The Relationship between Knowledge of Ergonomic Science and Occupational Injuries from Nurses, Point of View

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A R T I C L E I N F O	A B S T R A C T
Article type: Original article *Article History:* Received: 12-Aug-2018 Accepted: 10-Feb-2019 *Key words:* Ergonomic science Knowledge Nurses Occupational injuries	***Introduction:*** The goal of ergonomics science is to achieve an effective adaptation between the user and the workstation to improve productivity, increase the safety and reduce occupational injuries. Therefore, this study was conducted with the aim of studying knowledge about ergonomics, determining working conditions and occupational injuries of nurses in selected hospitals of Shahid Beheshti University of Medical Sciences. ***Materials and Methods:*** This cross-sectional study was done on nurses working in hospitals affiliated to Shahid Beheshti University of Medical Sciences by one standard questionnaire. Using descriptive statistics, Kolmogorov-Smirnov, chi-square, independent t-test and one-way ANOVA, data were analyzed. ***Results:*** The mean and standard deviation of age and work experience were about 32.67 ± 8.63 and 8.84 ± 7.46 years, respectively. Results showed the level of nurses 'knowledge about ergonomics with an average of 0.72 ± 3.14 was good. Also, the extent of occupational problems and injuries, such as musculoskeletal disorders (MSDs), with a mean of 0.95 ± 2.10 was also weak. The results showed that there was a significant reverse relationship between the level of knowledge of ergonomic science and the level of occupational injury (P-value = 0.00, R = -0.299) and between working conditions and occupational injuries (P-value = 0.000, R = -0.357). ***Conclusion:*** There was a reverse relationship between the level of knowledge of ergonomic and occupational injuries. Also, there was a significant reverse relationship between working conditions and occupational injuries. Therefore, use of training and ergonomic interventions can be useful.

Introduction

Ergonomics is the scientific study of human work. The goal of ergonomics is to achieve an effective adaptation between the user and the workstation to improve productivity, increase the safety, convenience and ease of use of users.

Failure to take ergonomic principles reduces productivity and increases discomfort at work stations (1). Ergonomic science tries to provide an environment for the worker or employee by limiting Nervous tension in the workplace and

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creating an appropriate working environment so that people can work in a stress-free environment. In fact, it can be said that ergonomic measures and operations according to the principles of ergonomics can always be the main guarantor of safety and efficiency in organizations, which mainly leads to increased productivity(2). In the absence of ergonomic design, long-term work can lead to work musculoskeletal disorders (WMSDs) in work environments(3). Human engineering and ergonomic research on health system staff has a long history and research in this field can be useful and effective (4). MSDs is one of the major health problems that have been considered globally as the second cause of physical inability (5) And one of the most important problems of nurses in work environments (6).

Various risk factors are effective in causing these injuries which can be divided into physical factors (inappropriate posture, lifting and carrying heavy loads, work with repetitive motions)(7), organizational psychological, and individual Factors(8).

Nursing and midwifery professions require a lot of physical activity, bending, turning, standing, moving the patient, lifting heavy objects, etc., which increases the risk of developing musculoskeletal disorders in these professions(9-11). Karahan and colleagues found that nurses had the highest incidence of musculoskeletal disorders (77.1%) in a sample of Turkish health workers(12).

Few studies of nurses have reviewed the physical and ergonomic conditions of work environments and musculoskeletal disorders (13). Therefore, considering the importance of this issue and the necessity of further studies in this regard, this study was conducted with the aim of studying knowledge about ergonomics, determining working conditions and occupational injuries of nurses in selected hospitals of Shahid Beheshti University of Medical Sciences.

Methods

This cross-sectional study was carried out to determine the working conditions of nursing and medical staff, determine their work problems and their occupational injuries and their knowledge of ergonomic science in Shahid Beheshti University of Medical Sciences affiliated hospitals. The research population consisted of all nurses and hospital health care, including supervisors, nurses, help nurses, clinical staff, who have more than one year of work experience, which was examined using a standard questionnaire.

In this study, a standard questionnaire is used to assess the level of knowledge and occupational injuries after the coordination. These questionnaires are distributed as anonymous and at the beginning of the work, people's consent was taken. All individuals with congenital defects, as well as people with non-job-related restrictions, are also excluded from the study.

The first part of the questionnaire includes questions containing demographic information such as sex, age, marital status, educational status, work experience. The second part of the questionnaire consisted of 13 closed-ended questionnaires on Likert scale in order to measure the level of knowledge of the individual about ergonomics, the third part of the questionnaire containing 16 closed-ended questions in order to measure the working conditions of the individual and the fourth part of the questionnaire containing 22 closed questions on Likert scale in order to determine the number of occupational injuries including MSDs is nursing staff.

Meanwhile, validity and reliability of the questionnaire were determined in a study by Mosaddegh Rad in 2004 (2). The scores obtained for categorizing nursing staff awareness of ergonomics, working conditions and job injuries are grouped as follows: Less than 2 are very weak, 2 to 2.75 are very weak, 2.76 to 3.5 medium, 3.51 to 4.25 good and 4.26 to 5 is very good.

This research is categorized, so that, five hospitals were randomly selected from hospitals affiliated with the university and in each hospital, a number of nurses and qualified medical staff were selected randomly from each department. The sample size was estimated 150 people, according to the following formula and taking into account the 95% confidence level. (N: Sample Size, Z: The percentage error of the acceptable coefficient of confidence, S: Standard deviation, and D: Degree of confidence).

$$N = \frac{Z^2 \times S^2}{d^2}$$

Using SPSS software version 22, data were analyzed. We carried out Kolmogorov-Smirnov for checking normal distribution of data. Also the independent t-test and one-way ANOVA was used for comparing quantitative variables between categorical variable levels. In addition, the significance level was considered as 0.050 in this study.

Results

The results of the study showed that the mean and standard deviation of age and work experience were about 32.67 ± 8.63 and 8.84 ± 7.46 years, respectively. The youngest person

Table 1. Demographic data and mean score of ergonomic awareness and amount of occupational injuries

Variable		N (%)	Awareness of Ergonomic science $\overline{X}\pm SD$	P-value	Amount of Occupational injuries $\overline{X}\pm SD$	P-value
Sex	Male	41(27.3)	3.04(0.79)	0.34	2.05(1.18)	0.38
	Female	109(72.7)	3.17(0.69)		2.12(0.85)	
Marital status	Married	73(48.7)	3.20(0.68)	0.29	2.10(0.92)	0.93
	Single	77(51.3)	3.08(0.75)		2.11(0.97)	
Education level	Diploma	22(14.7)	3.1(0.70)	0.61	2.09(1.10)	0.52
	Associate Degree	7(4.7)	3.01(0.79)		2.62(1.36)	
	Bachelor's degree	101(67.3)	3.10(0.65)		2.07(0.88)	
	Master's degree	20(13.3)	3.32(1.00)		2.13(0.97)	
Work experience (Year)	<5	69(46.0)	3.07(0.76)	0.003	2.08(1.14)	0.21
	5-15	52(34.7)	3.01(0.70)		2.26(0.82)	
	>15	29(19.3)	3.54(0.50)		1.87(0.56)	
BMI	≤18.5	38(25.3)	2.9(0.89)	0.16	2.01(0.98)	0.14
	18.51-24.9	85(56.7)	3.2(0.64)		2.06(0.95)	
	>25	25(16.7)	3.02(0.67)		2.46(0.85)	

Table 2. Scores for Awareness of Ergonomic science, the status of working conditions and occupational injuries by category

Groups	Awareness of Ergonomic science		Amount of Occupational injuries		Work condition	
	N	Percent	N	Percent	N	Percent
Very week (<2)	13	8.7	68	45.3	33	22.0
Week (2-2.75)	21	14	42	28.0	51	34.0
Mediocre (2.76-3.5)	61	40.7	31	20.7	56	37.3
Good (3.51-4.25)	50	33.3	7	4.7	10	6.7
Very good (4.26-5)	5	3.3	2	1.3	-	-

was 21 years old and the oldest was 52 years old. Minimum and maximum work experience was 1 and 28 years respectively. According to Table 1, of the total number of nurses, most of the subjects were women (72.7% (109), single (51.3% (77)) and undergraduate (67.3% (101)). The level of nurses 'knowledge about ergonomics with an average of 0.72 ± 3.14 out of 5 points was good, nurses' working conditions (in terms of harmful ergonomic, physical, biological, and chemical factors) with a mean of 0.68 ± 2.58 were weak. Also, the extent of occupational problems and injuries, such as musculoskeletal disorders, with a mean of 0.95 ± 2.10 out of 5 points was also weak. According to Table 1, there was no significant relationship between demographic variables with knowledge of ergonomic science and occupational injuries (p>0.05), (except for the relationship between work experience and knowledge of ergonomic science (p= 0.003)).

Table 2 examines the number and percentage of Nurses studied in the three dimensions studied. According to the results, more knowledge of ergonomic science was 40.7% and 33.3%, respectively, in the medium to good range, respectively.

The results showed that there was a significant reverse relationship between the level of knowledge of ergonomic science and the level of occupational injury (P-value = 0.00, R = 0.299) and between working conditions and occupational injuries (P-value = 0.000, R = -0.357).

Discussion

The results of this study showed that nurses' knowledge of ergonomics is good. Also, the amount of musculoskeletal injuries and disorders was also weak, so there was a significant negative correlation between knowledge of ergonomic science and occupational injuries, Therefore as awareness increases, damage will be reduced.

The findings of the study showed that poor working conditions forced personnel to deal more with risk factors, such as adverse work posture, increased exposure to harmful biological agents, contact with sharp and winning devices, hand-transport and handover of patients, and psychological stresses. In this study, there was a significant relationship with the amount of occupational injuries and musculoskeletal disorders in the personnel workstations. This problem can increase the incidence of work-related absences as a result of increased occupational injuries, which is consistent with the results of research conducted in the United States, Canada, Finland, Sweden and the United Kingdom (14-16).

Baba Md Deros et al. Also recommended that managers should make greater efforts to raise awareness of ergonomics, especially in hand-carrying activities to reduce occupational injuries(17).

Kin Cheung et al. In a study on nursing aids recommended that, efforts should be directed at integrating "work style intervention" into lifestyle physical activity training(18). Abdul Rahim Shaik in a study on dentists showed that ergonomic training programs could be effective in reducing ergonomic risk factors(19).

Mossadegh Rad also examined the level of

knowledge about ergonomics and occupational injuries in the nursing staff and concluded that the level of knowledge, working conditions and occupational injuries of the nursing staff was weak. However, in the present study, the knowledge of personnel was well evaluated (2).

Therefore according to results, unfavorable working conditions such as inappropriate work postures, miscarriage of patients, lack of proper equipment for carrying patients, and the lack of awareness of nurses' personnel about the principles and rules of human engineering, provides background for occupational complications and injuries in hospital environments. It is suggested that senior managers of hospitals and medical universities offer more support for ergonomic intervention studies aimed at improving nurses' working conditions. Therefore, the results of this study can help managers and authorities in making decisions to improve the working conditions of nurses.

Conclusion

The results showed, that there is a reverse relationship between the level of knowledge of ergonomic science and occupational injuries. There was a significant reverse relationship between working conditions and occupational injuries. Therefore, use of educational programs to increase nurses' awareness of the principles and rules of ergonomics in work environments and to familiarize themselves with the principles of body mechanics and the use of ergonomic interventions to improve conditions and work environment can play an effective role in reducing nurses' occupational injuries.

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Conflicts of Interest

None declared.

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