

## ORIGINAL PAPER

doi: 10.5455/medarch.2020.74.210-215

MED ARCH. 2020 JUN; 74(3): 210-215

RECEIVED: APR 12, 2020 | ACCEPTED: MAA 22, 2020

Faculty of Nursing, National and Kapodistrian University of Athens, University of Athens, Greece

**Corresponding author:** Marianna Diomidous, MD, Msc, MPM, PhD, Associate Professor of Epidemiology, Public Health, Faculty of Nursing, National and Kapodistrian University of Athens. Tel.: +030)2107461438. E-mail: mdiomidi@nurs.uoa.gr. ORCID ID: <http://www.orcid.org/0000-0002-9023-8041>.

# Sleep and Motion Disorders of Physicians and Nurses Working in Hospitals Facing the Pandemic of COVID 19

Marianna Diomidous

## ABSTRACT

**Introduction:** Several research studies have started to investigate the health conditions of medical doctors and nurses in order to find a relationship if any between their work environment, their usually heavy duties and the result of these two parametric on patients' health  
**Aim:** The present research study is an effort to investigate the relationship between the physical activity and sleep disorders among health care professionals, particularly among medical doctors and nurses.  
**Methods:** Participants of the study were asked to fill a questionnaire which was a mixture of other internationally accredited questionnaires regarding physical activity level as well as sleeping functions. Data were collected among 204 physicians and nurses. The statistical analysis revealed a correlation between physical activity and some aspects of sleep disorders.  
**Results:** A total number of 204 questionnaires have been distributed to medical doctors and nurses working in public hospitals in Athens Greece from the middle of February until the middle of April 2020. The hospitals were assigned by the health authorities to the fight of the pandemic of COVID 19. The majority of the participants were women 71,3% and 28,7% were men. From a total of 204 half of them were medical doctors and half of them were nurses. 43% were married, 49% were single and 8% were divorced and there were no widows. Regarding the participant nurses, 43% had a university degree and 38,4% had a technological education degree. The results of the statistical analysis showed that there are positive correlations between the level of physical activity during the daily work and the free time of the participants with parameters that are related to sleep disorders.  
**Conclusion:** The sample of the study was not a large one but nevertheless a stressful situation such as is the epidemic of COVID19 can provide useful information in order to better understand the relationship between physical activity and sleeping disorders in such working conditions.

**Keywords:** physical activity, sleep, MD's nurses.

## 1. INTRODUCTION

Several research studies have started to investigate the health conditions of medical doctors and nurses in order to find a relationship if any between their work environment, their usually heavy duties and the result of these two parametric on patients' health (1). A research study undertaken in 2010 focusing on the attitudes of the medical doctors towards physical activity and the protection of their personal health in Estonia indicated that women physicians are far more prone to physical activity than their male colleagues. 92% of the participating women mentioned that they had at least an adequate physical activity during the week. The level of the physical activity was not related to age to BMI, to residence location or to the time they sleep sit or do paperwork. Additionally, the majority of the participants pointed out that physical activity is strictly related to their everyday duties. Five years later another study with the assumption that the habit of medical doctors to spent time for physical activity is related to their tendency to promote the usefulness of the physical activity to their patients. A study in India (2015) with 146 physicians investigating their participation in physical activities indicated that only 37.7% of the sample had a mediocre physical activity, meanwhile the 63.2% of the sample had none. Additionally the results of another research study in 300 health professionals (medical doctors and nurses) in Nigeria showed that the 79.2% of the participants were engaged in a low-level physical activity, the 9.7% in a mediocre level and finally only the 11.1% were engaged in an

© 2020 Marianna Diomidous

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

intense physical activity, a fact that indicates a high level of stress for health professionals.

Several other research studies are focusing on physical activity of physicians and nurses. In a recent study (2014) involving 40 Registered nurses and 31 nurses aids indicated that their physical activity level is matching the one proposed by WHO. But in the above-mentioned research there should be some bias due to the fact that nurses are not allowed to sit and relax for a long time during the performance of their everyday duties (1). Another parameter that seems to play an important role is the interchange of shifts in the nursing job. According to Peplonska B et al (2) the total job physical activity of nurses working in nightshifts is an intense one and this fact is inversely related to the adoption of physical activity during their free time (2). Related studies also indicated that nurses in Saudi Arabia feel the same way about physical activity. On the country in England 75% of nurses indicated that they are engaged in physical activity during their free time and half of them are undergoing a physical activity during their daily work (3).

Regarding the sleeping habits and the sleep disorders of health professionals they have been undertaken several studies regarding this subject around the world. In a research study held in Island in 2006 regarding a self-evaluation of sleep habits their have been encouraging results with no disturbance of the kirkadic rhythm of nurses (4). In contrast in another research study in Japan held in 2003 regarding the same subject (self- evaluation of sleep) there was a 26% of nurses who mentioned an intense feeling of drowsiness during the day. The same results were found in other countries like in Turkey (5) and in N. Taiwan (6). Similar research studies in Norway showed a positive relationship between the quick interchange of shifts and the occurrence of drowsiness, or the feeling of being sleepy and tired during the daily work (7) with the nurses who have worked at the night shift to have a higher sensation of drowsiness and fatigue (8). Nurses who were working with an interchange of two twelve – hour shifts seemed to have less sleep disturbances compared to the ones with 3 eight hours consecutive shifts (9, 10, 11) and to the ones who had a day shift. Regarding physicians a research study by Mota in 2013 in medical doctors (52 women and 20 men) undergoing specialty training revealed a high level of sleep disturbances and drowsiness during the day (12). In Hungary 125 medical doctors filled an accredited questionnaire regarding their sleeping quality in a study undertaken in 2015. The results showed that a 78% of them felt drowsiness during the day and a 70% had no sleep at all (13). In contrast, in France a research study among anesthesiologists, pointed out that there were differences in the occurrence of sleep disorders between physicians and the general population (14) in 2015.

As a matter of fact, sleep disorders among health professionals are common in several countries around the world with the principal manifestation being the one of daily drowsiness, while the major problem causing this feeling is the interchange of shifts.

## 2. AIM

In the present study, an attempt was made to investigate the sleep disorders.

## 3. MATERIAL AND METHODS

Total number of 204 questionnaires have been distributed to medical doctors and nurses working in public hospitals in Athens Greece from the middle of February until the middle of April 2020. The hospitals were assigned by the health authorities to the fight of the pandemic of COVID 19. The majority of the participants were women 71,3% and 28,7% were men.

The present research study used a combination of 3 different internationally tested questionnaires for the investigation of sleep disorders. These are the Jenkins sleep Scale, the Athens Insomnia Scale and the Sleep\_50 Questionnaire. For the investigation of the physical activity of physicians and nurses has been used the Physical Activity Questionnaire. The Jenkins sleep Scale is composed only of 4 questions focusing on several issues such as: the difficulty of getting asleep, the frequency of getting up during the night, the difficulty to remain in a sleepy condition and finally the experiencing of a feeling of intense fatigue or drowsiness even after a good night sleep. The participants had to respond by filling a scale from 0 to 5 (0 meaning no problem and 5 the maximum problem) the previous month. This is a good method to start the investigation of sleep disorders (15).

The second questionnaire (the Athens Insomnia Scale) is a psychometric method of self-evaluation for the quantification of sleep problems based on ICD-10 {International Classification of Diseases} is composed of 8 questions The first five are referring to the upcoming of sleep, to the times of remaining awake during the sleep , to the total duration of sleep and to the quality of sleep. The last 3 questions are referring to the wellbeing, to the participants working ability and to the presence of drowsiness during the day. This is a very valuable questionnaire (16). Finally, the Sleep-50-Questionnaire is comprised of 50 questions designed to investigate sleep disorders in the general population.

There are five subscales in the Questionnaire to investigate the sleep disorders and the diagnostic parameters of the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders). These symptoms are comprised of the experience of the loss of respiration during the sleep, the drowsiness, the narcolepsy, the syndrome of uneasy kicking feet, the alteration of the kirkadic rhythm of the sleep, the situation of walking asleep, the nightmare, the parameters that affect the sleep as well as the consequences of a low quality sleep to the completion of the daily duties of a person. The participants have to respond by using a scale from 0 to 4 (0 is no disturbance and 4 is a great deal of disturbances), referring to the above-mentioned facts occurred during the last month. Finally, the international Physical Activity Questionnaire for the investigation of the Physical activity of the physicians and nurses is a very valuable questionnaire composed for the first time in 1998. This questionnaire is suitable to be used in diverse populations speaking

different languages and having different code of ethics. The questionnaire is comprised of five different sections of interest (17).

#### 4. RESULTS

From the total of 204 participants in the study half of them were medical doctors and half of them were nurses. and 43% were married, 49% were single and 8% were divorced and there were no widows. Regarding the participant nurses, 43% had a university degree and 38,4% had a technological education degree.

The results regarding the physical activity of the participants were as follows: 5 days a week healthcare professionals were walking as part of their daily work and 166 on a daily basis, and approximately 3 days a week they were having an intense physical activity and 39 of them every single day. For their transportation they used public or private transportation for the time period of one hour and a half. Regarding walking for transportation, they mentioned approximately 2 hours per day or 28' per day. The use of a bicycle for transportation was not a preferred way of transportation for them. As far as walking for amusement during the free time of MD's and nurses this incident was not very popular. The participants mentioned that they were not walking more than half an hour per day. The majority of them mentioned that they were not engaged in an intense or mediocre physical activity more than one hour per day. Regarding the time that physicians and nurses had to be sited during the working- time is 40' per day, meanwhile the same time during the weekend amounted to 77' approximately.

##### Results for sleep disturbances

In a high percentage (52,6%) were not roaring. 37.1% mentioned a mediocre appearance of this symptom while in 3% of the sample appeared to be intense. Regarding the sweating during the night sleep 51% mentioned none, a little in 34,8% and only 1% mentioned a very intense sweating but the majority of the sample mentioned to have no problem with sweating

##### Sleep disorders

More than half of them (52,3%) mentioned that did not have any problem to get asleep; 3,7% reported to experience a mediocre difficulty to get asleep and only the 1,5% reported an intense problem to get asleep. The 54,8% mentioned that they get up several times during the night sleep, but they didn't have any problem to sleep afterwards. Only a 8,9% reported the fact that they were awoken more than 3 times during the night sleep. Regarding the hours of sleep 33,7% reported that the hours of sleeping were not enough, meanwhile the 24,1% mentioned to have an inadequate time of sleeping. The 19,6% reported to sleep 5 hours and the 14,1% only 3 hours. Regarding the sleeping hours during the night shift the 24,2% reported a four-hour sleeping time, meanwhile the 27,8% reported to sleep only 2-3 hours during night shifts. The majority of the sample reported that they didn't kick their feet during the night sleep (64,1%) and they didn't walk during the night sleep (93,4%), meanwhile 6,1% of the sample men-

tioned to walk during the night sleep. 55,3% mentioned not to have terrifying dreams and 43,8% reported to have sometimes such dreams but not very often. 56,9% mentioned to experience sorrow and 29,4% reported depression. The 41,9% mentioned to feel a little tired when they got up during the morning, the 8,2% to feel very tired, the 14,1% to feel exhausted and only the 7,1% didn't feel any tiredness. 23,2% of the participants didn't feel sleepy during the daily work, meanwhile the 43,4% felt a little sleepy with this percentage to get higher with consecutive night shifts. The 18,2% reported to experience dizziness during the day due to lack of sufficient sleep meanwhile the 9,6% of physicians and the 5,6% of the nurses mentioned that they were making a lot of effort to remain awake during the daily work. As a result a 27,3% of the physicians mentioned that they needed more physical energy during the day, meanwhile the 30,8% of the nurses needed a larger amount of energy and a 23,7% of both medical doctors and nurses needed a very high level of energy for accomplishing the daily work. Regarding their behavior the 35,4% reported that they had never being criticized for their behavior during the daily work, a 17,7% of the physicians reported that they have received some criticism regarding a misconduct in some cases, a 10,1% of nurses reported to have received some criticism quite often and a 3% of physicians mentioned to have received criticism for bad behavior at a 3%. 45,5% of the physicians reported that they had never experience a difficulty in accomplishing their daily work and a 46% of nurses mentioned also that this factor was never a major problem in accomplishing their daily work.

A 38,2% of the physicians reported to have a good night sleep or a mediocre quality of sleep (38,2% both physicians and nurses): In the question asking to validate the quality of sleep in numbers (in a scale of 1-10) the 1 being the worst kind and the 10 the best quality of sleep the majority of the answers were between 5 and 8 The average number of hours the medical doctors and nurses sleep are between 5-6 hours per night, with the majority of them reporting that the sleeping hours were between 12 at night and 5 am to 6 am in the morning.

##### Correlations between physical activity and sleep disorders

An important interrelationship is found between the intense physical activity during the daily work and the time the sample is sitting and relaxing during the weekends ( $\rho=0.194$ ;  $p=0.36$ ).

Meanwhile a negative correlation ( $\rho=-0.157$ ;  $p=0.047$ ) is found between the intense physical activity during the daily work and the sleep duration. The correlation indicates that an intense physical activity during the working time leads to a diminution of the duration of the sleep.

In particular it seemed that with the more intense physical activity there was a sensation of having less time to sleep both for physicians and nurses.

Additionally, based on the responses of the participants with an intense physical activity at work there was a major feeling of tiredness during the morning wake

		My sleep is short	Feeling of tiredness During wake-up in the morning	Preference of having more energy during the day	Bad quality of sleep
INTENSE PHYSICAL ACTIVITY AT WORK Days/week (mean rank)	None	57.04	57.14	72.19	65.86
	Mediocre	75.12	70.42	62.14	85.42
	Enough	71.04	85.76	91.84	96.16
	A lot	100.43	90.02	85.81	89.25
	Very-very long	93.92	102.37	97.47	-
Kruskal Wallis test		14.775; p=0.005	13.486; p=0.009	14.200; p=0.007	11.986; p=0.017

Table 1. Correlation with intense physical activity at work

-up as is presented in Table V. The same also positive correlation existed with the mediocre physical activity at work and the feeling of tiredness during the wake-up in the morning.

Another important point was the correlation between the hours of sleep and the time spent by the sample during their free time. A related positive correlation also exists between the mediocre physical activity during the free time and the hours of sleep. The results showed that when physical activity was intense or mediocre then the hours of sleep were going down.

The general notion between the participants regarding the perception of not sleeping well seemed to be positively correlated with the daily work and the free time. Meanwhile the time spend sitting or relaxing in their daily work or their free time was irrelevant regarding the quality of their sleep (Tables 1 and 2).

It is important also to mention that there was no correlation between the intense and the mediocre physical activity at work and the daily drowsiness and their effort to remain awake during the day. This parameter is not correlated either with the time medical doctors and nurses are spending sitting down and relaxing during the weekend or doing administrative work at the job. It is also important to notify that the intense physical activity of both physicians and nurses is positively correlated with their desire to have more energy during the day as is pinpointed in Table VII. This finding is also positively correlated with the duration of intense physical activity during the free time of the participants in the study as it is shown in Table VIII. It is also worthwhile to mention that there is no correlation with the time that the participants spent sitting during their daily work, or during the weekend.

The general evaluation of the sleep quality of medical doctors and nurses has been investigated with the following questions:

Give a number to evaluate your sleep quality between 1: "Very bad" and 10 "Excellent". The given responses seemed to be correlated positively with the time the participants spent for physical activity during their free time independently of the fact that this physical activity could be either intense or mediocre as it is shown in Table 4.

		My sleep is short	Preference of having more energy during the day	Bad quality of sleep
INTENSE PHYSICAL ACTIVITY DURING THE FREE TIME minutes / day (mean rank)	None	106.95	99.19	89.46
	Mediocre	85.22	89.85	75.69
	Enough	74.74	70.97	93.15
	A lot	82.92	78.69	77.45
	Very-very long	72.02	78.24	59.00
Kruskal Wallis test		14.032; p=0.007	15.153; p=0.004	10.679; p=0.030

Table 2. Correlation with intense physical activity during the free time

		Feeling of tiredness During wake-up in the morning
INTENSE PHYSICAL ACTIVITY DURING WAKE-UP IN THE MORNING (mean rank)	None	96.50
	Mediocre	86.36
	Enough	71.38
	A lot	74.23
	Very-very long	82.52
Kruskal Wallis test		10.223; p=0.037

Table 3. Correlation with intense physical activity during wake-up in the morning

		Sleep evaluation Medical doctors	Sleep evaluation Nurses
INTENSE PHYSICAL ACTIVITY DURING WAKE-UP IN THE MORNING (mean rank)	Very poor	68.00	61.50
	1	68.00	82.13
	2	79.58	72.17
	3	73.62	94.45
	4	84.58	78.18
	6	86.30	86.46
	7	73.55	67.01
	8	86.54	83.15
	Excellent	114.40	119.61
	Kruskal Wallis test	18.170; p=0.033	23.772; p=0.005

Table 4. Correlation with intense physical activity during free time and sleep evaluation

The sleep evaluation of the participant is correlated with a number of other parameters such as:  
 a: the quantity of sleep of both physicians and nurses  
 b: the difficulty of getting asleep  
 c: the wake-up times during the night sleep  
 d: the feeling of sorrow and depression they may feel

- e: the feeling of tiredness during their awake-up time
- f: the feeling of drowsiness during the day and their effort to remain awake
- g: the desire to have more energy during the day
- h: the difficulty of concentrating in their work
- i: the inner feeling of having a bad sleep

## 5. DISCUSSION

Based on the findings of the research is obvious that both nurses and medical doctors are having a very demanding job (18) which obliged them to be in a somehow continuous physical activity both intense or even mediocre. In contrast during their free time they seem not to be engaged in intense or even mediocre physical activity as it is found in other research studies (14, 15). The meantime they spent sitting or doing administrative work both during their daily work or during their free time was not different for medical doctors and nurses (4 to 4,5 hours a day). Referring to sleep problems like snoring or nocturnal sweating, or difficulty in getting sleep, to terrifying dream, to the feeling of sorrow or depression are not so important for the participants of the study and the majority of them mentioned that they didn't experience such symptoms. Additionally, the majority mentioned that they didn't kick off their feet during the night sleep. Additionally, the majority of the participants mentioned that they had only few sleeping hours and that felt somehow tired when they awake up during the morning. A high percentage of the participants reported that they felt drowsiness during the daily work and they made a great effort to remain awake and that they would like to have more energy during the day. Generally, they evaluated their sleeping time as good or mediocre. To the question of a numeric evaluation of the quality of their sleep with a scale of 1 (very poor) to excellent (10) the majority responded as mediocre with grades from 5 to 8. The sleep duration of nurses and physicians was between 5-6 hours per night from 12 o'clock at night till 5-6 in the morning.

Finally, from the correlation between physician activity and sleep disorders the following results were pointed out. The intense physical activity during the daily work had a positive correlation with the following parameters:

- the time they spent sitting and relaxing health professionals in one day during the week-end
- the feeling of having a poor sleep (short time of sleeping),
- the feeling of tiredness when they got awake during the morning,
- the desire to have more energy during the day,
- the general perception of having a poor quality of sleep.

As a result, the fact of an intense physical activity at work leads to a higher degree of the above-mentioned conditions. Additionally, the intense physical activity during the daily work is negatively correlated with the sleep duration the participants, meaning that an intense physical activity may lead to less sleeping hours, a fact that matches the intense physical activity with the above-mentioned conditions.

Another critical point to be mentioned is that a mediocre physical activity is positively correlated with the feeling of tiredness during the awake up time of the participants. As a result, as the duration of an intense physical activity is getting longer, the sleeping duration is getting shorter as well as the feeling of tiredness during the awake up time, the desire for more positive energy during the day and the general perception that the quality of the sleep is very poor. In contrast a mediocre physical activity during the daily work led only to a feeling of tiredness during the awake up time.

Regarding the physical activity held during the free time of the health professionals has been found that the intense physical activity is positively correlated with:

- the feeling of having a poor sleep,
- the feeling of tiredness during the awake up time,
- the desire for more energy during the day,
- the general perception of having a poor sleep,
- the evaluation of the sleeping time.

With the last condition was also positively correlated the mediocre physical activity during the free time, which also has a positive correlation with the feeling of having a poor sleep.

As a matter of fact, a longer intense physical activity during the free time, led to a poorer sleep, to a feeling of tiredness during the wake up time, to a desire of more energy during the daily work and to the general perception that a person has a poor sleep. Meanwhile a longer mediocre physical activity led to a higher notion of having a poor-quality sleep. Finally, both the intense and the mediocre physical activity during the free time of the participants was positively correlated with the sleep evaluation of the health professionals. This fact means that a longer intense physical activity during the free time leads to a better sleep evaluation. This as a condition which is in contrast with the correlation between the intense physical activity during the free time and the feeling of having a poor sleep quality. Finally, it is -advisable-to undertake-a study of a bigger sample to finalize the results.

## 6. CONCLUSION

The data was collected from a sample of 204 nurses and medical doctors working in public hospitals in Greece. For the completion of the study a questionnaire was used which was a merge of other validated international questionnaires which measure the level of physical activity and the sleep disorders. The results of the statistical analysis showed that there are positive correlations between the level of physical activity during the daily work and the free time of the participants with parameters that are related to sleep disorders. To have more validated results a bigger sample is needed, and a longer period of observation is required.

- **Author's contribution:** M.D. gives a substantial contribution to the conception and design of the work and to the acquisition of data, a substantial contribution to the analysis, interpretation of data and drafting the article and a substantial contribution to revising it critically for important intellectual content. Also, she gave final ap-

proval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

- **Conflicts of interest:** There are no conflicts of interest.
- **Financial support and sponsorship:** Nil.

## REFERENCES

1. Flannery K, Burket TL, Resnick B. Exercise habits of licensed nurses and nursing assistants: are they meeting national guidelines? *Geriatr Nurs*. 2014; 35(2 suppl): S17-20.
- 2.. Peplonska B, Bukowska A SW, Peplonska B, Bukowska A, Sobala W. Rotating night shift work and physical activity of nurses and midwives in the cross-sectional study in kódz, Poland. *Chronobiol Int*. 2014 Dec; 31(10): 1152-1159.
3. Bakhshi S, Sun F, Murrells T, While A. Nurses' health behaviours and physical activity-related health-promotion practices. *Br J Community Nurs*. 2015 Jun; 20(6): 289-296.
4. Sveinsdottir H. Self-assessed quality of sleep, occupational health, working environment, illness experience and job satisfaction of female nurses working different combination of shifts. *Scand J Caring Sci*. 2006 Jun; 20(2): 229-237.
5. Karagozoglou S, Bingol N. Sleep quality and job satisfaction of Turkish nurses. *Nurs Outlook*. 2008; 56(6): 298-307. e3.
6. Chien PL, Su HF, Hsieh PC, Siao RY, Ling PY, Jou HJ. Sleep Quality among Female Hospital Staff Nurses. *Sleep Disord*. 2013; 2013: 283490.
7. Eldevik MF, Flo E, Moen BE, Pallesen S, Bjorvatn B. Insomnia, excessive sleepiness, excessive fatigue, anxiety, depression and shift work disorder in nurses having less than 11 hours in-between shifts. *PLoS One*. 2013; 8(8): e70882.
8. Oyane NMF, Pallesen S, Moen BE, Akerstedt T, Bjorvatn B. Associations between night work and anxiety, depression, insomnia, sleepiness and fatigue in a sample of Norwegian nurses. *PLoS One*. 2013; 8(8): e70228.
9. Lee CY, Chen HC, Meg Tseng MC, Lee HC, Huang LH. The Relationships Among Sleep Quality and Chronotype, Emotional Disturbance, and Insomnia Vulnerability in Shift nurses. *J Nurs Res*. 2015 Sep; 23(3): 225-235.
10. Fusz K, Toth A, Fuller n, Muller A, Olah A. Sleep quality of nurses working in shifts - Hungarian adaptation of the Bergen Shift Work Sleep Questionnaire. *Orv Hetil*. 2015 Dec; 156(49): 2003-2008.
11. Costa G, Anelli MM, Castellini G, Fustinoni S, Neri L. Stress and sleep in nurses employed in "3x8" and "2x12" fast rotating shift schedules. *Chronobiol Int*. 2014 Dec; 31(10): 1169-1178.
12. Mota MC, De-Souza DA, Rossato LT, Silva CM, Araujo MJB, Tufik S, et al. Dietary patterns, metabolic markers and subjective sleep measures in resident physicians. *Chronobiol Int*. 2013 Oct; 30(8): 1032-1041.
13. Susanszky E, Szanto Z. How do physicians sleep and dream?. *Lege Artis Med*. 2012 Jan; 22(1): 53-58.
14. Richter E, Blasco V, Antonini F, Rey M, Reydellet L, Harti K, et al. Sleep disorders among French anesthesiologists and intensivists working in public hospitals: a self-reported electronic survey. *Eur J Anaesthesiol*. 2015 Feb; 32(2): 132-137.
15. Jenkins CD, Stanton BA, Niemcryk SJ, Rose RM. A scale for the estimation of sleep problems in clinical research. *J Clin Epidemiol*. 1988; 41(4): 313-321.
16. Soldatos CR, Dikeos DG, Paparrigopoulos TJ. Athens Insomnia Scale: validation of an instrument based on ICD-10 criteria. *J Psychosom Res*. 2000 Jun; 48(6): 555-560.
17. Wanner M, Probst-Hensch N, Kriemler S, Meier F, Autenrieth C, Martin BW. Validation of the long international physical activity questionnaire: Influence of age and language region. *Prev Med reports*. 2016 Jun; 3: 250-256.
18. Pantermali D. Healthcare professionals sleep disorders, MSc thesis, 2017-2018.