The prevalence of musculoskeletal disorders and its relationship to general health statement in hospital nurses

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Abstract: **Introduction:** The term musculoskeletal disorders (MSDs) covering over 200 conditions that affect the muscles, joints, tendons, ligaments, peripheral nerves and supporting blood vessels causing pain and functional impairment to sufferer. This study was directed as an epidemiologic survey with a view to "assessing the prevalence of MSDs among inpatient hospital nurses of Oil Company's grand hospital in Ahvaz-Iran over the Last 12 months and last week separately, measuring the general health state and its relationship to the prevalence of MSDs of specific sites of body". **Aims:** Estimation of the prevalence of MSDs among different groups of inpatient hospital nurses**,** Demonstration the relationship of MSDs and mental health state in hospital nurses**, and hypotheses:** Estimation the prevalence of MSDs in specific sites of the body, Categorize the severity of mental health state in hospital nurses, The relationship between MSDs in specific site of body and mental health state. **Materials and methods:** All of the nurses and nurse aides who are working in inpatient wards are included in this study but not outpatient and other clinical nurses. In this study the shift-workers are the nurses who are intermittently working in morning (6am -2pm), in afternoon (2pm – 10pm), and at night (10pm -6am). In the retuned-back questionnaires the questionnaires which contained at least one answer about MSDs YES or NO is recorded as a responder. From the 195 distributed questionnaires 161completed questionnaires were retuned back with the response rate of 82.5%. The SPSS software was used for processing and analysing the data. **Result:** From the 161 responders 10.5% of them had a $15 < \text{score} \geq 20$ which suggests the evidence of distress, and 4.3% of them had a score more than 20 which suggests severe problem and psychological disorders. The minimum score of GHQ was zero which is the indicator of best general health state, while the maximum score was 34 which indicate the poor general health state. The mean of GHQ score was 10.8(table 5), the distribution of GHQ scores from zero to 34 is demonstrated. The correlation between poor general health state and all of the musculoskeletal disorders over 12months was strongly positive except for neck, elbow, hand and wrist disorders.The correlation between hand/wrist disorders in last 12 months and poor general health was weakly positive but there was not any relationship between elbow and neck disorders in last 12 months and poor general health state.

1. Introduction
1.1. Definition and history

The term musculoskeletal disorders (MSDs) covering over 200 conditions that affect the muscles, joints, tendons, ligaments, peripheral nerves and supporting blood vessels causing pain and functional impairment to sufferer (1).

Investigations have demonstrated that MSDs are the leader causes of occupational injuries, disability, absenteeism and incapacity among workers in developed and developing countries.

1.2. Musculoskeletal disorders in nurses
1.2.1. The prevalence of MSDs among nurses

There are some investigations to support that MSDs are more common among nurses than other groups of work forces. For example in the study by Karahan (2) it is demonstrated that MSDs are common among Turkish hospital staff and in compare to other employees in hospital, the nurses have the highest prevalence. According to this study the prevalence of low back pain in hospital staff has been overall 65.8% while the highest prevalence (77.1%) was reported by the nurses. This study included only low back pain and not all of MSDs such as neck, shoulder, hip, knee, and ankle disorders. In another study among hospital nurses in Nigeria by Fabunmi (3) it is demonstrated that the 12 month prevalence of musculoskeletal disorders at any site of the body to be 90.7% and the low back pain is a commonly reported MSDs with the prevalence rate of 78%.

Studies of back-related worker compensation claims in USA reveals that nursing personnel have the highest claim rate of any occupation or industry, and 12 percent of nurses leave their profession

annually as a result of back injuries, and more than 52 percent of them complain of chronic back pain (4) (Nevada RN formation 2003) .

In the review of research of musculoskeletal disorders among Italian nursing personnel with a particular focus on studies that had examined individual, physical and psychosocial risk factors by Lorusso (5) (2008) it was shown that low back pain prevalence rate was varied widely among different investigations conducted in Italy, ranging from 33 % to 86 %. In the study by Mehrdad et al (6) (2010) the prevalence of MSDs among hospital nurses in Iran has been as follow: back pain 73.2%, knee pain 68.7%, shoulder pain, 48.6% and neck pain 46.3%. In the other study in Iran by Choobineh et al (7) (2006) it was demonstrated that 84.4% of the hospital nurses had experienced some symptoms of MSDs during a 12 months period.

1.3. MSDs in nurses, causes and risk factors

The causes of MSDs in nurses are widespread and patient care and treatment such as turning position and transferring, handling drugs, handling medical equipment and devices, work station design, physical environment, welfare and psychosocial factors are common causes. In the study among Japanese nurses by Smith and Derek (8) (2006) alcohol consumption, tobacco smoking, and having children have been shown to be significant risk factors, with adjusted odds ratio of 1.86, 2.45, and 2.53 respectively.

Also the prevalence of musculoskeletal disorders is increased by work volume; work hours per week and job experiences (3). It should be considered that there are some non occupational components such as leisure, play and daily physical activities and psychosocial disorders that contribute to occurrence of MSDs. According to a prospective cohort study among nurses by Nidd hammer (9) (1994) the risk factors associated with cervical, dorsal and lumbar pain are smoking, experience symptom of psychological disorders and physical work load. Psychological disorders are the risk factors for recurrent or chronic back pain. Age and history of previous MSDs are risk factors for cervical pain, and have children under 3 -year and tobacco consumption are risk factors for dorsal pain. In another study by Harcombe et al (10) (2010) in New Zealand nurses, job strain had the strongest association with neck (OR 3.46) and wrist/hand pain. It means that addressing job strain could provide significant benefit for those with neck and wrist/hand pain. In the study by Nick pour et al (11) (2009) on Iranian hospital nurses it was demonstrated that previous history of MSDs, increasing BMI and lifting patients are related to the prevalence of MSDs.

1.4. The psychosocial factors

Exposure to physical work factors and the development and prognosis of particular disorders may be modified by psychosocial factors. Understanding these associations and relating them to the causes of disease is critical for identifying exposures amenable to preventive and therapeutic interventions. For this reason the remediation strategies which focus only on manual handling task would probably are suboptimal in reducing MSDs among nurses (8) (Smith & Derek 2006).

For managing and reducing the risk of MSDs among high risk group of work forces such as nurses, estimation of MSDs prevalence, identification of risk factors and exposure assessment is mandatory.

This study was directed as an epidemiologic survey with a view to "assessing the prevalence of MSDs among inpatient hospital nurses of Oil Company's grand hospital in Ahvaz-Iran over the Last 12 months and last week separately, measuring the general health state and its relationship to the prevalence of MSDs of specific sites of body".

1.5. Aims, objectives and hypotheses
1.5.1. Aims
A. Estimation of the prevalence of MSDs among different groups of inpatient hospital nurses
B. Demonstration the relationship of MSDs and mental health state in hospital nurses

1.5.2. Objectives
[1] Estimation the prevalence of MSDs in specific sites of the body
[2] Categorize the severity of mental health state in hospital nurses
[3] The relationship between MSDs in specific site of body and mental health state

1.5.3. Hypothesis
I. There is a correlation between the prevalence of MSDs and mental health state
II. There is the correlation between MSDs in specific site of body and mental health state

1.6. Materials and methods
1.6.1. Sampling
All of the nurses and nurse aides who are working in inpatient wards are included in this study but not outpatient and other clinical nurses.

1.6.2. Questionnaires and Data Collection
All of the data which were needed in this study are based on self reporting via the

questionnaires provided. In this study the shift-workers are the nurses who are intermittently working in morning (6am -2pm), in afternoon (2pm – 10pm), and at night (10pm -6am). The nurses who are usually working at morning but sometimes working as over time in afternoon or night, or she/he has a history of shift working not included as shift workers. In this survey, a smoker is defined as a person who smokes at least one cigarette per day.

The MSDs' Nordic questionnaire which specifies the organ involvement of the persons who have or have had MSDs, in recent 7days or during the last 12 months according with the attached picture was used to demonstrate the pain or any discomfort from head, neck, shoulder, elbow, wrist and hand, upper back , lower back, hip and thigh, knee and ankles.

Among the general health questionnaires (GHQ) which demonstrate the recent weeks' mental health state of the responders and non-psychotic disorders, the GHQ-12 which is quick, reliable and sensitive was preferred to be used.

In the retuned-back questionnaires the questionnaires which contained at least one answer about MSDs YES or NO is recorded as a responder. From the 195 distributed questionnaires 161completed questionnaires were retuned back with the response rate of 82.5%. The SPSS software was used for processing and analysing the data.

GHQ score:
Scoring – Likert Scale 0, 1, 2, 3 from first to 4th choice.
12 items, 0 to 3 for each item
Score range is from 0 to 36.
 Scores about 11-12 is typical, Score >15 suggest the evidence of distress and Score >20 suggests severe problems and psychological distress

1.6.3. Analysis
The answers to questions of MSDs in Nordic questionnaires including NO or YES were converted to 0 and 1. The minimum score of musculoskeletal disorders for each person was zero and maximum score was 20. And in the same way responses to smoking habits No or Yes were converted to 1 and 2. Also the age groups converted to 1, 2, 3, and 4.

For estimating the prevalence of MSDs as a whole, the person who had reported at least one disorder were considered as a case then the prevalence was calculated as follow: the number of cases/161 multiplied by 100 (161 is the total number of responses). In the same way the prevalence of who had at least two or more disorders were calculated. The prevalence of each disorder such as disorders of

neck, shoulder, elbow, back, etc also calculated separately. For demonstrating the relationship between the numerical data such GHQ score and the prevalence of MSDs, the Pearson's correlation coefficient (r) estimation was used.

1.7. Results
1.7.1. Demographic data
According to demographic data 87% of valid cases were female, 3.1% of them were smoking and 76.4% were working as shift workers. 25.9% of responders were between 20-30 years old, 5o.6% were 30-40, and 21.5% were between 40-50 years old and only 1.4% of them were between 50-60 years. The range of experience was between 0-5 years to more than 25 years (table 1).

Table1. Demographic data of inpatient hospital nurses of National Iranian Oil Company (NIOC) grand hospital nurses – Ahvaz

|		
Male	**19 person**	**13%**
Female	**127 person**	**87%**
Experience 0-5 years	**39 person**	**24.7%**
Experience 5-15 years	**81 person**	**51.3%**
Experience 15-25 years	**37 person**	**23.4%**
Experience > 25 years	**1 person**	**0.6%**
Age between 20-30 years	**41 person**	**25.9%**
Age between 30-40 years	**80 person**	**50.6%**
Age between 40-50 years	**34 person**	**21.5%**
Age between 50-60 years	**3 person**	**1.9%**
Non shift workers	**37 person**	**23.6%**
Shift workers	**120 person**	**76.4%**
Non smoking nurses	**156 person**	**96.9 %**
Smoking nurses	**5 person**	**3.1%**

1.7.2. Reliability of the questionnaires:
The reliability of Nordic questionnaire for MSDs and GHQ 12 questionnaire by Cronbach's Alpha test was 83.5% and 87.1% respectively.

1.7.3.   Prevalence of musculoskeletal disorders:
The prevalence of MSDs during the last week and over last12 month are demonstrated in tables 2 & 3 respectively.

In overall 90.1 percent of the responders reported that they had at least one disorder of musculoskeletal system during last week while 81.4 percent of them had at least two disorders and 65.8 percent had more than two disorders (Fig1).
As is demonstrated in figure 1 only 9.9% of responders were free of symptoms during last week. 19.3% had 3 disorders and 1.9% of them had complained from all of the disorders.

experience of MSDs over last week
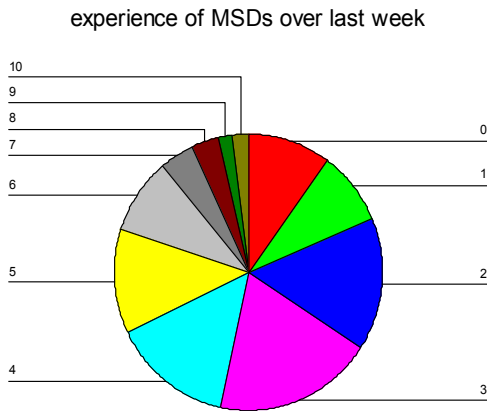
Fig1. Frequency of nurses who had experienced o, 1, 2, 3, ...of MSDs during last week in grand hospital of NIOC in Ahvaz

1.7.4. General Health statement

From the 161 responders 10.5% of them had a 15<score ≥ 20 which suggests the evidence of distress, and 4.3% of them had a score more than 20 which suggests severe problem and psychological disorders (Table 4).

The minimum score of GHQ was zero which is the indicator of best general health state, while the maximum score was 34 which indicate the poor general health state. The mean of GHQ score was 10.8(table 5), the distribution of GHQ scores from zero to 34 is demonstrated in figure 2.
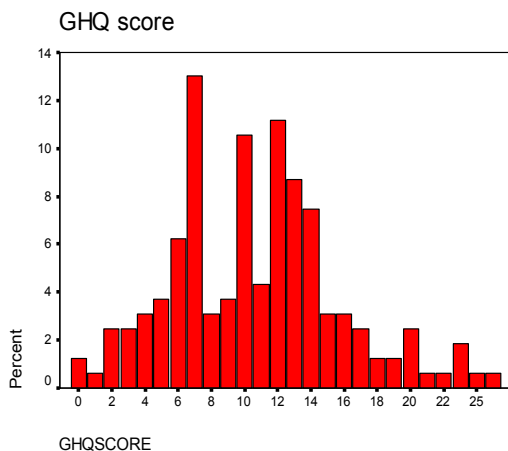
GHQ score

Fig2. Distribution of GHQ score among inpatient hospital nurses of NIOC's grand hospital in Ahvaz

1.7.5. Correlation analysis

Is there any correlation between GHQ score and MSDs?

By Pearson's correlation test between MSDs and general health state, there was a strong positive correlation between poor general health state (high GHQ score) and the prevalence of MSDs during last 12 month and last week separately and in combination, with the confidence of more than 99% (table 6).

The detailed correlation test between each site of body disorders during last week (table 7) and last 12 months (table 8) and general health score demonstrated that some disorders are more affected by general heath state than others. For example the correlation between poor general health state and musculoskeletal disorders of foot/ ankle, hip/ thigh, lower back and upper back are stronger than other disorders over last week while there was not any correlation between neck disorders in last week and general health state.

The correlation between poor general health state and all of the musculoskeletal disorders over 12months was strongly positive except for neck, elbow, hand and wrist disorders (table 8). The correlation between hand/wrist disorders in last 12 months and poor general health was weakly positive but there was not any relationship between elbow and neck disorders in last 12 months and poor general health state.

1.8. Discussion

The data collected in this study was based on questionnaires and self reporting, and like to any other type of questionnaires, it measures the attitude and individual perception of pain and discomfort, pleasure, happiness and so on. For this reason the prevalence of MSDs among special group of workers in different countries even with the same hazards may be different due to their different attitude and perception.

The strongly positive correlation between poor general health statement and short term and long term MSDs (over last week and last year) supports the ideas of who believe that general health and psychosocial statement have an important role in developing MSDs. Psychosocial risk factors as well as leading to stress, which is a hazard in its own right, can lead to musculoskeletal disorders. The stress-related changes in the body (such as increased muscle tension) can make people more susceptible to musculoskeletal problems (13) (HSE book, 2000).

Table 2. Prevalence of MSDs in specific sites of the body over last week among inpatient hospital nurses of NIOC's grand hospital in Ahvaz

head	Neck	shoulder	elbow	Hand/wrist	Upper back	Lower back	Hip/thigh	knee	Ankle/foot
53.7%	45.3%	39.8%	14.9%	42.9%	32.3%	37.9%	20.5%	46%	26.1%

Table 3. Prevalence of MSDs in specific sites of body over last 12 months among inpatient hospital nurses of NIOC's grand hospital in Ahvaz

head	Neck	shoulder	elbow	Hand/wrist	Upper back	Lower back	Hip/thigh	knee	Ankle/foot
62.1%	64%	44.1%	14.3	49.7%	41.6%	48.4%	25.5%	54.7%	37.9%

This relationship is also demonstrated in previous studies such as the study by Warming (14) (2009), which demonstrated that stress and transfer task are associated with low back pain. Another example is the study by Simon, et al (15) (2008), "back or neck- pain-related disability of nursing staff in seven European countries" which showed a pronounced association between psychosocial factors and back or neck-pain-related disability. In this survey as is demonstrated in tables 8 and 9 all of MSDs except neck, elbow and hand/wrist have a strong positive correlation with general health statement score.

As demonstrated in this survey general health score has a strong positive correlation to develop MSDs (nurses with poor general health more involved). It means that in any program for prevention of MSDs the general health state of employees should be considered.

Recommendations

There are some recommendations for reducing the prevalence of MSDs among nurses and its consequences, direct and indirect costs. These recommendations are to who have a role in prevention of MSDs such as policy makers, employers, clinicians and other stakeholders.

A. Identification of vulnerable group who suffering from some evidence or severe psychological problem and appropriate intervention to control it

B. Providing the psychosocial support and welfare facility to improve the motivation and mental health levels.

Table 4. Frequency of GHQ score among inpatient hospital nurses of NIOC's grand hospital in Ahvaz

GHQ Score	f_i	%
0	2	1.2
1	1	.6
2	4	2.5
3	4	2.5
4	5	3.1
5	6	3.7
6	10	6.2
7	21	13.0
8	5	3.1
9	6	3.7
10	17	10.6
11	7	4.3
12	18	11.2
13	14	8.7
14	12	7.5
15	5	3.1
16	5	3.1
17	4	2.5
18	2	1.2
19	2	1.2
20	4	2.5
21	1	.6
22	1	.6
23	3	1.9
25	1	.6
34	1	.6
Total	161	100.0

Table 5. Descriptive Statistics of GHQ score among inpatient hospital nurses of NIOC's grand hospital in Ahvaz

	Number	Minimum	Maximum	Mean	Std. Deviation
GQH SC.	161	0	34	10.76	5.306

Table 6. Correlations between job experience, MSDs and GHQ score among hospital nurses in NIOC's Grand hospital

Correlation analysis (Pearson Correlation)	MSDs over last12 months	MSDs over Last week& last 12months	Years of experience	GHQ score
MSDs over Last week	.715(**)	.917(**)	.143	.369(**)
MSDs over last12 months		.935(**)	.222(**)	.417(**)
MSDs over Last week& last12months			.200(*)	.426(**)
Years of experience				-.003

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed)

Table 7. Correlation between GHQ score & MSDs in specific site of body over last week among hospital nurses in NIOC's Grand hospital of Ahvaz

MSDs in specific site of body →	ankle/ foot last week	Knee last week	hip/ thigh last week	lower back last week	upper back last week	hand/ wrist last week	elbow last week	shoulder last week	Neck last week	head last week
GHQ SCORE Pearson Correlation	.216 (**)	.190 (*)	.267 (**)	.224 (**)	.217 (**)	.188 (*)	.160 (*)	.185 (*)	. 038	.202 (*)

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed)

Table 8: Correlation between GHQ score & MSDs in specific site of body over last12 months among hospital nurses of NIOC's Grand hospital of Ahvaz

MSDs in specific site of body →	head 12m	neck 12m	shoulder 12m	Elbow 12m	hand/wrist 12m	upper back 12m	lower back 12m	hip/ thigh 12m	Knee 12m	ankle/ foot 12m
GHQ SCORE Pearson Correlation	.273 (**)	.118	.260 (**)	.129	.183 (*)	.266 (**)	.281 (**)	.228 (**)	.231 (**)	.333 (**)

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed)

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