ORIGINAL ARTICLE

Frequency of Musculoskeleton Health Problems and its Relation with Demographic Variables among Cherat Coal Miners District Nowshera Khyber Pukhtunkhwa Pakistan

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ABSTRACT

Objectives: The objective was to determine the frequency of musculo-skeleton health problems among the coal miners and to assess the relation of musculo-skeleton with various demographic variables among cherat coal miners of District Nowshera Khyber Pukhtunkhwa Pakistan.

Materials & Methods: A cross-sectional study design was conducted between July and December 2014 at the cherat coal mines of District Nowshera. A sample size of 400 was selected through cluster sampling technique, in which the study area was divided into four clusters and then from each cluster 40% coal miners were selected based on simple random technique. There are approximately 80-90 Cherat coal mines in which around 1000 of coal miners are working. Coal miner's having more than one year of coal mining job were included in the study while those with less than one year or having any pathological problems were excluded from the study population. Field visits were conducted to collect relevant data from the study areas. The structured pretested questionnaire was used to collect data regarding history of musculo-skeleton problems and was evaluated with the selected demographic variables like age, duration of coal mining job, job satisfaction, and previous history of mine injuries.

Results: Our study results showed that approximately 61% of coal miners had history of musculo-skeleton problems. Among those coal miners who gave history of musculo-skeleton problems, 76.64% were due to lack of training, 24.59% to early 1-4 years of coal mining job, 60.23% to less than 30 years of coal miner's age, 75.00% to unsatisfied with job, 83.19% to poor/bad knowledge of mine safety measures; 58.87% for not using personnel protective measures; and 67.62% to positive smoking history while the remaining 32.38 were among non-smokers.

Conclusion: The frequency of occupational musculo-skeleton problems among coal miners 61% more and had strong relationship with age, duration of coal mining job, smoking behavior, job satisfaction, coal mining training, knowledge regarding occupational safety and health practices, and with compliance of personnel protective devices.

Key words: Musculo-skeleton problems, miners, coal mining, satisfaction, smoking history, training, knowledge.

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INTRODUCTION

Coal is the major source of energy consumed in domestic and commercial sectors. Coal production helps a lot in the economic development but also renders a great deal of risk to the coal mine workers. Coal mining is considered as one of the dangerous occupation throughout the globe. Worldwide mining, especially underground coal mining is one of the dangerous occupation;[1] poses many health problems to coal miners for example respiratory, cardiovascular, gastro-intestinal, musculo-skeleton/bones /joints, skin and foot problems etc and causing loss of working days due to various occupational problems[2].

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Diseases of the musculo-skeletal and peripheral nervous systems have become one of the most serious health problems. They also make one third of the total sickness absenteeism[3]. According to many international studies, the repetitive operation and awkward posture were the risk factors for the musculoskeletal disorders in neck, shoulder and upper limbs; the repetitive operation, moving heavy substance and stooping posture were related significantly to lumbago; the musculoskeletal disorders in lower limbs were associated with the long standing and awkward posture[4]. Lumbo-sacral disorders were the most frequent locomotor system complaints reported by miners, especially those who work in a bending down position. According to the clinical data, spondylosis and allied disorders were the main reasons for musculoskeletal disorders. The majority of musculo-skeleton complaints were found in 46-55 age groups. The analysis of the association between back pains and duration revealed that complaints occurred frequently after a five-year employment[5]. Heavy physical work, severity of the working conditions, unavailability & noncompliance of personnel protective equipments, lack of knowledge regarding modern machines, work place injuries and accidents were the main causes of occupational morbidity and mortality[6].

Pakistan, being a developing country, faces many problems regarding occupational health & safety standards. The standards formulated by International Labor Organization (ILO) and World Health Organization (WHO) for implementation and monitoring are not followed and thus poses a significant potential risk to coal miners. There are around 90 million of tons of coal in Khyber Pukhtunkhwa Province Pakistan i.e. from Hangu/Orakzai and Cherat/Nowshera[7]. The coal miners of Cherat were one of the neglected sectors, where no such standards were followed and monitored and thus this cross sectional study was conducted in order to find the frequency of musculo-skeleton problems; and to assess the relation of musculo-skeleton problems with various demographic variables among cherat coal miners of District Nowshera Khyber Pukhtunkhwa Pakistan.

MATERIALS & METHODS

This cross-sectional study was conducted from July to December 2013; in Cherat area, District Nowshera, Khyber Pukhtunkhwa, Pakistan. Cherat, is a hilly area located about 50 km from the District Peshawar, having a total of 80-90 coal mines and in them approximately one thousand coal miners were working. A study sample size of 400 was selected according to WHO sample calculation formula, based on 95% confidence interval, 50% prevalence and 5% precision. Coal miners who have more than one year of coal mining job were included in the study sample while those having less than one year mining job and having various pathological problems were excluded from the study. Cluster sampling technique was followed in which the whole area was divided into four clusters i.e. Shakot, Jaba Tar, Jaba Khushk and Dak Ismail Khel, and then from each cluster 40% coal miners were selected. The coal miners having history of either Bodyache, backache, knee joint pain, lower limbs pain and upper limbs/shoulder pain were used as a diagnostic criterion. A detailed structured questionnaire was formulated to collect data for important variables like age, duration of coal mining job, smoking history, job satisfaction, knowledge and training regarding occupational health and safety and compliance of personnel protective equipments. Statistical Package for Social Sciences (SPSS) version 16 and Microsoft Excel software were used for data analysis and interpretation. Continuous variables were analyzed using means and standard deviations for example: age etc; categorical variables were analyzed using percentages.

RESULTS

The demographics of the coal miners included in the study were: age distribution among 400 coal miners was analyzed as 5.25% miners were < 20 years, 36.5% miners were in age range 20-25 years, 17.25% miners were in age range 26-30 years, 12% miners were in age range 31-35 years and 29% miners were in age range 36 and above. Mean age was 30 years with standard deviation ±1.26. 28% of the coal miners had 1-4 years, 27.25% had 5-8, 17.75% had 9-12 years and 27% had 13 or more years of working experience in the coal mines. Mean job duration was 8 years with standard deviation ±1.12. Smoking status among 400 coal miners was analyzed as 72.25% miners' were smokers while 27.75% miners were not smokers. Previous injury or mine accident history among 400 coal miners was analyzed as 45.25% miners had mine accidents, while 54.75% miners gave no history of any mine accidents or injuries. Out of all Musculo-Skeleton Problems (n=244); 25.25% gave history of Bodyache, 8.75% Backache, 12.00% knee joint pain, 5.50% lower limbs pain, while 9.50% of coal miners had complaint of upper limbs/ Shoulder Pain as shown in Table No 1, 2; & Graph No 1.
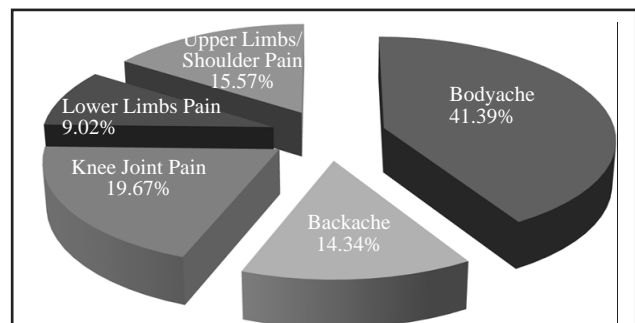
Graph No. 1: Percentage of different categories of Musculo-Skeleton Problems among n=400 Cherat coal miners of Nowshera Khyber Pakhtunkhwa Pakistan

Table No. 1: Frequency of different Musculo-Skeleton Disorders Vs Age distribution, Duration of job & Level of Knowledge among Coal Miners of Nowshera Khyber Pukhtunkhwa Pakistan

Demographic Variables	Total Population (n=400) %	Musculo-Skeleton Disorders (n=244)%
Age Distribution		
< 20 years	21 (5.25)	11 (4.50)
20-25 years	146 (36.50)	95 (38.93)
25-30 years	69 (17.25)	41 (16.80)
31-35 years	48 (12.00)	23 (9.42)
36 years & above	116 (29.00)	74 (30.32)
Duration of Job		
1-4 years	112 (28.00)	60 (24.59)
5-8 years	109 (27.25)	49 (20.08)
9-14 years	71 (17.75)	52 (21.31)
15 years & above	108 (27.00)	83 (34.01)
Level of Knowledge		
Good	89 (22.25)	41 (16.80)
Poor/ Bad	311 (77.75)	203 (83.19)

Table 2: Frequency of Musculo-Skeleton Disorders Vs Smoking/ Job Satisfaction/Training/ Personnel Protective Devices

Variables	Response	Total Population (n=400) %	Musculo-Skeleton Disorders (n=244)%
Smoking History	Yes	289 (72.25)	165 (67.62)
	No	111 (27.75)	79 (32.38)
Job Satisfaction	Yes	182 (45.50)	61 (25.00)
	No	218 (54.50)	183 (75.00)
Coal Mine Training	Yes	135 (33.75)	57 (23.36)
	No	265 (66.25)	187 (76.64)
Usage of Protective Devices	Yes	193 (48.25)	115 (47.13)
	No	207 (51.75)	129 (52.87)

DISCUSSION

Musculo-skeleton problems are one of the most common occupational problems experienced by the coal miners. The frequency of musculo-skeleton problems is increasing and is mainly due to awkward posture and unhygienic practices by coal miners due various mining activities.

According to our study results, the frequency of musculo-skeleton problems among coal miners were 61% (n=266) while in international research studies the prevalence calculated was 65.45% and 78.4%[8]. The highest frequency of musculo-skeleton problems as observed were Bodyache n=101, followed by knee joint, and upper limb/shoulder pain while lower frequency were of lower limbs pain as n=22 as shown in table No 1. This showed that the prevalence of musculo-skeleton problems were similar as compared to other countries[4,9,10].

As investigated in the national and international research studies the musculo-skeleton problems were increased in later years of coal mining job whereas in our study the frequency was more in early years; and these may be due to inadequate training in the early years; lack of knowledge etc and lack of working conditions in the new environment. The prevalence of musculo-skeleton problems between 25 to 30 years age almost doubled in the age ranges 30 & above as were revealed in various international[4,5,8].

In a study, approximately 65.45% of coal miners complained regarding musculoskeletal disorders and the major complaint was lower back pain,[7] while lower back pain was 78% in Turkish coal miners[8] and 64.9% in Chinese coal miners[9] moreover in another study, the overall frequency of a low-back-pain syndrome was 73.2% among coal miners[11]. Among coal miners, 61% reported musculoskeletal disorders in a 12-month period and predominantly back pain was the most frequent musculoskeletal symptom[12] while in another study it was observed as 58.18% among coal miners and interestingly the prevalence of musculoskeletal disorders increased significantly with their ages[7]. In another study the musculoskeletal disorders were 78.4% among the coal miners and showed significantly increased prevalence with old age[4].

Our study results revealed that musculo-skeleton problems were more prevalent in less than 30 years ages i.e. 60.23%, and the percentage of musculo-skeleton problems above 30 years age groups were 39.73% while internationally the musculo-skeleton problems were more in age above 40 years[4,5,8]. Our results also show that musculo-skeleton problems are least prevalent in the younger age groups i.e. below 20 years age and between 30-35 years as compared to other age groups as shown in Table No 1. Approximately 55.25% (n=221) of the coal miners had 1-8 years of coal mining job and in these coal miners nearly 44.67% (n=109) of musculo-skeleton problems had taken place; in previous studies it was confirmed that there was strong relation between occupational musculo-skeleton problems in initial years of coal mining job[4,8,9,10].

In our study, approximately 54.50% (n=218) of coal miners were not satisfied with their coal mining job and 66.25% (n=265) of coal miners do not have any sort of training regarding coal mining safety measures; and thus having 75% (n=183) and 76.64% (n=187) of occupational musculo-skeleton problems among coal miners; and these relationships were also confirmed and supported in various international studies. In our study, 72.25% (n=289) of the coal miners showed

positive history of smoking and 67.62% (n=165) of musculo-skeleton problems occur in these coal miner smokers; the relationship of musculo-skeleton problems and smoking/substance abuse were also revealed in many studies. There is a strong relation between occupational musculo-skeleton problems and compliance of personnel protective equipments. In our study, 51.75% (n=207) of coal miners do not follow the standard personnel protective equipments and thus among these coal miners 52.87% (n=129) had history of occupational musculo-skeleton problems in past which was higher than the international rates of ILO and WHO[8,9,10]. From our study results, it was concluded that occupational musculo-skeleton problems had high among the Cherat coal miners of District Nowshera; and approximately 61% of the coal miners gave positive history of musculo-skeleton problems. The various demographic variables studied showed strong relation with musculo-skeleton problems; and thus immediate remedial measures are needed from the Government and concerned departments. Pre placement and periodic examinations are needed to be conducted regularly; registration of each medical examination is necessary; coal miners needed to be educated regarding occupational safety and health practices; compliance of personnel protect measures be implemented in all coal mines; and further research is needed to highlight the problems associated with coal mining.

CONCLUSION

The frequency of occupational musculo-skeleton problems among coal miners 61% more and had strong relationship with age, duration of coal mining job, smoking behavior, job satisfaction, coal mining training, knowledge regarding occupational safety and health practices, and with compliance of personnel protective devices.

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