an increased risk for long sleep, as the risk of burnout syndrome occurs independently of the exposure duration (23).

Exposure to long working hours and shift work is associated with presenteeism (26). Presenteeism is a process. Presenteeism is the employee's behaviour of physically attending work with reduced performance due to illness or other reasons (25,26). Exposure to extended working hours is predicted presenteeism among our healthcare workers in family medicine centers, too. In general, presenteeism can cause a loss of productivity and adverse health effects (6,27). Consequently, shift work can also be a risk factor for presenteeism. A Finnish study reported a relationship between presenteeism and shift work, but they did not find statistical significance. In this study, shift workers showed a bit higher experience rate of presenteeism than non-shift workers, and we were able to find a significant association in the adjusted model (28). Experience of presenteeism among family medicine staff was associated with long working in day-evening shifts. Presenteeism was found more frequently among health care workers on the day shift and extended working hours than those who worked on 8-hour regular schedule or night shift. Extended working hours were a significant risk factor of presenteeism in all exposed healthcare workers in family medicine centres. We were able to identify a statistically significant association between long working hours (>40) and presenteeism for 2019, but not for 2014.

Organizational determinants of shift work practices could be a tool for targeting research and workplace interventions (29). As working times become increasingly irregular and flexible, their associations with work-life balance, work satisfaction, mental health, and productivity are of growing interest (30-31). Working hours, schedule, and family time vary for each family physician related to specific practice arrangements (32). New ways of working define temporal and spatial flexibility, often combined with the extensive use of information and communication technologies and performance-based management (33). Flexible schedules could be an option as a strong defence against presenteeism (33-35).

There are two principal limitations in this study. First, the insufficient number of healthcare workers from Family Medicine Centres may affect the interpretation of the research results. The second is using repeated self-reported questionnaires in two-time points, such as social desirability bias. Besides, misclassification due to uncertainty of participants' memory similarly cannot be

excluded. This misclassification can cause attenuation of statistical associations.

The main strength and significance of this study is the longitudinal design. We had the opportunity to recognize and determine the direction of causality and any temporal relationship between burnout and presentism and shift work and overtime work.

It is confirmed in this study that presenteeism experience intensifies in the long run, but burnout does not. Extended working hours predicted presenteeism. This problem has been little researched and requires new studies to prevent burnout and presentism separately. Appropriate management of shift work and better organization of work schedules in family medicine with the introduction of an admissible level of work-flexibility protects well-being, efficient work, and quality of health care. This paper also identifies important areas for future research with the goal of developing better working schedules and introducing preventive interventions of finding appropriate harm risk minimization strategies for the well-being of healthcare workers and patients. Finally, results of this study will be beneficial to family medicine practitioners, primary healthcare managers, and particularly patients.

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TRANSPARENCY DECLARATION

Competing interests: none to declare.

REFERENCE

1. Howard J. Nonstandard work arrangements and worker health and safety. Are J Ind Med 2017; 60:1-10. Epub 2016 Oct 25
2. Ray TK, Kenigsberg TA, Pana-Cryan R. Employment arrangement, job stress, and health-related quality of life. Safe Sci 2017; 100(A):46-56.
3. Dixon J, Carey G, Strazdins L, Banwell C, Woodman D, Burgess J, Bittman M, Venn D, Sargent G. Contemporary contestations over working time: time for health to weigh. BMC Public Health 2014; 14:1068.
4. Winkler MR, Mason S, Laski MN, Christoph MJ, Newmark- Steiner D. Does non-standard work mean non-standard health? Exploring links between non-standard work schedules, health behavior, and well-being. SSM -Population Health 2018; 4:135-43.
5. Lee J, Hong Y, Lee W. Prevalence of insomnia in various industries and associated demographic factors in night-shift workers using workers' specific health examination data. Int J Environ Res Public Health 2021; 18:6902.
6. Nwosu ADG, Ossai E, Onwuasoigwe O, Ezeigweneme M, Okpamen J. Burnout and presenteeism among healthcare workers in Nigeria: Implications for patient care, occupational health and workforce productivity. J Public Health Res 2021; 10:1900.
7. Eurostat- European Statistic. Fifth European Working Condition Survey. Eurostat regional yearbook. Luxembourg (Luxembourg): Publications Office of the European Union, European Union, 2018. https://ec.europa.eu/eurostat/about/policies/copyright (22 April2018)
8. Costa G. Introduction to problems of shift work. In: Iskra- Golec I, Barnes- Farrell, Bohle P, eds. Social and Family Issues in Shift Work and Non-Standard Working Hours. Basel: Springer; 2016:19-35.
9. Wong IS, Dawson D, Van Dongen HPA. International consensus statements on non-standard working time arrangements and occupational health and safety. Ind Health 2019; 57:135–8.
10. Folkard S. Do permanent night workers show circadian adjustment? A review based on the endogenous melatonin rhythm. Chronobiol Int 2008; 25:215–24.
11. Skoufi GI, Lialios GA, Papakosta S, Constantinidis TC, Galanis P, Nena E. Shift work and quality of personal, professional, and family life among health care workers in a Rehabilitation Center in Greece. Indian J Occup Environ Med 2017; 21:115-20.
12. Guseva- Canu I, Marca SC, Dell'Oro F, Balázs Á, Bergamaschi E, Besse C, Bianchi R, Bislimovska J, Koscec Bjelajac A, Bugge M, Busneag CI, Çağlayan C, Cernițanu M, Costa Pereira C, Dernovšček Hafner N, Droz N, Eglite M, Godderis L, Gündel H, Hakanen JJ, Iordache RM, Khireddine-Medouni I, Kiran S, Larese-Filon F, Lazor-Blanchet C, Légeron P, Loney T, Majery N, Merisalu E, Sivesind Mehlum I, Michaud L, Mijakoski D, Minov J, Modenese A, Molan M, van der Molen H, Nena E, Nolimal D, Otelea M, Pletea E, Pranjic N, Rebergen D, Reste J, Schernhammer E, Wahlen A. Harmonized definition of occupational burnout: a systematic review, semantic analysis, and Delphi consensus in 29 countries. Scand J Work Environ Health 2021; 47:95-107.
13. Girma G, Moges T. Contributing factors to long working hours: a case study of waiters in Dire Dawa Administration. Beijing Law Review 2015; 6:165-89.
14. Wisetborisut A, Angkurawaranon C, Jiraporncharoen W, Uaphanthasath R, Wiwatanadate P. Shift work and burnout among health care workers. Occup Med (Lond) 2014; 64:279-86.

15. Ganesan S, Magee M, Stone JE, Mulhall MD, Collins A, Howard ME, Lockley SW, Rajaratnam SMW, Sletten TL. The impact of shift work on sleep, alertness and performance in healthcare workers. Sci Rep 2019; 9:4635.
16. Estryn- Behar M, Fry C, Guetarny K, Aune I, Machet G, Doppia MA, Lassaunière JM, Muster D, Pelloux P, Prudhomme Ch. Work week duration, work-family balance and differences encountered by female and male physicians: results from French SESMAT study. Work 2011; 40: S83-100.
17. Giardino DA, Everly GS, Dusek, D.E. Controlling Stress and Tension. 9th edition. Needham Heights: Allyn and Bacon, 1996.
18. Koopman C, Pelletier KR, Murray JF, Sharda CE, Berger ML, Turpin RS, Hackleman P, Gipson P, Holmes DM, Bendel T. Stanford presenteeism scale: health status and employee productivity. J Occup Environ Med 2002; 44:14-20.
19. Baldonedo- Mosteiro M, Sánchez-Zaballos M, Rodriguez- Diaz FJ, Herrero J, Mosteiro- Diaz MP. Adaptation and validation of the Stanford Presenteeism scale-6 in healthcare professionals. Int Nurs Rev 2020; 67:109-117.
20. Nien- Chih H, Jong- Dar C, Tsun-Jen C. The Associations between long working hours, physical inactivity, and Burnout. J Occup Environ Med Action 2016; 58:514-8.
21. Zhihui J, Xiaotong W, Xiaohui L, Yixiang L, Xuyang L, Guoqing L, Yuan Z. Working hours, job burnout, and subjective well-being of hospital administrators: an empirical study based on China's Tertiary Public Hospitals. Int J Environ Res Public Health 2021; 18:4359.
22. Ro- Thing Lin, Yu-Ting Lin, Ying-Fang Hsia, Chin-Cji Kuo. Long working hours and burnout in health care workers: non-linear Lindose- response relationship and the effect mediated by sleeping hours: A cross-sectional study. J Occup Health 2021; 63: e12228.
22. Shamali M, Shahriari M, Babaii A, Abbasinia M. Comparative study of job burnout among critical care nurses with fixed and rotating shift schedules. Nurse Midwifery Stud 2015; 4: e27766
23. Härmä M, Karhula K, Puttonen S, Ropponen A, Koskinen A, Ojajärvi A, Kivimäki M. Shift work with and without night work as a risk factor for fatigue and changes in sleep length: A cohort study with linkage to records on daily working hours. J Sleep Res. 28: e12658.
24. Peterson SA, Wolkow AP, Lockley SW, O, Brien CS, Qadri S, Sullivan JP, Czeisler CA, Rajaratnam SMW, Berger LK. Association between shift work characteristics, shift work schedules, sleep, and burnout in North American police officers: a cross-sectional study. BMJ Open. 2019; 9(11): e030302.
25. Sung-Hwan J, Jong-Han L, Shin-Goo P, Yong- Seok, H, Burn- Joon, L, So-Hyun M, Dal-Young J, Hwan-Cheol K. Association among working hours, occupational stress, and presenteeism among wage workers: results from the Second Korean Working Conditions Survey. Ann Occup Environ Med 2014; 26:6.
26. Rathore H, Shukla K, Singh S, Tiwari G. Shift work-problem and its impact on female nurses in Udaipur, Rajasthan India. Work 2012; 41: 4302-14.
27. Skagen K, Collins AM. The consequences of sickness presenteeism on health and wellbeing over time: a systematic review. Soc Sci Med 2016; 161:169-77.
28. Vásquez- Trespalacios EM, Palacio-Jaramillo V, Gómez- Parra M, Romero- Arrieta L. Shift work and work-related stress symptoms in health care workers in a tertiary hospital in Medellin, Colombia: a cross-sectional study. CES Psycologia 2016; 9:28-39.
29. Hall AL, Smit AN, Mistlberger RE, Landry GJ, Koehoorn M. Organizational characteristics associated with shift work practices and potential opportunities for intervention: findings from a Canadian study. Occup Environ Med 2016; 74:6-13.
30. Rainbow JG, Steege LM. Presenteeism in nursing: an evolutionary concept analysis. Nurs Outlook 2017; 65:615–23.
31. Sanderson K, Cocker F. Presenteeism: implications and health risks. Aust Fam Physician 2013; 26:172–5.
32. Wöhrmann AM, Dilchert N, Michel A. Working-time flexibility and work-life balance. Zeitschrift für Arbeitswissenshaft 2021; 75:74-85.
33. Mehase E. Flexible working and teamwork are needed to protect doctors' wellbeing, say leaders. BMJ 2021; 23: n535.
34. Hulsegge G, van Mechelen W, Proper K, Paagman H, Anema, JR. Shift work, and burnout and distress among 7798 blue-collar workers. Int Arch Occup Environ Health 2020; 93:955-63.
35. Silva-Costa A, Ferreira PCS, Griep RH, Rotenberg L. Association between presenteeism, psychosocial aspects of work and common mental disorders among nursing personnel. Int J Environ Res Public Health 2020; 17:6758.