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Depression among Mine Workers in Chitradurga: A Cross Sectional Study

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ABSTRACT

Introduction: Occupational health deals with work-related disorders apart from all the factors that affect workers' health. Lack of education and unawareness of importance of mental health lead to various mental disorders, depression being the most common. Successful management of stress at the workplace has become a topic of great interest over the last decade.

Material and methodology: This cross sectional study was conducted among 493 mine workers in 3 actively working mines in Chitradurga to know the depression patterns and factors associated with it among the mine works. PHQ-9 was administered to know the depression pattern.

Results: There were 69% field workers, 18.7% working in transport and 12.4% office workers. Most workers were in age group 20-30years (37.5%), about 87.2% were married, 62.4% belonged to nuclear type of family. Majority were educated up to high school (37%). 76.3% had been working since 1-5yrs. PHQ-9 was administered and was seen that 55.8% had minimal, 26.6% had mild, 11% moderate, 4.3% moderately sever and 2.4% sever depression. Field workers were more prone to higher level of depression and was statistically significant (p value<0.05).

Conclusion: The results emphasize the importance of assessing the mental health among the workers and for optimum preventive measures that should be taken.

Key words: Occupational disease, mine workers, depression

INTRODUCTION

Workers represent half the world's population and are the major contributors to economic and social development. Their health is determined not only by workplace hazards but also by social and individual actors and access to health services.[1] About 45% of the world's population and 58% of the population over 10 years of age belong to the global workforce.[2]

Occupational factors make an important contribution to the global burden of disease. Work-related morbidity and mortality adds to the overall cost to society through lost productivity and increased use of medical and welfare services.[3]

Depression is a common mental health problem in the workplace and a leading cause of disability worldwide, can affect workers' productivity and overall job performance.[4] Higher prevalence of depressive symptoms in workplaces has been examined, with studies from different countries reporting the prevalence of at least 20%.[5,6,7] Even higher estimated prevalence of 12-month major depressive disorder (6.4%) has been reported among American workers.[8]

In a survey of 150 people over a 12-month period, it was found that workers, as well as their partners, were likely to be more prone to depression.[9] Preliminary findings of an Australian study have

shown that the shifts worked by mining and energy employees are detrimental to sleep patterns, mental health and family life.[10] A study in regional Queensland confirmed that relationships, life styles, work characteristics, and mental health attitudes were the main factors that could impact the mental health and psychological well-being of resident (non-fly-in fly-out) mine workers at a local mine.[11]

Depressed workers have high rates of absenteeism, presenteeism, and turnover intention, even work cessation, and they are more likely to abuse alcohol and drugs in comparison with those without depression. Moreover, the risk of occupational injury experienced was higher among workers who reported depressive symptoms.[11]

This issue is more evident in developing countries in which working is accompanied with excessive pressure in order to increase production, regardless of preventive safety principles, standards, working hours, training of workers, use of suitable personal protective equipment, and etcetera.[12]

India has been bestowed eminently with large amount of mineral deposits. India has a unique blend of big and small, manual and mechanized, opencast and underground mines.[13]In terms of man power involved and the capital amount invested in mining industry makes it to be in top five major industries in India.[14]

The studies conducted on mining and its effects are very few in our country especially in Karnataka. Moreover there are no studies conducted on the mental health of the mine workers. The availability of mining activity in Chitradurga district led to undertake this study to know the mental health status of mine workers and to investigate the factors associated with it.

METHODOLOGY:

A cross-sectional study was undertaken in the three licensed and active mines near Chitradurga, namely B.B.H (Bheemasamudra), SESAGOA (Bheemasamudra), John mines (D. Madikeripura) for a period of one year.

Chitradurga district is located on the NH-4, 200 kms from Bangalore. The Chitradurga city population is 1,39,914 and is geologically rich with various minerals such as iron ore, coal, manganese and carbide. The mining activity is being in the fore for many years. There are about 66 licensed mining sites out of which 26 were newly licensed.[15]

The mines which were included in the study are situated at about 10-15kms from Basaveshwara Medical College campus. The data was collected using complete enumeration method. A total of 493 mine workers aged above 18 years with a minimum 1 year duration of working in the same mine and who were available at the time of examination were included in the study.

Pilot study: Pilot study was conducted among 50 mine workers of B.B.H mines before starting data collection, to identify problems in the research design, test the applicability and validity of the study, evaluate the appropriateness of the questions, test the clarity of the wording, and to clarify areas of ambiguity and suitability of the questionnaire. The results were reviewed and some modifications were taken in consideration.

The proforma included the socio-demographic characteristics, details of their occupation, present health complaints, existing morbidity if any, sleeping, dietary and other habits among the participants; anthropometry measurements and general physical examination. Mental health of the mine workers were assessed using PHQ-9 Patient Health Questionnaire.[16]It consists of 9 questions with a recall period of 2 weeks with score given depending on the frequency of the various conditions experienced by the respondent. The sum of the scores is equated and classified according to the scale given. Interpretation of Total Score is as follows: Minimal depression (Score 1-4); Mild depression (Score 5-9); Moderate depression (Score 10-14); Moderately severe depression (Score 15-19); and Severe depression (Score 20-27).

Data collected were entered in Microsoft excel and analysed using SPSS software. Results were represented as descriptive statistics like mean, standard deviation, frequencies and percentages. Further, Chi-square test was applied to find out association between two attributes. Statistical significance was set at 0.05% level of significance ($p < 0.05$).

Table 1: Job wise distribution of the study population in the mines under study

Job description	BBH mines, n(%)	John mines, n(%)	SESAGOA mines, n(%)	Total, N
Office Work, n (%)	12 (19.67), (10.91)	11 (18.03), (15.72)	38 (62.30), (12.15)	61(12.37)
Field work, n(%)	79 (23.24), (71.82)	35 (10.29), (50)	226 (66.47), (72.20)	340(68.97)
Transport, n (%)	19 (20.65), (17.27)	24 (26.09), (34.28)	49 (53.26), (15.65)	92(18.66)
Total	110 (22.31)	70 (14.20)	313 (63.49)	493

Table 2: Socio-demographic characteristics of study participants

Socio demographic characteristic	Frequency (%)
Age	
<20 Years	4 (0.8)
20-30 Years	185 (37.5)
31-40 Years	139 (28.2)
41-50 Years	111 (22.5)
51-60 Years	54 (11)
Marital status	
Un married	56 (11.4)
Married	430 (87.2)
Widowed	4 (0.8)
Divorced	3 (0.6)
Type of family	
Nuclear Family	273 (62.4)
Joint family	163 (26)
3 generation family	57 (11.6)
Religion	
Hindu	451 (91.5)
Muslim	34 (6.9)
Others	8 (1.6)
Education	
Illiterate	38 (7.7)
Primary School	105 (21.3)
High school	182 (37)
P.U.C	29 (5.9)
Diploma	48 (9.7)
Graduate / Post graduate	91 (18.5)
Socioeconomic status	
Class I	52 (10.5)
Class II	55 (11.2)
Class III	170 (34.5)
Class IV	197 (40)
Class V	19 (3.9)
Locality	
Local	451 (91.5)
Non local	42 (8.5)

Table 3: Characteristics of workers in the mines

Characteristics of workers	Frequency (%)
Duration of work	
1 – 5 Years	376 (76.3)
6 – 10 Years	95 (19.3)
11 – 15Years	16 (3.2)
16 – 20 Years	6 (1.2)
Drug abuse	
Tobacco chewing	172 (34.9)
Smoking	168 (34.1)
Alcohol consumption	204 (41.4)
Preplacement examination	
Yes	223 (45.2)
No	270 (54.8)
Periodic examination	
Yes	50 (10.14)
No	443 (89.86)
Frequency of using personal protective devices	
Do not use	47 (9.5)
Use –Irregularly	136 (27.6)
Use- Regularly	310 (62.9)
Vaccination status	
T.T	51 (10.3)
T.T and Hepatitis B	3 (0.6)
NIL	439 (89.2)

RESULTS

Of the 493 study population, 313 (63.5%) workers were working in Sesagoa mine which is the biggest among the selected mines. BBH mines accounted for 110 (22.3%) workers and only 70 (14.2%) workers in John mines. The study population is constituted by the field workers who were 340 (69%) followed by people who were working in the transport i.e., 92 (18.7%) and with office work being done by 61 (12.4%). (Table 1)

In the present study, 185 (37.5%) of the respondents were in the age group of 20-30 years, followed by 139 (28.2%) in the age group of 31-40 years and only 45 (11%) and 4 (0.8%) in the age group of 51-60 and <20 years respectively. About 430 (87.2%) study participants were married, 273(62.4%) belonged to nuclear type of family and 451 (91.5%) were Hindus. Majority of the respondents were educated up to High school 182 (37%), followed by 105 (21.3%) workers up to primary high school and 91 (18.5%) were either graduates or Post graduates. Only 38 (7.7%) were illiterates. Most of the respondents 197(40%) were from class IV and only 19(3.9%) belonged to class V socio economic status. 451(91.5%) workers were from nearby localities while remaining 8.5% of the workers were staying away from their families. (Table 2)

Among the working population, 376 (76.3%) of the workers had been working in the mines since 1-5 years. 95 (19.3%) of workers were working since 6-10 years and only 16 (3.2%) and 6 (1.2%) of workers were working since 11-15 years 16-20 years respectively. Drug abuse was seen among the workers and alcohol consumption 204(41.40%) was most common among them. The pattern of tobacco usage showed that 172(34.90%) of workers were chewing tobacco while smoking was seen among 168(34.10%) of workers. Only 223 (45.20%) and 50 (11%) workers had underwent pre placement examination and Periodic examination respectively. Among the workers who were using personal protective equipments (PPE), 62.9% were using it regularly and the rest 30.5% were using irregularly. Vaccination status of the workers showed that 51(10.3%) of the workers were vaccinated for T.T alone and 3(0.6%) of the workers for both T.T and Hepatitis B. (Table 3)

PHQ-9 questionnaire was applied to find depression among mine workers and it was seen that 275 (55.8%) had minimal depression. Mild depression was seen in 131 (26.6%) workers, 54 (11%) had moderate depression and 21 (4.3%) had moderately severe depression. Severe depression was seen in 12 (2.4%) workers. (Table 4)

When socio-demographic and other factors were

Table 4: Depression among mine workers (n=493)

Depression status (PHQ-9 Score)	Frequency
Minimal depression (1-4)	275 (55.8)
Mild depression (5-9)	131 (26.6)
Moderate depression (10-14)	54 (11)
Moderately severe depression (15-19)	21 (4.3)
Severe depression (20-27)	12 (2.4)

Table 5: Association between socio-demographic characteristics and depression among mine workers

Characteristics	Depression (%)		P value
	Minimum to Mild	Moderate to sever	
Age			
<30	150 (36.95)	39 (44.83)	0.17
>30	256 (63.05)	48 (55.17)	
Education status			
Illiterate	28 (6.89)	10(11.49)	0.144
Literate	378(93.11)	77 (88.51)	
Marital status			
Single	54(13.30)	9 (10.34)	0.45
Married	352 (86.70)	78 (89.66)	
Socio economic status			
Class I-III	225 (55.42)	58 (66.67)	0.054
Class IV-V	181 (44.58)	29 (33.33)	

(p value <0.05 was taken as statistically significant association)

Table 6: Association between different factors and depression among mine workers

Variables	Depression (%)		P value
	Minimum to Mild	Moderate to sever	
Tobacco consumption			
No	270 (66.50)	51(58.62)	0.1615
Yes	136 (33.50)	36 (41.38)	
Smoking			
No	267 (65.76)	58 (66.67)	0.8718
Yes	139 (34.24)	29 (33.33)	
Alcohol consumption			
No	245(60.34)	50 (57.47)	0.6197
Yes	161 (39.66)	37 42.53)	
Duration of work			
<10yrs	391 (96.31)	80 (91.95)	0.074
>10yrs	15 (3.69)	7(8.05)	
Job description			
Office	54 (13.30)	7 (8.05)	---
Field	280 (68.97)	60 (68.96)	0.234
Transport	72 (17.73)	20(22.99)	0.1029
Injury			
No	372 (91.63)	79 (90.80)	0.803
Yes	34 (8.37)	8 (9.20)	
Musculo-skeletal disorder			
No	260 (64.04)	59 (67.82)	0.503
Yes	146 (35.96)	28 (32.18)	

(p value <0.05 was taken as statistically significant association)

compared with the level of depression for association it was seen that field workers were more prone to higher level of depression when compared to office workers and workers in transportation. Factors like lower education status, longer duration of work and tobacco chewing were found to be associated with higher level of depression but was not statistically significant (p value >0.05). It was also seen that higher level of depression in the worker were more prone to injuries but this association was not found to be statistically significant. (Table 5, 6)

DISCUSSION

In the present study that was conducted majority of the respondents were in the age group of 20-30 years (37.5%). In the study conducted by R.C. Giri et al[17], 59.1% were between 35 to 49 years. In similar type of study conducted by Biswas et al[18], 42.5 % were between 35 – 44 years respectively. In a study by Pandit et al[19], about 49% of the workers were between 30 – 40 years. The workers of age less than 24 years were least in the compared studies. Mining being a laborious occupation, the younger age groups were involved more compared to the older age groups.

In this study, 26.20%of the respondents were educated up to High school. Similar findings were also observed in a study conducted by Giri et al [17]where 27.3% educated up to high school.In another study by Biswas et al[18], 24.25% were educated up to high school. Mining is a labour intensive industry which attracts the people with low education. This pattern of distribution of education status among the workers also signifies that low knowledge regarding health hazards among the workers.

In this study, majority of the respondents belonged to class IV (40.0%). The findings were in corroboration with study conducted by Giri et al[17] which showed that 37% of workers belonged to class IV. In similar type of study conducted by Biswas et al [18], 47% of workers were class III and 37% were class IV. Mining is a hazardous occupation and also an occupation of poor.

Among the study population, 76.3% of the workers had been working in the mines for the duration between 1 – 5 years and 40% were working since 15 – 30 years. This finding was not in corroboration with the studies conducted by Giri et al[17] and Biswas et al[18] which showed 38.75% of workers were working since >20 years and 24.25 % of workers working since 10 – 15 years respectively. Vinod et al[20] Duration of work for the subjects was 38% were working since more than 10 years, 33.78% were working since 5-10 years and 22.82% were working for less than 5 years. In the study conducted by Athavale et al[21]25% of workers worked for <10 years, 33.93% worked for 11 – 20 years and 41.07% worked for >20 years. This ob-

servation signifies the longer duration working have higher health problems. The replacement and periodic examinations are must in order to prevent health hazards due to occupation for the persons who were working for more number of years.

The study regarding the pattern of drug abuse among mine workers showed that alcohol consumption was most common among them (41.4%). The pattern of tobacco usage showed that 34.9% of workers were chewing tobacco while smoking was seen among 34.1% of workers. Similar findings were also observed in the study conducted by Giri et al[17] with 47.3% of workers chewing tobacco, 36.4% of workers smoking and consumption of alcohol was seen in 37% of workers. The study by Vinod et al[20] revealed that 45.3% of workers were smoking. Stress associated with occupation plays an important role in drug abuse which is higher among the mine workers.

In the study population, the majority 90.5% of workers were using the Personal Protective Equipments (P.P.E). Among the workers who were using PPE, majority 62.9% were using it regularly and the rest 30.5% were using irregularly. The commonly used PPE were boots, helmet, mask and goggles. Those who weren't using regularly cited inconvenience while working as the reason for not using. These findings were higher when compared to study conducted by Mehrparvar et al[22]which showed that 77.8%, 26.3%, and 21% used gloves, respirators and hearing protection devices, respectively. In the study conducted by Pandit et al[19] 10%, 2%, 16%, 10% and 25% of workers used boots, helmets, gloves, gloves and boots and eye shields respectively. The higher percentage of usage of Personal Protective Equipments in the present study can be due to the improved knowledge and strict implementation of safety measures at the work places.

In our study, mild depression was found in 26.6% of workers and 2.4% were severely depressed. These results were slightly higher than the studies conducted by Hendryx et al[23]which showed mild depression was seen in 34% of workers while severe depression was seen in 6% of workers. A study conducted in Canada showed, 4.6% of workers had depression.[4] Even higher estimated prevalence of 12-month major depressive disorder of 6.4% has been reported among American workers.[5] Higher prevalence of depressive symptoms in workplaces has been examined, with studies from different countries reporting the prevalence of at least 20%[6,7,8]. In china average prevalence of depressive symptoms was 46.2% among various occupational groups.[24] In a study done by Liu L et al[11] it was seen that the prevalence of depressive symptoms were 62.8%.

In the present study depression was not associated significantly with factors such as marital status, type of family, education status, socio economic status, musculo-skeletal disorders, locality of the worker and duration of work. Field workers werefound to be associated with higher level of depression and was also not statistically significant. These findings were in contrast when compared to the study done by Liu L et al[11] which showed that marital status, education, monthly income, and weekly working time were significantly associated with depressive symptoms. Also high level of depressive symptoms was significantly associated with high effort-reward imbalance (ERI), over commitment (OC), work-family conflict (WFC). This signifies the multi factorial causation of the psychological ailments.

CONCLUSION

The study emphasises the importance of mental health of the working population in mines. It was seen that all the workers had at least minimal depression and hence it's important to know the factors responsible and apply preventive measures so that the workers can work efficiently with high productivity. Further studies are required that will help add to the present data and get more results on mental health of the working population so that effective action can be taken by the government in future to reduce depression.

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