

## Anthropometric measurements and postural evaluation of Nurse's aide in Selected Hospitals of Shahid Beheshti University of Medical Sciences

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p> <hr/> <p><i>Article History:</i> Received: 23-Apr-2019 Accepted: 06-Jun-2019</p> <hr/> <p><i>Key words:</i> Anthropometry Musculoskeletal disorders Nurse's aide Postural evaluation</p>	<p><b>Introduction:</b> The lack of anthropometric data in the design of work stations and equipment can lead to injuries associated with work musculoskeletal disorders (WMSDs). Therefore, the aim of this study was to investigate anthropometric and postural evaluation of Nurse's aide in Selected Hospitals of Shahid Beheshti University of Medical Sciences.</p> <p><b>Materials and Methods:</b> This descriptive-analytic study was performed on the Nurse's aide working in the selected hospitals of Shahid Beheshti University of Medical Sciences. In this study the Body Map questionnaire was used to assess musculoskeletal disorders (MSDs) and discomfort, and QEC (Quick Exposure Check) software was used to evaluate posture. Finally, the data were analyzed using SPSS software version 21 using descriptive statistics, independent T test and Pearson correlation with 95% confidence level.</p> <p><b>Results:</b> The mean age and work experience of the two groups of men and women were (38.17±9.48 and 37.44±9.51) and (14.27±9.51 and 12.06±8.34) respectively. The QEC score was unacceptable and the results showed that men are more at risk than women, although this was not significant (P = 0.082). In the majority of anthropometric dimensions, there was a significant difference between men and women (p&lt;0.05). Also, the results showed that the highest and lowest incidence of discomfort was in the waist and hips areas respectively.</p> <p><b>Conclusion:</b> Significant anthropometric differences were observed among men and women. Establishing anthropometric database of Nurse's aide in two groups of women and men and designing a work station suitable for anthropometric dimensions can reduce MSDs.</p>
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### Introduction

Medical and healthcare services, especially nursing and Nurse's aide, are those that inherently have factors and stimuli, such as excessive workload, which constitute a serious threat to the well-being and comfort of

individuals and their quality of life (1). Nurse's aide, is a professional who faces with a number of physical and psychological stressors, including shift work, high workload and wanted or unwanted overtime (2). Duties of Nurse's

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aide are supporting nurses in providing assistance to patients and clients as well as, the daily work of patients includes personal hygiene, changing clothes, eating, moving things, and so on (3).

Anthropometry or measurement of the body dimension is a branch of anthropometric physics that measures body dimensions, including different parts, the field of motion, and muscle strength of the body (4). Anthropometric data are an essential part of the ergonomic design of equipment, space and work environment. The use of anthropometric information will enable designers to meet the requirements and dimensional characteristics of the target group (5).

According to studies, structural features and especially the dimensions of the human body are affected by factors such as race, age, sex, nutrition, shape, health status, etc. This means that anthropometric information is specific to the population that has anthropometric study and is not applicable to other populations. A large amount of anthropometric data has been collected and published for populations of different age, sex, and geographical areas, and anthropometric information databases have been established (4). The lack of anthropometric data in design of equipment can lead to work-related injuries, such as musculoskeletal disorders (4).

MSDs or musculoskeletal disorders, are soft tissue injuries and disorders (muscles, tendons, ligaments, joints and cartilages) and the nervous system (6). MSDs are mainly due to repetitive work for a long time, which is due to physical tasks in various postures, such as helping patients adjust their positions, keeping forward bending, wrapping around, and lifting patients (7). Various methods have been developed for assessing postures at workplaces. The QEC (Quick Exposure Check) method was used in this study because it involved the whole body of the nurse's aide while working. Posture assessment is used by QEC to assess a wide range of risk factors for MSDs in individuals (8). Therefore, due to the lack of anthropometric information in different groups and populations in Iran, the present study intends to study the postural and anthropometric evaluation for nurse's aide, and help improve work stations and decision makers by creating an anthropometric database.

## Methods

This descriptive study was carried out in summer of 2018 in Nurse's aide working in selected hospitals of Shahid Beheshti University of Medical Sciences. Of the hospitals, four hospitals (Taleghani, Shohadaye Tajrish, Imam Hossein, and Modarres) were selected for evaluation. Given that these hospitals were more

accessible and collaborative, sampling was done purposefully. Sample size With regard to the prevalence of disorders in the Ashghali Farahani study (9), the confidence intervals of 95% and accuracy of 0.11% were estimated to be 71, increasing to 75 samples for increased precision and study strength. The inclusion criteria consisted of at least one year of work experience and written informed consent for participation in the research. All subjects also signed an informed consent form and then entered the study. Then, explanations were given about the study and its confidentiality. In this study, in addition to demographic variables (including age, BMI, work shift), a list of related anthropometric parameters was investigated. The body map questionnaire was used to investigate MSDs and discomfort. Body postural assessment was done by QEC software.

After performing the necessary coordination, demographic information, information about working conditions and history of disturbances and surgery were collected from the nurse's aide in order to better interpret the results using a questionnaire. The questionnaires were distributed as anonymous and were collected before the consent of the individuals.

In the present study, a list of relevant anthropometric dimensions (Table 2) was measured, according to the goals and dimensions, and postures of the nurse's aide, by measuring tape, caliper and digital scale. The scale of body weight and body dimensions are (kg) and (cm) respectively. Meanwhile, after measuring the weight and height, Body mass index (BMI) was calculated by related formula. The work conditions and postures of people including the physical condition during work, members involved in the movement of the body and the states of sitting and standing were recorded using the camcorder, and the extraction information from the recorded videos entered the QEC posture assessment software. In the QEC method, emphasis will be placed on changes in work stations, tools, equipment, and methods of performing work to eliminate or reduce exposure to risk factors. The QEC is one of the posture evaluation methods in which the researcher determines each body part's code by taking pictures and filming of job positions and then the final judgment is made up. Also this method was introduced by Li and Buckle (10).

In order to determine the prevalence of musculoskeletal disorders in various organs of the body, a body map questionnaire was used. The questionnaire can identify organs involved with musculoskeletal disorders (11). The questionnaire grouped the whole body into 8 anatomical regions and asked people to

determine the area of pain, and its severity on the Likert scale (12). Validity and reliability of this questionnaire was carried out by Kuorinka et al (12). Finally, data were analyzed by SPSS software version 21, using descriptive statistics, independent T test and Pearson correlation coefficient with 95% confidence level.

**Results**

In this study, the subjects were 38 women and 37 men. The mean age and work experience of the two groups of men and women were (38.17 and 37.44) and (14.27 and 12.06) respectively. The demographic information is detailed in Table 1. According to the table 1 and using independent T test, the QEC score showed

that men are more at risk than women, although this relationship was not significant (P = 0.082).

According to Table 2, anthropometric information is provided by nurse's aide in selected hospitals. As you can see, in all dimensions, based on independent T test, there was a significant difference between men and women in the anthropometric dimensions except for the dimensions of Buttock height, thigh thickness, and front grip access limit.

Also, the results showed that the highest and lowest incidence of discomfort was in the waist and hips areas respectively. Meanwhile, the results showed a significant correlation between BMI and amount of MSDs in the shoulder region with BMI (P = 0.009, r = 0.301).

**Table 1.** Demographic information and QEC postural evaluation of nurse's aide providers by gender

Variable	Sex	Range	M	SD	P
Age	M	26-60	38.18	9.48	0.736
	F	23-60	37.44	9.51	
Work experience	M	3-30	14.27	8.53	0.262
	F	1-30	12.06	8.34	
Weight	M	57-90	75.02	7.54	0.025
	F	50-95	70.28	10.12	
Height	M	150-194	173.79	9.87	<0.001
	F	146-185	163.47	8.67	
BMI	M	19.95-29.68	24.87	2.11	0.009
	F	12.21-28.95	26.19	2.12	
Total Score of QEC	M	26-98	73.67	22.34	0.082
	F	28-98	65.34	18.38	

Note: BMI = body mass index, M=Male, F=Female

**Table 2.** Anthropometric information of nurse's aide in different body dimensions

Anthropometric Statistics (cm)	Male (37 individuals)		Female (38 individuals)		P
	Range	M± SD	Range	M± SD	
height	146-185	163.47±8.67	150-194	173.79±9.87	<0.001
Shoulder height	120-149	134.31±6.94	123-158	143.29±7.59	<0.001
Buttock height	55-102	86.55±8.24	62-101	87.91±7.34	0.451
Height middle fingertips	55-72	63.34±3.62	45-76	66.85±5.47	0.002
Thigh thickness	9-18	13.68±2.48	10-19	13.78±1.91	0.847
sitting shoulder height	39-63	48.78±5.11	42-63	53.97±4.74	<0.001
Buttock-knee length	32-52	41.07±4.73	32-54	43.32±3.88	0.028
Buttock-popliteal length	42-56	47.97±3.50	42-60	53.27±3.83	<0.001
Knee height	32-49	40.42±3.75	37-49	43.35±2.93	<0.001
popliteal height	32-60	42.94±4.66	40-60	48.56±4.22	<0.001
Depth of the abdomen	7-80	68.81±11.29	62-84	74.22±5.29	0.010
Upper limb length	51-68	59.39±3.80	54-72	62.56±4.37	0.001
Shoulder- grip length	15-20	17.39±1.34	15-23	19.27±1.45	<0.001
Standing grip access limits	159-240	190.75±14.90	176-234	204.64±13.13	<0.001
Sitting grip access limits	61-146	109.94±16.16	95-175	118.94±13.16	0.010
front grip access limits	56-169	69.18±17.50	55-86	73.43±7.13	0.175

**Discussion**

In this study, 16 anthropometric dimensions of nurse's aide were studied. In almost anthropometric terms, there were significant differences between women and men. In this study, there was no significant difference in hip height, Thigh thickness, and front grip access limits in male and female nurses aide. There have been many studies in the country that confirm this difference.

In the study of Sadeghi et al (13). And in the study of Habibi et al. (14), There were no

significant differences between two groups in male and female in (thigh thickness) and (Sitting width and height of the backrest) respectively. Meanwhile, the study of the Sadeghi's was carried out on Iranian students with Persian ethnicity and Habibi's study on students.

Another study by Habibi et al (15), was conducted on male and female students a significant difference was observed in the two groups and it was concluded that the lack of

attention to the anthropometric dimensions would cause lumbar, cervical discomfort and early fatigue.

In the present study, due to the difficulty of the work of nurse's aide, the tools and workstations of nurse's aide should be designed in a way that is appropriate to the diversity of the population. Considering this, it seems necessary that most work stations are designed for men, while women represent a wide range of health workers. However, in this study, the results did not show significant differences in posture between two groups, however, considering the high and unacceptable QEC score in the two groups, it is necessary to consider ergonomic interventions. It should be noted that in a study by Bernal et al in 2015, aimed at assessing MSDs and the risk of work-related psychological factors in nurses and nurses' assistance, it was concluded that, in addition to ergonomic interventions, attention was paid to the organizational aspects of work environments. It can also play an effective role in reducing MSDs (16).

The results of this study showed that most of the discomfort is in the lower back. In fact, due to the large amount of manual work and displacement of patients in this population, the most likely cause of injury in the lumbar region was. Most studies, such as Stone (17), Sembajwe (18), confirm this results. Stone and colleagues concluded that lumbar, shoulder, neck and hip regions were the most frequent injuries in the study (17), but in our study, the hip region had the least amount of injury. Ching's study also found that multi-dimensional intervention strategies using engineering, administrative and personal controls should be developed to reduce WMSD among nursing staff (19).

Also, according to Laal et al., The use of anthropometric data of employees is a great way to design workstations of people, therefore, it should be considered more and more (20). If the number of samples increases in such studies, we will achieve more significant results. Therefore, it is suggested that this case be considered in future studies. The lack of collaboration of some personnel and the low sample size were the limitations of the present study. It is recommended that higher sample sizes be used in future studies.

## Conclusion

Establishing anthropometric database of nurse's aide in two groups of women and men and designing a work station suitable for anthropometric dimensions can reduce musculoskeletal disorders. Ergonomic interventions in this area are required and should be addressed

more and more by decision makers and managers.

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## Conflicts of Interest

None declared.

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