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TO STUDY THE PREVALENCE OF MUSCULOSKELETAL DISORDERS IN SECURITY GUARDS

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ABSTRACT

Background: The prevalence of musculoskeletal disorders has increased markedly with promotion of industrial life. It is one of the causes of absenteeism of employees from their work and significantly affecting their quality of life. The prevalence is not known in profession such as security guards, whose occupation comprises of prolonged standing mainly.

Methods: A cross sectional survey was administered to 100 security guards in Guru Gobind Singh Super Thermal plant, Ropar, Punjab, India, using a self-structured questionnaire.

Results: 100 security guards included in the study were in the age group of 30-50 years. 58% of the guards were alcoholic while only 19% were smokers. Out of 100 respondents, 68% had complained of MSDs in different areas while 32% did not complain of any musculoskeletal discomfort. Out of 68 security guards who had MSDs, majority of the guards had back pain 42.6%. Higher prevalence of MSDs, 97.1% (33/34) had been found in 46-50 years of age, followed by age group of 41-45 years where the prevalence was 76.2% (16/21). The most common risk factor in our study identified was opening the gate again and again (98.5%) which could be due to the nature of their duty. Most common used coping strategy (69.9%) was to change from standing to sitting position when MSDs aggravates.

Conclusion: It can be concluded that there is significant (68%) prevalence of MSDs in security guards. Demographic variables such as age, smoking and alcohol consumption have been found out to be contributing risk factors.

Keywords: Musculoskeletal disorders, WMSDs, Security guards, physical disability, Nordic Questionnaire

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INTRODUCTION

A wide range of inflammatory and degenerative conditions affecting muscles, tendons, joints, peripheral nerves etc. are categorized as "musculoskeletal disorders"(MSDs).¹ It causes long term pain, fatigue and physical disability as it affects multiple joints leading to increased job restriction, increased absenteeism (lost work) and transfer to another job.² In western countries more work absenteeism or disability is caused by MSDs than any other group of diseases even 50-70% of work force in developing countries is at a risk of developing musculoskeletal disorder owing to the various ergonomic risks factors present in their workplace.³ The disorders that result from work related event are known as "work related musculoskeletal disorders" (WMSDs), where workers experience discomfort in one or multiple body parts, pain in joints, tingling and swelling.^{2,4}

Thus term work related musculoskeletal disorders (WMSDs) was replaced with cumulative trauma disorders (CTDs) as it was noticed that stress, fatigue and some other types of psychological depression could also trigger pain even if no lesion was present.⁵ The health care professionals (nurses⁶ and physiotherapists⁷) and bus drivers⁸ are prone to WMSDs inherent due to their clinical practices and repeatedly activities respectively. Working in standing provides large degree of freedom and enables a worker to perform job in an easy and efficient way enhancing productivity⁴. But, when workers spend more than 50% of total working hour in standing, which is termed as prolonged standing, it exposes them to potential occupational injuries⁴. This is in consistent with prevalence of low back pain and pain in distal lower limb with constrained standing, i.e. standing without freedom to sit, compared to standing with freedom to sit.⁹ This is a vital contributor to decrease in workers performance in industry⁴. Literature quotes standing more than four hours a day exposes a worker to low back pain, while 50% of healthy individual report discomfort in back and leg even after 2 hours of prolonged standing⁴. Security guards spend almost their entire working hours in standing position. This puts them at higher risk for hazards of prolonged standing than any other occupations such as lathe operators and milling machine operators who do repetitive movement, bending and vibration etc. in addition to prolonged standing. MSDs have multiple risk factors related or unrelated to occupation. Addressing these risk factors may be helpful in minimizing MSDs. Age, gender, smoking, weight, height, BMI, and general health status are other individual risk factors which are seen associated

with WMSDs in security guards.¹⁰ Thus our study focuses on delivering the prevalence of MSDs in security guards whose job demands prolonged standing, as the major activity. Once the prevalence is known, preventive and coping strategies can be adopted to prevent MSDs. It will make the lifestyle of security guard physically and mentally healthy, safe and improve their work efficiency and productivity.³

MATERIALS AND METHODS

A total of 100 security guards were selected through consecutive sampling method to respond the questionnaires. Visits were made on 5 consecutive days to collect the data from security guards working in Guru Gobind Singh Super Thermal Plant, Ropar, Punjab, India. Male Security guards between age of 30-50 years, who had experience of 3 years or more with working of 8 hours per day, were included in the study. Exclusion criteria included, any history of trauma to spine, any diagnosed case of local and systemic infection, malignancy, any history of neurological disorders, orthopaedic disorder or fracture, psychological disorder and involvement in any form of active sport. Outcome measures were Self structured questionnaire^{2,5,9,10} for measuring Job risk factors and coping strategies and Standardized Nordic Questionnaire¹¹ for analysis of musculoskeletal symptoms. The basal metabolic rate (BMI) was calculated after measuring weight and height of the subject. Subjects were asked to answer at the best of their knowledge. So, data was documented by using following questionnaire: (1) Standardized Nordic Questionnaire¹¹ is the most frequently used symptom based questionnaire used to assess the nature and severity of self reported musculoskeletal complaints with respect to 9 body areas. Occurrence of these symptoms over past week and past 12 months was captured. (2) Self Structured Questionnaire^{2,5,9,10} consist of 3 sections regarding demographic data and occupational risk factors and coping strategies. For each question 'Yes' was scored as '1' and 'No' will be scored as '0' except questions 2,3,4 and 11. For these questions 'No' will be scored as '1' and 'Yes' will be scored as '0'. Highest potential score was 14(14×1) and lowest potential score was 0. Total score of section B was out of 14. Total number of questions for section C i.e. coping strategy score was 10. For each question 'Yes' was scored as '1' and 'No' was scored as '0'. Highest potential score would be 10(10×1) and lowest potential score was 0. Total score of the section C was out of 10. A higher score represented a higher chance of developing musculoskeletal disorders. Total score = Score of

section B +Score of section C Maximum score = 24(14 + 10), Minimum score = 0

Data were summarized using the descriptive statistics of mean and standard deviation. Data were summarized and presented in number and percentages of survey response. Pearson's correlation and Chi square analysis was used to determine correlation and the association of prevalence of self reported musculoskeletal symptoms with personal characteristics, job risk factors and coping strategies. SPSS (standard package for social sciences) version 19.0 software for window 2007 was used to analyze the data. Significance level was set at $p < 0.05$.

RESULTS

100 security guards participated in the study. 100 security guards included in the study were in the age group of 30-50 years with mean age 41.6 ± 6.3 years. All of them had mean BMI of 25.9 ± 3.7 and range varied from 16.33-34.66. Security guards in present study had Mean experience and range 6.8 ± 3.7 years and 3-20 years respectively. 58% of the guards were alcoholic while only 19% were smokers (Table1).

Table 1: Demographic characteristics of 100 security guards.

Characteristics	Mean \pm SD Range
Age	41.6 ± 6.3 30-50
BMI*	25.9 ± 3.7 16.33-34.66
Years of experience	6.8 ± 3.7 3-20
Alcoholic(Yes/No)	3.9 ± 1.2 1-9
Smokers (Yes/ No)	7.5 ± 1.2 4-10
Score of section B of self structured questionnaire	11.5 ± 1.9 6-17
Score of section C of self structured questionnaire	$19 \pm 19\%$ 81(%)
Score total of section B and C of self structured questionnaire	$58 \pm 58\%$ 42(42%)

Out of 100 respondents, 68% had complained of MSDs in different areas while 32% did not complain of any musculoskeletal discomfort. Higher prevalence of MSDs, 97.1% (33/34) had been found in 46-50 years of age, followed by age group of 41-45 years where the prevalence was 76.2%(16/21). Age group of 35-40 years had 50.0% (13/26) of MSDs while least 31.6% (6/19) had been found in age group of 30-35 years. The odd's of alcoholic security guard having MSDs is 8.33(CI=3.176-21.865) while the Odd's of smoker

having MSDs is 5(1.079-23.160). There were 56 respondents out of 100 who had trouble in doing routine activities in last 12 months. Out of 68 security guards who had MSDs, 80.9% (55/68) had trouble in doing daily activities in last 12 months had MSDs. 33out of 100 respondents had trouble in doing routine activities in last 7 days. This restriction in last 7 days could be continuation of restriction in last 12 months. Initially body tries to adjust to stress of prolonged standing but slowly it fails to adapt and causes MSDs.

TABLE 2: The work factors contribution to MSDs.

Risk factors	Yes/ No	Number of respond ents	(%)
1. Do you open the entry gate again and again in one day	Yes(1)	67/68	(98.5%)
2. Do you take rest breaks or pauses during the working hours	No(1)	3/68	(4.4%)
3. Do you change to sitting position from standing	No(1)	4/68	(5.9%)
4. Do you walk around the concerned area of duty	No(1)	1/68	(1.5%)
5. Do you carry heavy gun around your shoulder	Yes(1)	45/68	(66.2%)
6. Do you Reach or work away from your body.	Yes(1)	4/68	(5.9%)
7. Do you work overtime	Yes(1)	3/68	(5.4%)
8. Do you work on irregular shifts	Yes(1)	19/68	(27.9%)
9. Do you work beyond your physical limits	Yes(1)	2/68	(2.9%)
10. Do you work when injured or hurt	Yes(1)	2/68	(2.9%)
11. Do you take adequate training in injury prevention	No(1)	62/68	(91.2%)
12. Do you experience unequal weight bearing in standing during your working hours	Yes(1)	66/68	(98.1%)
13. Do you find your job stressful	Yes(1)	6/68	(8.8%)
14. Do you lift heavy objects	Yes(1)	13/68	(19.1%)

Table 2 shows the risk factors those results into musculoskeletal disorders in security guards. The most common risk factor in our study identified was opening the gate again and again (98.5%) which could be due to the nature of their duty. Another possible reason can be of transmission of force from distal to proximal for opening the large

gate frequently which may lead to shoulder pain. Lack of adequate training had been another common risk factor for developing MSDs (98.1%). This could be due to the fact that lack of appropriate training leads to decrease muscle mass and decrease strength. Working beyond physical limits and working when injured were least contributing risk factors (2.9%).

TABLE 3: Coping strategy adopted by security guards

Coping strategy	Yes (%)	No (%)
1. I am aware of my posture during working hours	0/68 (0%)	68/68 (100%)
2. I am aware of my working posture	4/68 (5.9%)	64/68 (94.1%)
3. I pause regularly so I can stretch	2/68 (2.9%)	66/68 (97.1%)
4. I select work/functions that will not aggravate/provoke my discomfort	6/68 (8.8%)	62/68 (91.2%)
5. I seek medical attention when I experience pain	9/68 (13.2%)	59/68 (86.8%)
6. I modify my standing position in order to avoid stress or injury(lean on wall, unequal weight bearing)	38/68(55.9%)	30/68 (44.1%)
7. I change from standing position to sitting when it aggravates my discomfort	47/68(69.1%)	21/68 (30.9%)
8. I warm up and do stretching exercises before the starting of working hours.	5/68 (7.4%)	63/68 (92.6%)
9. I do exercises at home regularly	43/6 (63.2%)	25/68 (36.8%)
10. I use external support when I feel discomfort	2/68 (2.9%)	66/68 (67.3%)

Table 3 shows the coping strategies adopted. Most common used coping strategy (69.9%) was to change from standing to sitting position when MSDs aggravates, followed by doing exercises at home regularly (63.2%). Least used coping strategies were to pause regularly so that to stretch (2.9%) and to use external support when feel discomfort (2.9%). One explanation of absence of coping strategy can be demanding nature of job due to which a single security guard had burden of 4 times that he can tolerate. In these situations employ forget to use suitable coping strategy to prevent MSDs.

There was positive correlation (p value = 0.045) between risk factor score and age of the

participants. With increase in age there is increase in risk factors score and thus individuals with higher age are more likely to develop MSDs. The correlation between BMI and job risk score has been found negative (p value = 0.900). It indicates with increase in BMI, there will be lesser chances to have MSDs. job risk score and experience had negative correlation (p value = 0.365) between them. With increase in experience, lesser the development of MSDs. As there is negative correlation (p=0.304) between coping strategies score and age, so with increase in age, there is decrease in coping strategy score and more the chances to have MSDs. Positive correlation (p=0.002) between risk factors score and coping strategies score has been found. It suggests that with increase in risk factors for developing MSDs, there will be increase in coping strategy score.

DISCUSSION

Out of 100 respondents, 68% had prevalence of MSDs in different areas while 32% did not complain of any musculoskeletal discomfort. Out of 68 security guards who had MSDs, majority of the guards had back pain 42.6% (29/68). Back pain in standing may be due to increased perceived exertion and discomfort in low back and increased muscle fatigue from efforts required to maintain upright posture. The Back pain in standing may be due to increased perceived exertion and discomfort in low back and increased muscle fatigue from efforts required to maintain upright posture. This high prevalence of MSDs might be due to the fact that performing job in prolonged standing for more than 4 hours potentially exposes the worker to MSDs⁴. As the working hour of subjects in our study was 8 hours, so they were twice at risk to develop MSDs than other workers. Possible explanation can be that prolonged standing leads to static contraction of muscles to maintain posture which leads to discomfort and fatigue, which is supported by Krijnen et al (1998)¹². This is in consistent with Vaan Dieen et al (1987)¹³ who had also proved that prolonged low intensity loads could increase the likelihood of tissue damage, due to visco elastic time dependent behavior of biological tissues leading to pain and discomfort.

Radin et al 1973 investigated that fatigue in ligaments, other passive structures, spinal shrinkage due to spinal loading, agonist-antagonist co-activation are other factors which contribute to back pain as they are required in maintaining upright posture.¹⁴ Shoulder pain was second common cause of musculoskeletal disorder. This could be because of repetitive movement of upper limb of opening the gate in guards and carrying heavy gun. The frequency may vary from 10 to 100

times. Through this transmission of vibration and various forces occur, that may cause physiological stress and fatigue of upper limb muscles. Security guards were exposed to a high load on the trapezius muscles bilaterally, as well as prolonged forward bending of the head.¹⁵ With advancing age the risk of developing MSDs also increases. Security guards may be imposed to more stress and discomfort with increase in age. It has been suggested that smoking, alcohol and tobacco has association with development of MSDs and significant odd's ratio has been found in nurses among japan.⁶ There were 56 respondents out of 100 who had trouble in doing routine activities in last 12 months. Out of 68 security guards who had MSDs, 80.9% (55/68) had trouble in doing daily activities in last 12 months had MSDs. The appropriate explanation for this may be the pain or discomfort that had been changed to disability with the course of time due to which there was restriction in doing daily activities. Although dysfunction is primarily of physical nature, it appears to impact mental status as well. Thus, the physical limitation posed to the patient also affects their mental status which has a negative effect both physically and psychologically. This suggest the quality of life of the patient is affected both physically and mentally¹⁶. Another supporting fact is that lack of staff members, to attend more than one patient at a time were some factors to increase workload on physiotherapists and thus results in prevalence of MSDs in last 12 months^{17,18}. With prolonged axial loading of spine there is visco elastic deformation and causes stress concentration in intervertebral disks and thus higher risk of failure which is supported by Adams et al (1996). 3.1% (1/32) had no any complaint of MSDs but their activities were restricted in last one year which may be due to factors not related to occupation. 33out of 100 respondents had trouble in doing routine activities in last 7 days. This restriction in last 7 days could be continuation of restriction in last 12 months. Initially body tries to adjust to stress of prolonged standing but slowly it fails to adapt and causes MSDs.

CONCLUSION

It can be concluded that there is significant (68%) prevalence of MSDs in security guards. There is significant restriction of routine activities in last 12 months (p value = .000) and 7days (p value = .000) due to MSDs. Demographic variables, age, smoking, alcohol consumption has been found out to be contributing risk factors. The three common risk factors related to job, identified are opening the gate again and again (98.5%), experiencing unequal weight bearing (98.1%) and taking

inadequate training in injury prevention (95.6%). The common coping strategies are changing from standing to sitting position when MSDs aggravates (69.9%), doing exercises at home regularly (63.2%) and modifying position (55.9%). Job risk factors and coping strategy are directly proportional to each other. There was positive correlation between age and job risk factors while negative correlation between BMI and years of experience with job risk factors. There was correlation of coping strategies with the demographic variables (age, BMI and years of experience). Chances of MSDs in smokers (OR=5.000, CI=1.079-23.160) and Alcohol (OR=8.333, CI=3.176-21.865) was higher. Thus our hypothesis that there is prevalence of MSDs in security guard is accepted.

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