

The prevalence and associated factors of chronic pain in nurses Iran

Dolor crónico en enfermeras de Irán: prevalencia del y factores asociados

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Abstract

Background: Chronic pain is a long-term, debilitating condition. Nurses experiences pain and functional restrictions earlier than other groups of people. Therefore, this study was conducted to evaluate the prevalence and associated factors of chronic pain in nurses. a

Method: A structured, self-administered questionnaire was used to collect information. Participants included 639 registered nurses from a medical center in Bandar Abbas.

Results: At the baseline of the study, 64.8% of nurses reported chronic pain. The low back (27.7%, [n=115]), leg (21%, [n=87]), neck (16.7%, [n=63]), head and knee (15.2%, [n=69]), had the highest frequency among the nurses. Age ($p<0.001$), gender ($p<0.001$) and type of employment ($p=0.04$) increased risk of chronic pain. Also, significant difference was found between people with the onset of pain over the past three months and those with onset of pain over more than one year according of employment history and the type of unit ($p<0.05$), and significant difference between people with the onset of pain over the past three months and those with onset of pain over more than one year according to their job. ($P<0.05$).

Conclusion: Results indicate the high prevalence of chronic pain in different parts of the nurses' body. Most of them, the onset of pain was more than one year. Therefore, it is possible to develop appropriate preventive and educational programs by knowing the factors affecting chronic pain and situations increasing the duration of pain.

Keywords: prevalence, chronic pain, nurse, Iran

Resumen: Antecedentes: el dolor crónico es una afección debilitante a largo plazo. Las enfermeras experimentan dolor y restricciones funcionales antes que otros grupos de personas. Por lo tanto, este estudio se realizó para evaluar la prevalencia y los factores asociados del dolor crónico en las enfermeras.

Método: se utilizó un cuestionario estructurado y auto-administrado para recopilar información. Los participantes incluyeron 639 enfermeras registradas de un centro médico en Bandar Abbas.

Resultados: Al inicio del estudio, el 64.8% de las enfermeras reportaron dolor crónico. Los dolores crónicos en la espalda baja (27.7%, [n=115]), pierna (21%, [n=87]), cuello (16.7%, [n=63]), cabeza y rodilla (15.2%, [n=69]), tuvieron la mayor frecuencia entre las enfermeras. La edad ($p<0,001$), el sexo ($p<0,001$) y el tipo de empleo ($p=0,04$) aumentaron el riesgo de dolor crónico. Además, se encontró una diferencia significativa entre las personas con dolor en el inicio, los últimos tres meses y aquellos con inicio de dolor durante más de un año de acuerdo a su historial de empleo y el tipo de unidad ($p<0.05$), y una diferencia significativa entre las personas con inicio de dolor en los últimos tres meses y aquellas con inicio de dolor durante más de un año en de acuerdo a su puesto de trabajo. ($P<0.05$).

Conclusión: los resultados indican la alta prevalencia de dolor crónico en diferentes partes del cuerpo de las enfermeras. La mayoría de ellos, la aparición del dolor fue de más de un año. Por lo tanto, es posible desarrollar programas preventivos y educativos adecuados al conocer los factores que afectan el dolor crónico y las situaciones que aumentan la duración del dolor.

Palabras clave: prevalencia, dolor crónico, enfermera, Irán

Chronic pain is a global health problem and known as a frequent or continuous period of pain, which can last longer than expected duration. This time is considered to be at least 3 months for research objectives¹. In the United States, the prevalence of chronic pain in the adult population is reported to be between 14.6% and 64%². It is also common in Europe and its treatment imposes high burden on people, employers, health care systems and the community as a whole³. Chronic pain is a severe, prolonged and debilitating condition, which significantly decreases the health status of people and the quality of life of them⁴. It is considered as one of the major causes of suffering and disability in the world⁵. This type of pain can affect various aspects of the person and cause emotional, behavioral and functional disabilities. Evidence suggests that unwanted consequences such as depression⁶, anxiety and emotional disorders are associated with long-term outcomes of sustained pain such as physical disability, work disability⁷, increased health care costs⁸, death⁹ and suicide¹⁰. In Europe, out of five patients with chronic pain, one person lost his job due to pain and one third of the subjects suffered from chronic pain and its effects in some hours of work or whole of it¹¹. Studies suggest that high indirect economic and social costs are associated with chronic pain in Europe and America^{3,12}.

Nursing is recognized as one of the high-risk jobs in terms of development of disorders and diseases¹³. The results of some studies have shown that nurses experience more functional restrictions compared to other two job groups. They also complain of continuous and prolonged pain in most parts of their body, while the mean age of these three job groups was not the same¹⁴. In this regard, some studies have only examined the differences in psychological factors in the two groups of nurses who had a disorder during the last one month, compared to those who had a disorder during the last one year¹⁵ and even in studies conducted with the aim of evaluating the prevalence of chronic pain in the general population, despite the difference in the onset of pain among the population studied, the factors affecting the inclusion of subjects in different groups have not been examined¹⁶. By gaining this type of knowledge, we can identify the people who are exposed to pain earlier than others and take some steps in order to reduce or delay the onset of pain in this group. Therefore, considering the effects of chronic pain and the effects of existing disorders on nurses' job performance and their ability to provide effective care in patients¹⁷, the prevalence of chronic pain needs to be evaluated in nurses. In addition, given the working conditions of this group of people, it is necessary to recognize the time of the onset of chronic pain and factors affecting it. In this regard, based on the available research literature, no study was

found to evaluate the prevalence and associated factors of chronic pain in this job group. Thus, this research was conducted to evaluate the prevalence and associated factors of chronic pain in nurses Iran. We hope that the results of this research to be useful in improving the conditions of the nurses and providing high quality care for them.

Participants and methods: In this cross-sectional study, the participants included all nursing staffs working in educational hospitals in Bandar Abbas in 2017. In some studies, total population has been examined. In this study, all 710 nursing staffs with master and bachelor level of education were invited to participate in the study. The inclusion criterion of the study included: 1) having more than one year of clinical employment history. Exclusion criteria of study: 1) included people who have left the work or were absent in work place for any reason and 2) Unwillingness to participate in the study. Finally, 639 people were included in the study.

Data collection: The data collection tool in this research was a structured, self-administered questionnaire (based on a review of the literature^{2,18,19} of the experts' studies and views). It included three parts: The first part included demographic information of nurses such as age, gender, marital status, level of education, job experience, type of work place, type of employment, work shift and job position. The second part consists of two questions, including the presence or absence of continuous pain and the onset of pain (in the last 2 weeks - last one month -last 3 months- more than 3 months- in the last 6 months- more than one year). It should be noted that chronic pain was considered as a pain lasting more than three months in this study, and the third part was a question about pain in different parts of the body (16 parts of the body were examined).

In order to examine the face and content validity of the research tool, the views of experienced professors and experts in this area were used and its validity was reported to be desirable. To calculate its reliability, the data collection form was given to 30 nurses as pilot. Finally, based on the internal correlation of the questions, the Cronbach's alpha was calculated to be 0.9 ($p < 0.05$). Accordingly, reliability of the tool was reported to be desirable.

Data analyses: To analyse the data, SPSS 15 software was used. To describe the quantitative data, mean and SD were used, and to describe qualitative data, frequency and percentage of frequency were used. In order to determine the prevalence of chronic pain, all nurses were first examined and to determine the relationship between chronic pain and demographic variables, Chi-square, Fisher exact test and independent t-test were used. Then, Chi-square tests was used to determine the differences in the three groups

of chronic pain patients with onset of pain in the more than three months ago, in the last six months and more than one year. Finally, binary nominal and multi-nominal logistic regression analyses were used to determine the effect of independent variables on chronic pain and onset of chronic pain.

The prevalence of chronic pain and associated factors: Results showed that out of 639 nurses, 459 subjects had continuous and recurrent pain, which onset of chronic pain in 414 of them (64.8%) was more than three months ago. Among the subjects, 67% were female and 31% were male. Their mean age was 36.46 ± 6.98 , and 6.2% of them were married and 77.3% had bachelor level of education. In addition, the majority of subjects with chronic pain had work experience of 10 to 20 years and they were formally employed. More information is provided in Table 1. In addition, the chronic pains of low back (27.7%, [n=115]), leg (21%, [n=87]), neck (16.7%, [n=63]), head and knee (15.2%, [n=69]), and waist (7.2%, [n=30]), respectively, had the highest frequency among the nurses (Chart 1). In addition, chronic pain had a significant relationship with variables of gender, marital status, and level of education, type of employment, job position, and work experience ($P < 0.05$) (Table 1). In designed models, in binary logistic regression, the variables such as age, gender, and type of employment were introduced as the predictors of chronic pain in nurses. (Table 2) shows the results of logistic regression analysis and odds ratios for the model variables at the confidence level of about 95%.

Chart 1. Frequency the types of chronic pain in nurses The quality of the figure must be improved

Chronic pain and associated factors Table 1:				
variables	groups	Chronic pain		P-value
		NO	YES	
		N (%)	N (%)	
Gender	female	198 (33.0)	402 (67.0)	<0.001
	male	27 (69.2)	12 (30.8)	
Marital status	single	45 (44.1)	57 (55.9)	0.042
	married	180 (33.5)	357 (66.5)	
Education level	Junior college	19 (19.6)	78 (80.4)	0.002
	bachelor	198 (38.2)	320 (61.8)	
	Post graduate	8 (33.3)	16 (66.7)	
Type employment	formal	86 (23.8)	276 (76.2)	<0.001
	contractual	78 (49.4)	80 (50.6)	
	corporative	23 (46.0)	27 (54.0)	
	temporary	38 (55.1)	31 (44.9)	
Job position	Practical nurse	22 (22.7)	75 (77.3)	0.041
	nurse	183 (37.8)	301 (62.2)	
	Head nurse	11 (36.7)	19 (63.3)	
	supervisor	9 (32.1)	19 (67.9)	
Work experience	Less than 10	149 (47.3)	166 (52.7)	<0.001
	10_20	52 (23.4)	170 (76.6)	
	More than 20	24 (23.5)	78 (76.5)	
Age	Mean+-SD	Mean+-SD		<0.001
	32.36+-6.99	36.46+-6.98		

Table 2. multivariable adjusted predictors of chronic pain				
variable	groups	Chronic pain		
		OR	C.I 95%	P-value
Age		1.07	1.03, 1.11	<0.001
Gender	female	4.21	2.14, 9.41	<0.001
	male	reference		
Type of employment	formal	2.02	1.01, 4.04	0.048
	Contractual	0.89	0.48, 1.65	0.723
	Corporative	1.03	0.47, 2.23	0.934
	temporary	reference		0.011

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Differences in the onset of chronic pain and associated factors: After examining the existing statistical differences between the three groups of nurses with a different onset of chronic pain, the results indicated that these three groups had significant differences in variables of job experience, type of employment, and age. More information is presented in (Table 3) ($P < 0.05$). Moreover, after entering the variables into the multi-nominal logistic regression model, the results showed significant differences between people with onset of chronic pain more than 3 months compared to people with onset of pain more than one year in terms of job experience and unit where they were working ($p < 0.05$). In addition, significant difference was seen between people with onset of pain in last 6 months and people with onset of pain in more than one year, so that the results showed that people with nursing job had onset of pain in more than one year ago, while people with supervisor job position had more onset of pain in last 6 months ($P < 0.05$) (Table 4).

Table 3. Comparison onset of chronic pain with general characteristic					
variable	groups	More than 3 month ago	In the last 6 months	More than 1 year	P-value
		N (%)	N (%)	N (%)	
Marital status	single	12 (21.1)	6 (10.5)	39 (68.4)	0.271
	married	51 (3.14)	59 (5.16)	247 (69.2)	
Gender	female	62 (15.4)	64 (15.9)	276 (68.7)	0.731
	male	1 (8.3)	1 (8.3)	10 (83.3)	
Education level	Junior college	10 (12.8)	13 (16.7)	55 (70.5)	0.671
	bachelor	50 (15.6)	48 (15.0)	222 (69.4)	
	Post graduate	3 (18.8)	4 (25.0)	9 (56.3)	
Work experience	Less than 10	39 (23.5)	32 (19.3)	95 (57.2)	0.001
	10_20	21 (12.4)	21 (12.4)	128 (75.3)	
	More than 20	3 (3.8)	12 (15.4)	63 (80.8)	
Type of employment	formal	29 (10.5)	40 (14.5)	207 (75.0)	0.001
	contractual	22 (27.5)	10 (12.5)	48 (60.0)	
	corporative	6 (22.2)	6 (22.2)	15 (55.6)	
	temporary	6 (19.4)	9 (29.0)	16 (51.6)	
Type of unit with longer duration	Internal department	20 (15.4)	24 (18.5)	86 (66.2)	0.389
	Surgery department	10 (14.9)	14 (20.9)	43 (64.2)	
	Emergency	8 (12.5)	10 (15.6)	46 (71.9)	
	Special department	13 (13.0)	11 (11.0)	76 (76.0)	
	Women and newborn	8 (25.0)	3 (9.4)	21 (65.6)	
	Psychiatric department	1 (7.7)	2 (15.4)	9 (76.9)	
Job position	Official department	3 (11.0)	1 (33.0)	5 (56.0)	0.433
	Practical nurse	10 (13.3)	12 (16.0)	53 (70.7)	
	nurse	50 (16.7)	43 (14.3)	207 (69.0)	
	Head nurse	1 (5.0)	4 (20.0)	15 (75.0)	
	supervisor	2 (10.5)	6 (31.6)	11 (57.9)	
Age	Mean ± SD	Mean ± SD	Mean ± SD		0.001*
	34.38±6.03	34.58±7.40	37.34±6.91		

*significant difference between onset of pain in more than last three months and more than one year (p -value= 0.006) and between onset of pain over last six months and more than one year ($p=0.012$)

Table 4. Multivariate adjusted predictors the onset of chronic pain

variable	groups	OR	P-value	CI 95%
Over the last 3 months	Work experience			
	Less than 10	22.43	0.001	3.57, 140.9
	10-20	6.55	0.018	1.38, 30.9
	More than 20	reference		
	Type of unit with longer duration			
	Special department	0.08	0.042	0.008, 0.92
In the last 6 months	Official department	reference		
	Job title			
	Practical nurse	0.10	0.041	0.01, 0.91
	nurse	0.10	0.001	0.02, 0.38
Supervisor	reference			
More than 1 year	reference			

Discussion

This cross-sectional study was conducted to determine the prevalence of chronic pain and the difference in the onset of pain and its related factors among nurses working in hospitals affiliated with Bandar-Abbas. The prevalence of chronic pain was reported 64.8%, indicating high prevalence of chronic pain in this job group compared to the general population^{20,21}. The highest frequency of pain was reported in low back, leg, neck, head and knee, respectively. Many studies have reported that low back pain is the most common pain in nurses^{22,23}, while the prevalence of other pains was also studied in this study. It should be noted that the scale used in the pain prevalence was different in different studies, but the results of this study were consistent with a number of studies, in which the prevalence of low back pain was higher than leg pain and neck pain, and knee pain^{24,25}. However, the results of some studies were inconsistent with the results of the present study regarding the prevalence of pain in the low back, leg and neck, which could be due to differences in the method of study, since they have examined merely acute pain and musculoskeletal disorders^{26,14}. Given the nature of nursing job and the high prevalence of musculoskeletal disorders and as the occurrence of these disorders can lead to continuous pain in these people, this group of people should be considered as one of the vulnerable groups exposed to chronic pain in different parts of the body and necessary measures should be taken to minimize this complication. In the present study, after performing multivariate analysis, three variables of age, gender, and employment type were identified as predictors of chronic pain in nurses. Many studies have reported the relationship between chronic pain and the age of people²⁷. The results of this study also showed that one year of increase in age increases the odds of chronic pain by 1.07.

In the study conducted by Feng et al. (2007) on chronic low back pain of nurses, in line with the results of the present study; this rate was reported 13.2%²⁸. Some studies have not showed association between age and chronic pain^{29,30}. It seems that this difference is due to differences in the studied population, so that only those with chronic pain disorder in one part of the body were selected as the research population. However, in the present study, nurses with chronic pain, without considering specific group, was considered as the research population. Results of the study indicate that chronic pain is also associated with gender^{2,31} and it is two times more in females compared to males², while in the present study, it was reported to be 4.2 times more in females. Given that the majority of this job group are women exposed to chronic pain, this result can be justified. However, some studies have not reported such association³², which seems to be due to differences in the research population, so that only nurses working in surgical, intensive and emergency units were included in some studies, while in the present study, nurses of all units were examined. Another result of this study indicated an increase in the odds of development of chronic pain in people with formal employment status, compared to people with temporary employment status. This can be analyzed in several ways. As people with formal employment have mean age and a higher employment history compared to people with temporary employment status, they are more exposed to chronic pain and injuries caused by it. Moreover, as people with temporal employment status have more physical activity and working shifts, compared to those with formal employment status, but, people with formal employment status more suffer from chronic injuries and disorders³³. Among nurses with chronic pain, 15.2% of nurses reported chronic pain experience more than 3 months, 15.7% reported chronic pain experience more than 6 months, 69.1% reported chronic pain experience more than one year. One of the strengths of the present study is to examine the differences among different groups with different onset of chronic pain, since it helps us in identifying the vulnerable groups who experienced chronic pain for a longer time. In addition, research suggests a mutual and strong relationship between chronic pain and mood and emotional disorders in those who experienced pain for a long time³⁴. Therefore, by identifying these people, we can take necessary measures to develop preventive programs in order to reduce the duration of chronic pain in people and develop appropriate interventional programs for this group. The results of this study showed that people with more than 20 years of employment history, nurses working in intensive units for longer time, and those working as nurse in the units suffer from pain with onset of more than one year. Nurses working in clinical units¹⁹ are exposed to various musculoskeletal disorders due to working conditions, doing unusual movements in unusual positions such as repetitive movements, excessive workloads, prolonged sitting ups and sitting downs and carrying heavy burden³⁵. Additionally, psychological factors such as high demand, lack of control over occupation and lack of social support²⁵ are

factors contribute to the development of disorders and disease, followed by chronic pain in this job group³⁶. Thus, the onset of chronic pain would be earlier in a person with longer employment history in the clinical setting and he or she would suffer from chronic pain for a longer period of time, which it can influence his or her activities^{37,38}. In addition, research shows that nurses working in intensive care units are more exposed to disorders and pain due to the characteristics of patients, the care of multiple intravenous lines, mechanical ventilation and other equipment, as well as activities related to patient care³⁹.

The study indicates high prevalence of chronic pain in nurses. Iranian nurses complain of chronic pain in many parts of their body and the onset of pain is different among them. Thus, the professional problems of nurses should be considered. Knowing the factors affecting chronic pain and prolonging its duration in this group can help us develop preventive and educational programs. In addition, as nurses have a direct and close relationship with patients, adopting strategies before its development seems to be necessary based on the factors predicting the chronic pain and its duration.

Limitation: As most of the studies, this study suffers some limitations. One of the limitations was that nurses responded to questions in their workplace, so their stress and anxiety of the workplace could have affected their response. In addition, this study examined the prevalence of pain and its different onset and its relationship with demographic and job factors, while psychological factors were not considered. In addition, the present study did not examine the restrictions caused by chronic pain in these subjects, while other studies examined the restriction caused pain in one part of body. Further studies are recommended to examine other job reasons and psychosocial factors involved in development of chronic pain in this job group.

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References

1. Merskey HE. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms. *Pain*. 1986.
2. Johannes CB, Le TK, Zhou X, Johnston JA, Dworkin RH. The prevalence of chronic pain in United States adults: results of an Internet-based survey. *The Journal of Pain*. 2010;11(11):1230-9.
3. Patel AS, Farquharson R, Carroll D, Moore A, Phillips CJ, Taylor RS, et al. The impact and burden of chronic pain in the workplace: a qualitative systematic review. *Pain Practice*. 2012;12(7):578-89.
4. Boonstra AM, Reneman MF, Stewart RE, Post MW, Preuper HRS. Life satisfaction in patients with chronic musculoskeletal pain and its predictors. *Quality of life research*. 2013;22(1):93-101.
5. Babadi ME, Nazari F, Safari R, Abdoli S. The effect of reflexology on pain perception aspects in nurses with chronic low back pain in Isfahan. *Iranian journal of nursing and midwifery research*. 2016;21(5):487.
6. Nicholas MK. Depression in people with pain: There is still work to do: Commentary on 'Understanding the link between depression and pain'. *Scandinavian Journal of Pain*. 2011;2(2):45-6.
7. Meints S, Edwards R. Evaluating psychosocial contributions to chronic pain outcomes. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2018.
8. Baumeister H, Knecht A, Hutter N. Direct and indirect costs in persons with chronic back pain and comorbid mental disorders—A systematic review. *Journal of psychosomatic research*. 2012;73(2):79-85.
9. Smith D, Wilkie R, Uthman O, Jordan JL, McBeth J. Chronic pain and mortality: a systematic review. *PloS one*. 2014;9(6):e99048.
10. Hassett AL, Aquino JK, Ilgen MA. The risk of suicide mortality in chronic pain patients. *Current pain and headache reports*. 2014;18(8):436.
11. Langley PC, Van Litsenburg C, Cappelleri JC, Carroll D. The burden associated with neuropathic pain in Western Europe. *Journal of medical economics*. 2013;16(1):85-95.
12. Gaskin DJ, Richard P. The economic costs of pain in the United States. *The Journal of Pain*. 2012;13(8):715-24.
13. Menzel NN. Psychosocial factors in musculoskeletal disorders. *Critical Care Nursing Clinics*. 2007;19(2):145-53.
14. Harcombe H, Herbison G, McBride D, Derrett S. Musculoskeletal disorders among nurses compared with two other occupational groups. *Occupational Medicine*. 2014;64(8):601-7.
15. Sadeghian F, Hosseinzadeh S, Aliyari R. Do psychological factors increase the risk for low back pain among nurses? A comparing according to cross-sectional and prospective analysis. *Safety and health at work*. 2014;5(1):13-6.
16. Nakamura M, Nishiwaki Y, Ushida T, Toyama Y. Prevalence and characteristics of chronic musculoskeletal pain in Japan: a second survey of people with or without chronic pain. *Journal of Orthopaedic Science*. 2014;19(2):339-50.
17. Amini H. Determination of the numerical scores of occupational hazards and their predisposing factors among nurses working in educational hospitals in Arak city. *Journal of Nursing Education*. 2013;1(2):53-61.
18. Sharma S, Shrestha N, Jensen MP. Pain-related factors associated with lost work days in nurses with low back pain: A cross-sectional study. *Scandinavian journal of pain*. 2016;11:36-41.

19. Shieh S-H, Sung F-C, Su C-H, Tsai Y, Hsieh VC-R. Increased low back pain risk in nurses with high workload for patient care: A questionnaire survey. *Taiwanese Journal of Obstetrics and Gynecology*. 2016;55(4):525-9.
20. Reid KJ, Harker J, Bala MM, Truyers C, Kellen E, Bekkering GE, et al. Epidemiology of chronic non-cancer pain in Europe: narrative review of prevalence, pain treatments and pain impact. *Current medical research and opinion*. 2011;27(2):449-62.
21. Sugai K, Tsuji O, Matsumoto M, Nishiwaki Y, Nakamura M. Chronic musculoskeletal pain in Japan (the final report of the 3-year longitudinal study): Association with a future decline in activities of daily living. *Journal of Orthopaedic Surgery*. 2017;25(3):2309499017727945.
22. Abedini R, Choobineh A, Hasanzade J. Musculoskeletal load assessment in hospital nurses with patient transfer activity. *International Journal of Occupational Hygiene*. 2015;5(2):39-45.
23. Lee S-J, Faucett J, Gillen M, Krause N. Musculoskeletal pain among critical-care nurses by availability and use of patient lifting equipment: an analysis of cross-sectional survey data. *International journal of nursing studies*. 2013;50(12):1648-57.
24. Çelik S, Tasdemir N, Öksüzoglu A, Dirimese E, Koçasli S. Critical-Care Nurses' Pain Experiences and the Prognostic Factors. *Dimensions of Critical Care Nursing*. 2018;37(1):3-11.
25. Moreira RF, Sato TO, Foltran FA, Silva LC, Coury HJ. Prevalence of musculoskeletal symptoms in hospital nurse technicians and licensed practical nurses: associations with demographic factors. *Brazilian journal of physical therapy*. 2014;18(4):323-33.
26. Rokni M, Abadi M, Saremi M, Mohammadi M. Prevalence of musculoskeletal disorders in nurses and its relationship with the knowledge of ergonomic and environmental factors. *Journal of Gorgan University of Medical Sciences*. 2016;18(1).
27. Wang Y, Xie J, Yang F, Wu S, Wang H, Zhang X, et al. The prevalence of primary headache disorders and their associated factors among nursing staff in North China. *The journal of headache and pain*. 2015;16(1):4.
28. Uygun, S. S., Sivri, M., Topsakal, A., Dikener, A. H., Soylu, H., & Anagur, A. (2017). Meckel Gruber syndrome: A case report with review of literature. *European Journal of General Medicine*, 14(4).
29. Rezaee M, Ghasemi M. Prevalence of low back pain among nurses: predisposing factors and role of work place violence. *Trauma monthly*. 2014;19(4).
30. Matsudaira K, Kawaguchi M, Isomura T, Inuzuka K, Koga T, Miyoshi K, et al. Assessment of psychosocial risk factors for the development of non-specific chronic disabling low back pain in Japanese workers—findings from the Japan Epidemiological Research of Occupation-related Back Pain (JOB) study. *Industrial health*. 2015;53(4):368-77.
31. Azevedo LF, Costa-Pereira A, Mendonça L, Dias CC, Castro-Lopes JM. Epidemiology of chronic pain: a population-based nationwide study on its prevalence, characteristics and associated disability in Portugal. *The journal of pain*. 2012;13(8):773-83.
32. Alexopoulos EC, Burdorf A, Kalokerinou A. Risk factors for musculoskeletal disorders among nursing personnel in Greek hospitals. *International archives of occupational and environmental health*. 2003;76(4):289-94.
33. Aghakhani N, Cheraghi R, Alinejad V, Baghayi R. Prevalence and causes of occupational injuries in nurses working in educational hospitals of Urmia University of Medical Sciences in 2013. *Urmia Nursing and Midwifery Faculty*. 2015;15(4):270_80.
34. Ersoy AÖ, Öztaş E, Özler S, Ersoy E, Topçu HO, Fındık RB, et al. The evaluation of the low risk pregnant women who gave birth to macrosomic infants. *J Clin Exp Invest*. 2017;8(4):114-9. <https://doi.org/10.5799/jcei.382414>
35. Nützi M, Koch P, Baur H, Elfering A. Work-Family conflict, task interruptions, and influence at work predict musculoskeletal pain in operating room nurses. *Safety and health at work*. 2015;6(4):329-37.
36. June KJ, Cho SH. Low back pain and work-related factors among nurses in intensive care units. *Journal of Clinical Nursing*. 2011;20(3-4):479-87.
37. Feili A, Kojuri J, Bazrafcan L. A dramatic way to teach clinical reasoning and professionalism. *Medical education*. 2018 Nov;52(11):1186.
38. Bazrafcan L, Takmil F, Shokrpour N. Assessing the Effectiveness of Problem-Based Learning as a New Approach on Health Care Provider Ethical Reasoning Development in Shiraz University of Medical Sciences. *The health care manager*. 2018 Jul 1;37(3):273-7.
39. Sagheb MM, Amini M, Saber M, Moghadami M, Nabiei P, Khalili R, Rezaee R, Bazrafcan L, Hayat AA. Teaching Evidence-Based Medicine (EBM) to Undergraduate Medical Students through Flipped Classroom Approach. *Shiraz E-Medical Journal*. 2017