

# Relation between the prevalence of work-related musculoskeletal disorders and years of job experience among workers of Nag Hammadi sugar factory in Egypt

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**Received** 11 September 2016

**Accepted** 5 December 2016

**Bulletin of Faculty of Physical Therapy** 2017, 22:23–26

## Background

Assessment of the level of exposure to work-related musculoskeletal disorders (WMSDs) risk factors can be an appropriate basis for planning and implementing an interventional ergonomics program in the workplace. This study was conducted among workers of Nag Hammadi sugar factory to investigate the relation between prevalence of WMSDs and years of job experience among factory workers.

## Materials and methods

A total of 109 workers were selected from Nag Hammadi sugar factory and included in the study. The Nordic musculoskeletal questionnaire was used to study the prevalence of WMSDs.

## Results

The statistical analysis has shown that there was no statistically significant difference of WMSDs prevalence in participants and years of job experience in all body regions except for upper back. Workers who have worked for 6–10 years showed a significant prevalence of upper back pain than those who worked less than 5 years ( $P < 0.05$ ).

## Conclusion

Ergonomic interventions and education programmes that might improve the working conditions may be necessary to decrease upper back trouble in those worker population.

## Keywords:

job experience, standardized Nordic questionnaires, sugar factory workers, work-related musculoskeletal disorder

Bulletin of Faculty of Physical Therapy 22:23–26

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1110-6611

## Introduction

Work-related musculoskeletal disorders (WMSDs) are a common health problem throughout the world and in the developed and industrially developing countries, it is considered as a major cause of disorders among the workforce [1,2]. The economic loss associated with these disorders affects the individual as well as the organization and the society as a whole [3]. National priority in many countries is preventing WMSDs [4] as they are considered one of the most widely reported problems ergonomists encounter in the workplace around the world [5].

A previous study have determined the rate of WMSD prevalence among workers in a sugar-producing factory; with knees, back and shoulder dysfunction being the most prevalent and determining the prevalence of WMSDs in relation to years of job experience with a mean age of 43 years [6]. The association between frequent prospective measurements of musculoskeletal pain and objective measurement of physical activities at work among blue collar workers has been investigated. Such musculoskeletal disorders

were not preventable by different strategies that were used [7].

Long exposure to work seems to increase the risk of musculoskeletal disorders in general. For example, workers at textile factories showed a significant association between the duration of employment and high Rapid Upper Limb Assessment scores [8,9]; however, there are limited data on prevalence of WMSDs in relation to years of job experience with elimination to the effect of aging process. The results of this study might help in scientific research for planning a proper prophylactic ergonomics program in the workplace for enhancing workers' health in the sugar-producing industry. Therefore, this study was carried out to investigate the relation of WMSD prevalence and years of job experience among workers of Nag Hammadi sugar factory in Egypt.

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## Materials and methods

### Study design

A cross-sectional study design was used. The dependent variable was the prevalence of WMSD and the independent variable was the years of job experience.

### Sample

One hundred and nine factory technicians of both sexes were recruited through conducting awareness workshops at the Nag Hammadi sugar factory. Based on years of experience, the participants were categorized into two groups: group A (1–5 years) had 31 participants and group B (6–10 years) had 78 participants. Workers with operations or accidents affecting the musculoskeletal system and systemic diseases involving the musculoskeletal system were excluded. Also workers who have another job besides the main job at the factory were excluded from this study. The participants' age ranged from 22 to 40 years and the average years of service ranged from 1 to 10 years. All participants were asked to provide an informed written consent before they were enrolled in the study. The study was approved by the faculty of physical therapy ethics committee.

### Instrumentation

Data were collected via the standardized Nordic questionnaire which is a valid and reliable questionnaire for WMSD analysis that consists of two sections. Section A covers personal data including age, sex, weight, height, number of years' service, and the average number of working h/week in sitting position, while section B includes questions about musculoskeletal

problems (have you at any time during the last 12 months had trouble: ache, pain, discomfort) referring to different anatomical areas such as the neck, shoulders, elbows, wrists/hands/thumb, upper back, lower back, hips/thighs, knees, and ankles/feet [10].

### Procedures

Reported WMSD symptoms (ache, pain, or discomfort) were limited to 12 months before the study. The questionnaires were completed on the basis of a face to face interview with each worker.

### Data analysis

Collected data were analyzed and compared statistically through using SPSS (version 18; SPSS Chicago, USA).  $\chi^2$  Analysis was used to determine the association of prevalence of self-reported musculoskeletal disorders and years of job experience.

## Results

### Patient characteristics

Table 1 demonstrates the general characteristics of patients while Table 2 demonstrates the frequency and percentage of reported WMSD in different body regions of both groups in the 12 months before the study. There was a significant prevalence of upper back troubles in participants who have worked for 6–10 years ( $P < 0.05$ ).

## Discussion

This study was conducted to examine the relation of WMSDs prevalence and years of job experience among workers of Nag Hammadi sugar factory via

**Table 1 General characteristics of patients**

General characteristics	Age (years)	BMI (kg/m <sup>2</sup> )	Average working hours (h)
Group A (N=31) (mean±SD)	27.74±3.47	24.43±3.1	53.1±5.7
Group B (N=78) (mean±SD)	29.1±3.14	25.55±2.21	53.23±6.3
Comparison (P-value)	0.059	0.073	0.916

**Table 2 Frequency and percentage of reported musculoskeletal disorders in different body regions in both groups in the 12 months before the study**

Body regions	Response by 'yes'		P-value
	Group A (1–5 years) [n (%)]	Group B (6–10 years) [n (%)]	
Neck	7 (22.5)	26 (33.3)	0.357
Shoulder	8 (25.8)	20 (25.6)	0.986
Elbow	2 (6.4)	17 (21.8)	0.057
Wrist and hand	5 (16.2)	15 (19.2)	0.79
Upper back	1 (3.2)	15 (19.2)	0.03*
Lower back	15(48.3)	31 (39.7)	0.52
Hip and thigh	2 (6.4)	9 (11.5)	0.725
Knee	9 (29.1)	33 (42.3)	0.276
Foot and ankle	4 (12.9)	13 (16.6)	0.774

\* $P < 0.05$ , significant.

standardized Nordic questionnaire. The results have shown that there was no statistically significant difference of prevalence in relation to years of job experience in all body regions, except for upper back that showed increased prevalence with increasing years of service.

Increasing the percentage of WMSDs for upper back with years of job experience may be explained by one of the following causes: first, repetitive tasks associated with work may result in inflammatory changes, particularly in tendons that were showed by several animals' histological examination which showed increased cellularity and increased cross-sectional area of tendons affecting their mechanical properties [11]. Second, high physical work demands such as monotonous and repetitive movements, awkward body postures, prolonged standing, work with require the arms to be used above shoulder height and heavy lifting are the main causes for WMSDs [12].

Third, the risk of hypoxia and anaerobic conditions might be increased by exposure to static workload and thereby reduce the endurance time for upper back muscles [13,14]. Last, symptoms associated with WMSD may be attributed to accumulation of microtrauma, which could be highly disabling over time if not treated properly [15].

The current finding of upper back agree with the findings of Andersen and Gaardboe [16] who reported that with increasing years of employment, the prevalence of shoulder and neck WMSDs increases in sewing machine operators. The workers who had worked for more than 5 years had an increased prevalence of WMSD. Our results of upper back also come in agreement with Choobineh *et al.* [6], who reported that increasing age was significantly associated with increasing neck, upper, and lower back WMSD symptoms among workers of an Iranian sugar-producing factory.

On the other hand, results of upper back do not agree with several investigators who indicated that younger workers suffer more occupational injury at a higher rate than older workers [17]. Also results of upper back disagreed with Häkkänen *et al.* [18], who showed that the effect of job experience on the incidence of WMSD depended on the workload, where in the high workload group all new workers had a higher incidence compared with experienced workers. This is also in disagreement with the findings of Abebe and Fantahun [19], Bhattacharjee *et al.* [20] who have shown that the risk of occupational injury in those who have started

working at a younger age is more than that of the older workers among factory workers.

Moreover several studies conducted on different types of jobs have shown that the performance of workers with less experience differs from that of workers who have worked for longer. In a study of wrist disorders, Malchaire *et al.* [21] found that people who have worked longer exerted less force in manual tasks suggesting that the cause results from differences in skills between people with different durations of employment. This can be explained as experience, skill, and the level of knowledge in work among young workers are low; also lack of training and sleep disturbance may be other causes [22].

The results of other body parts go in line with Pourmahabadian *et al.* [23] who have examined the prevalence of WMSD among workers of an Iranian pharmaceutical industry and found that age and job experiences were not significantly associated with musculoskeletal disorders.

#### Limitations

This study was limited to the small sample size so we cannot generalize the results; moreover the severity of symptoms is not specified. Further work should be done on a larger sample and on specified tasks to achieve a better understanding of the results.

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#### Conclusion

On the basis of the finding of this study, there was no statistically significant difference in the prevalence of WMSDs for all body parts in relation to years of job experience in sugar factory workers; except for upper back that showed a significant increase in the prevalence as the years of job experience increase. Therefore, ergonomic interventions and education programs might improve the working conditions and decrease the exposure level to WMSDs that should focus on eliminating awkward postures and manual handling of heavy loads, using proper seats that are equipped with backrest together with reducing the height of the working table in accordance with anthropometric data.

**Financial support and sponsorship**  
Nil.

#### Conflicts of interest

There are no conflicts of interest.

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