Original Article

Psychiatry Section

Psychiatric Morbidity in Industrial Workers of South India

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ABSTRACT

Background: The literature on psychiatric morbidity in industrial workers is scarce in India. This information will go a long way in planning preventive and promotive measures in industrial population thereby safeguarding their health.

Aim: This cross sectional was undertaken in the year 2001 in workers of a largest iron ore processing unit of India to study the prevalence of psychiatric morbidity and the associated risk factors.

Materials and Methods: This study was conducted in an Iron Ore processing company located in Chickamagalore District of Karnataka in the year 2001 using Mini International Neuropsychiatric Interview Plus and Occupational Stress Index. The total industrial work force was 1537 employees. A total of 252 (16.4%) formed the sample for the study of whom 235 (93.3%) were responders and 17 (6.7%) were non-responders. Following a detailed interview with the selected industrial workers, diagnosis was made based on International Classification of Diseases-10, Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research.

Results: Majority of the study sample consists of males (95.7%), Hindus (85.5%), married persons (96.2%), and originally from the state in which industry is located, i.e., Karnataka (96.2%). Education wise majority are ITI graduates (29%), 20% studied up to high school, and 12.3% hold diploma in engineering. 11% of the sample had hypertension, 8.1% had diabetes mellitus and 3.0% had both hypertension and diabetes. 69.4% did not had any physical problem. Prevalence rate for lifetime psychiatric disorder in the study sample was 56.2% (95% confidence interval = 49.8-62.6) using MINI plus. Prevalence rate for current psychiatric disorder in the study sample is 36.2% (95% confidence interval = 30.1-42). Nicotine dependence is the major diagnosis (27.7%) followed by alcohol abuse (12.3%). 7.25% of the population fulfilled criteria for alcohol dependence syndrome. There were 137 subjects reporting mild occupational stress and 48 reporting moderate to severe occupational stress. Persons with non-technical educational status had significantly higher proportions of mild stress and less of moderate to severe stress as compared to other groups. Stress levels seemed to be uniformly distributed amongst those with or without physical and psychiatric disorder.

Conclusion: A considerable proportion of industrial workers had psychiatric morbidity having many associated risk factors.

Key Words: Industry; Prevalence; Psychiatric disorder; Stress

INTRODUCTION

Occupational or industrial psychiatry is that area of psychiatry specifically concerned with psychiatric aspects of problems at work and with vocational maladjustment. It is well accepted that the work environment can profoundly influence psychological functioning and emotional distress [1]. In comparison with the general population, industrial workers have the added risk of physical, chemical, biological and other specific psychosocial factors of their occupational environment [2, 3]. The reported prevalence rates of psychiatric morbidity in the Indian industrial population range from 14% to 37% and can be up to 74% in Western reports [4]. The aims of this study were to determine the prevalence of psychiatric disorders in an industrial set-up and to study the factors associated with the morbidity.

MATERIALS AND METHODS

This cross sectional study was conducted in an Iron Ore processing company located in Chickamagalore District of Karnataka in the year 2001. It is the largest 100% Export Oriented unit in India. All the permanent employees enrolled by the company (n = 1537) were considered as the universe for the study. The employees are stratified into four categories according to their basic salary and eligibility of quarters, namely A (95 employees, 6.2%), B (1176 employees, 76.5%), C (197 employees, 12.8%), and D (69 employees, 4.5%). Sample size was calculated using EPI INFOR program by assuming an anticipated prevalence of overall psychiatric morbidity of 30% based on previous studies with confidence limit of 95% and relative precision of 20%. Adequate sample for such conditions to be fulfilled was determined to be 202. To provide for non response rate of 20% an additional 50 persons were included. Hence the final sample size was determined as 252. Using random number tables sample was selected by proportions to the size of the groups A, B, C and D. Study instruments included the Mini International Neuropsychiatric Interview plus and Occupational stress index.

The Mini International neuropsychiatric interview plus (MINI plus) is a short structured diagnostic interview developed jointly by psychiatrists and clinicians in the United States and Europe for generating DSM IV and ICD 10 psychiatric diagnosis. It was designed to meet the need for a short but accurate structured psychiatric interview for multicenter clinical trials and epidemiological studies and to be used as a first step in outcome tracking in non research clinical settings.

The occupational stress index purports to measure the extent of stress which employees perceive arising from various constituent and conditions of their job. However stress researchers have developed the scales which measure the stress arising exclusively from job roles [9]. The tool may conveniently be administered to the employees of every level operating in context of industries or other non production organizations. However it is more suitable for the employees of supervisory level and above.

The scale consists of 46 items, each to be rated on the five point scale. Out of 43 items 28 are 'true-keyed' and rest 8 are 'false keyed'. The items relate to almost all relevant components of the job life which causes stress in some way or the other, such as role overload, role ambiguity, role conflict, group and political pressure, responsibility for persons, under participations, powerlessness, poor peer relations, intrincis impoverishment, low status, strenuous working condition and unprofitability. The reliability index as ascertained by split-half (odd-even) method and Cronbach's alpha-coefficient for the scale as a whole was found to be 0.935 and 0.90 respectively. The validity of the occupational stress index was determined by computing coefficients of correlation between the scores on OSI and various measures of job attitudes and job behavior. The employees cores on the OSI is likely to positively correlate with the scores on the measures of such job related attitudinal and motivational and The correlation between the scores on Occupational Stress Index (OSI) and the measure of job anxiety was found to be 0.59 (N = 400) [5]. The employee's scores on OSI have been found to be positively correlated with their scores on the measures of mental ill health, standardized by Dr. Srivastava [5]. Since the questionnaire consist of both true keyed and false-keyed items two different patterns of scoring have to be adopted for two types of items. Norms have been prepared for the scores on occupational stress index as a whole as well as for its 12 subscales separately on a representative sample of 700 employees of different cadres operating in various production and non production organizations the scores were divided into three categories i.e. high, moderate, low following the principles of normal distribution.

The interview was conducted in the houses of the study subjects. With the help of the area map the houses of the randomly selected employee, were identified. The purpose of the visit was explained to the employer and to their family members and their cooperation was sought. After informed verbal consent was obtained, the randomly chosen respondent was administered MINI plus 2001 by the investigator. Care was taken to ensure privacy and confidentiality of the interview. Help of a psychiatry consultant sought to make sure that the interview process was carried out satisfactorily. The subjects were also given the Occupational Stress Index (OSI) questionnaire and were asked to fill and return them from next day. During the home visit if a house was found to be locked or if the respondent was not available three call back attempts were made to contact to him/her before considering him/her as non responder.

RESULTS

The present study was designed to elicit socio-demographic, lifetime and current psychiatric diagnostic and occupational stress data of the employees of an iron ore processing unit. [Table/Fig-1] depicts the derivation of study sample. The sample size was determined as stated earlier on the basis of anticipated prevalence of 30%, confidence limit of 95%, relative precision of 20% and providing for a non-response rate of 20%. [Table/Fig-2] depicts the socio-demographic data of the study sample. Majority of the study sample consists of males (95.7%), Hindus (85.5%), married persons (96.2%), and belonging to state of Karnataka (96.2%). [Table/Fig-3] depicts the distribution of reported medical problem in the sample. 11% of the sample had hypertension, 8.1% has diabetes mellitus and 3.0% had both hypertension and diabetes. [Table/Fig-4] depicts the prevalence rate for lifetime psychiatric disorder in the study sample. [Table/Fig-5] depicts lifetime prevalence of all psychiatric disorders in the study sample. Nicotine dependence is the major diagnosis (27.7%) followed by alcohol

Stratification of study population according to living quarter availability	Total Number of employees in each category N = 1537	Required sample size N = 252 (16.4%)	Study population N = 235 (93.3%)
A category	95	16	16 (100%)
B category	1176	192	177 (92.2%)
C category	197	32	30 (93.8%)
D category	69	12	12 (100%)

[Table/Fig-1]: Derivation of study sample

Variable	Frequency (N)	Percentage (%)
Age		
21-30	10	4.3
31-40	52	22.1
41-50	122	51.9
51-60	51	21.7
Gender		
Male	225	95.7
Female	10	04.3
Religion		
Hindu	201	85.5
Muslim	12	05.1
Jain	4	01.7
Christian	18	07.7
Home State		
Karnataka	203	86.3
Kerala	14	06.0
Tamil Nadu	08	03.4
Andra	3	01.3
Other states	7	03.0
Marital Status		
Married	226	96.2
Unmarried	9	03.8
Education		
Nil	2	00.9
Primary	16	06.8
High School	47	20.0
Pre-University	18	07.7
Industrial Training Course	68	29.0
Diploma in Engineering	29	12.3
Diploma in Nursing	3	01.3
B. Sc. / B.A./ B.Com	19	08.1
M.c/M.A./M.Com	9	03.8
B.E / B.Tech	22	09.4
MBBS / MS	2	00.9

[Table/Fig-2]: Sociodemographic Data of study sample

Medical problem	N = 235	%
Hypertension	26	11.1
Diabetes Mellitus	19	8.1
Hypertension and diabetes	7	3.0
Other medical problems	20	8.5
No medical problems	163	69.4

[Table/Fig-3]: Presence or absence of medical problem in study sample

abuse (12.3%). [Table/Fig-6, 7, and 8] depicts the data of the 185 persons who responded to the OSIQ (Occupational Stress Index Questinnaire), who were then examined with relation to stress (mild Vs Moderate/severe), on sociodemography, work and perceived problem, physical illness and psychiatric disorder variables. In this sample there were only two persons who had perceived severe stress. Hence for convenience of analysis moderate and severe categories were combined. Hence there were 137 subjects reporting mild occupational stress and 48 reporting moderate to severe occupational stress. Persons with non-technical educational status (B.A., B.Com., M.A., M.Com., etc.) had significantly higher proportions of mild stress and less of moderate to severe stress as compared to other groups. Stress levels seemed to be uniformly distributed amongst those with or without physical and psychiatric disorder.

Prevalence	Frequency (n = 235)	%	95% confidence interval
Lifetime	132	56.2	49.8–62.6
Current	85	36.2	30.1–42.3

[Table/Fig-4]: Current and lifetime prevalence of psychiatric disorders

Disorder	DSM 1V	ICD-10	Lifetime diagnosis in 132 patients	%	95% C.I.
Major depressive episode (MDE)	296.00	F32	14	5.9	2.9-8.9
MDE due to a general medical condition	293.83	F06	1	0.4	0-1.2
Dysthymia	300.4	F34.1	24	10.2	6.3-14.1
Panic disorder	300.00	F41.0	10	4.3	1.7-6.9
Social Phobia	300.23	F40.1	1	0.4	0-2.1
Specific phobia	300.29	F40.2	4	1.7	0-3.4
Alcohol dependence syndrome	303.90	F10.2	17	7.2	3.9-10.5
Alcohol abuse	305.00	F10.1	29	12.3	8.1-16.5
Substance dependence syndrome (nicotine)	305.10	F17.2	65	27.7	22-33.4
Substance abuse (nicotine)	305.90	F17.1	7	3.0	0.8-5.2
Paranoid schizophrenia	295.30	F20	2	0.9	0-2.0
Psychotic disorder due to general medical condition	293.00	F06.2	1	0.4	0-1.2
Psychotic disorder NOS	298.9	F29	2	0.9	0-2.1
Hypochondriasis	300.7	F45.2	4	1.7	0-3.4
Plain disorder	307.00	F45.4	17	7.2	3.9-10.5
Adjustment disorder	309.00	F43	2	0.9	0-3.4
Mixed anxiety and depression		F41.3	1	0.4	0-1.2
Substance induced mood disorder	291.8		3	1.3	0-2.8
Substance induced psychotic disorder	291.00		1	0.4	0-1.2
		Total diagnosis 207			

[Table/Fig-5]: Lifetime prevalence of all psychiatric diagnosis in study sample

	N = 185	Mild N = 137	Mod-severe N = 48	X^2, df, p
Age				
21-30	9	6 (4.4)	3 (6.2)	$X^2 = 0.543$
31-40	41	30 (21.9)	11 (22.9)	df = 3
41-50	88	67 (48.9)	21 (43.8)	p = 0.909
51-60	47	34 (24.8)	13 (27.1)	
Gender				$X^2 = 3.315$
Male	176	128 (93.4)	48 (100)	df = 1
Female	9	9 (6.6)	0 (0)	p = 0.069
Religion				$X^2 = 0.057$
Hindu	160	118 (86.1)	42 (87.5)	df = 1
Other religion	25	19 (13.9)	6 (12.5)	p = 0.811
State				$X^2 = 0.495$
Karnataka	156	114 (83.2)	42 (87.5)	df = 1
Other states	29	23 (16.8)	6 (12.5)	p = 0.482
Marital Status				$X^2 = 0.026$
Married	178	132 (96.4)	46 (95.8)	df = 1
Unmarried	7	5 (3.6)	2 (4.2)	p = 0.872
Education				
<12th standard	67	50 (36.5)	17 (35.4)	$X^2 = 0.650$
ITI/BE /dip.	91	62 (45.3)	29 (60.4)	df = 2
Other	27	25 (18.2)	2 (4.2)	p = 0.039

[Table/Fig-6]: Analysis of distribution of levels of stress across socio-demographic variables

DISCUSSION

The present study is an epidemiological survey utilizing the recent improvements in mental disorder diagnostic criteria, standardized diagnostic interviews and survey research design. This study was conducted in an industrial township to estimate the prevalence of current and lifetime psychiatric disorders in the study population.

The age distribution shows a preponderance of 41-50 year old workers. In keeping with the nature of jobs involved male workers prevail over females. The religion and state-wise distribution of workers and their marital status follows secular trends. As expected there are higher literacy levels in the industrial population than in general population. The Nature of education varies depending on the nature of work done by the respondents.

The current psychiatric morbidity in this study was 36.2% (Confidence interval = 30.1-42.3). This prevalence rate is higher than the prevalence rate for general population. While comparing this study with other industrial studies this study has shown high prevalence of psychiatric disorders than most of the other studies. The prevalence rates shown by various authors varied from 14% to 16% [2, 3, 6].

Lifetime psychiatric morbidity in the current study is 56.2% (CI = 49.8-62.6). National comorbidity survey by Kessler et al [14]

	Total N = 185	Mild N = 137 *Except N = 101	Mod-severe N = 48 *Except N = 35	X^2, df, P
Category of workers according to the basic salary				
A category Rs.3,810-5,030	13	10 (7.3)	3 (6.2)	$x^2 = 0.793$
B category Rs.5,070-9,950	130	99 (72.3)	31 (64.6)	df = 1
C category Rs.10,100-16,950	30	20 (14.5)	10 (20.8)	P = 0.373
D category Rs.17,200-27,050	12	8 (5.8)	4 (8.4)	
Shift				$x^2 = 10.178$
ABC/AB	91	67 (48.9)	24 (50.0)	df = 1
GEN	94	70 (51.1)	24 (50.0)	P = 0.896
Shift problems (N = 174)				$x^2 = 3.286$
Present	92	*64 (63.3)	*28 (80.0)	df = 1
Absent	44	37 (36.7)	7 (20.0)	P = 0.070
Interpersonal problems				$x^2 = 1.523$
Present	71	49 (35.8)	22 (45.8)	df = 1
Absent	114	88 (64.2)	26 (54.2)	P = 0.217
Job satisfaction				$x^2 = 0.11$
Full satisfaction	99	73 (53.2)	26 (54.1)	df = 1
Satisfied/NS	86	64 (46.7)	22 (45.9)	P = 0.916

[Table/Fig-7]: Analysis of distribution of levels of stress across nature of work and perceived problems at work.

	N = 185	Mild N = 137	Mod-severe n = 48	X^2, df, P
Present	59	45 (32.8)	14 (29.1)	$X^2 = 0.222$ df = 1 p = 0.638
Absent	126	92 (67.2)	34 (70.9)	

[**Table/Fig-8]:** Analysis of distribution of levels of stress in persons with and without medical problem

showed lifetime prevalence of 48.1%. Both higher and lower rates of prevalence of psychiatric morbidity have been reported in industrial set ups elsewhere [3, 8]. Alderette et al [9] showed a life-time prevalence of 26.7% in men and 16.8% in women. Looking closely at lifetime prevalence rate we found that in the 132 persons who had a lifetime diagnosis there were 118 (57.6%) nicotine/alcohol abuse/dependence diagnosis and only 89 (43.4%) other lifetime diagnoses.

51.5% of the workers do shift work and 49.2% of the worker do report shift related problems and 37.9% report interpersonal problems at work whereas only 4.7% expresses lack of job satisfaction. It is apparent from this that job satisfaction does not go hand in hand with perceived problems in the workplace. This is in keeping with Cooper's review on stress in the workplace [10].

In the present study current prevalence rate for alcohol abuse/dependence is 9.4% and lifetime prevalence is 19.5%. Liorente et al reported similar prevalence of 19.5% in a rural area of Austria, its population being characterized by a great proportion of miners [11]. Gautam an Bairwa reported alcohol dependence in 8.55% of workers [6]. Mittal et al reported alcohol dependence 21.6% of the workers and stated that the high prevalence is due to cultural and religious factors [12]. However Trivedi et al reported prevalence of alcohol dependence of only 12.3/1000 [13]. Alderete et al reported lifetime prevalence of alcohol dependence as 1% and alcohol abuse 6.6% [9]. In the present study current prevalence of nicotine abuse or dependence is 16.6% and lifetime prevalence of 30.0%. In general population the estimated prevalence rate of alcoholism in India was 6.9/1000 according to the meta analysis done by Reddy et al [14]. In the present study current prevalence of depressive disorder is 6.8% and dysthymia being 5.5%. Lifetime prevalence of mood disorder is 17.8% major depression in 7.6%. Ganguli et al reported neurotic depression in 3.4% of workers and Gautam et al found neurotic depression in 57.89% [2, 6]. Trivedi et al reported prevalence of affective disorder as 8.3% [13]. Alderete et al reported lifetime prevalence of affective disorder as 5.7% [9]. In Indian studies estimating only depression showed a prevalence ranging from 1.26 to 67.0/1000 [15-18].

Current prevalence of anxiety disorder found in this study is 3.8%, panic disorder 1.7%, specific phobia 1.7%, and social phobia 0.4%. The lifetime prevalence of anxiety disorder is 6.3%, panic disorder is 4.3%. Ganguli et al reported prevalence of anxiety neurosis as 15.29/1000 in textile factory workers, and Gautam et al reported anxiety neurosis in 21.05% of workers [2, 6]. Alderete et al reported lifetime prevalence of panic disorder 0.9% social phobia 5.8%, Agarophobia 5.8%, simple phobia 6.2 and reported lifetime prevalence of any anxiety disorder to be 12.5% [9]. In general population the reported prevalence of anxiety disorders in Indian literature is about 20.7/1000 [14, 15].

Prevalence of pain disorder is seen in 7.2% of the population. Common symptoms were headache, back pain and abdominal pain. Ganguli et al reported psychoneurosis with somatic symptoms as 40/1000 [2]. In all of these emotional disturbances have generated physical symptoms affecting different systems, most often affected were the genitor-uruinary and the digestive systems. Ajay Kumar reported one month prevalence of somatoform disorder in rural population as 1.4% [19]. Hypochondriasis is reported in 1.7% in the current study. Similar finding reported by Ganguli at al as hypochondriacal reaction in 12/1000 [2]. Current prevalence of Psychotic disorders found in this study is 2.2% and lifetime prevalence is 2.6%. Paranoid schizophrenia is seen in 0.9% of the sample. Trivedi et al reported schizophrenia 2.8/1000 in steel township [13]. Mittal et al reported that psychiatric morbidity was significantly higher among single (unmarried and widower), living in nuclear family, Muslims and Sikhs, having job stress and financial burden [13]. Trivedi et al reported that psychotic disorders were significantly more prevalent in the age group of about 30 years, in high literacy group, nuclear family [14]. The implications of the finding of the high psychiatric morbidity amongst these industrial workers on labor market, worker health and productivity, ceremony and healthcare delivery planning would be of great importance.

SUMMARY

The Present investigation was undertaken to assess prevalence of current and lifetime prevalence in industrial worker population of an iron processing unit. The study population had a preponderance of

males and majority were married. They were distributed over age ranges from 26-60 years. Majority were literate of Hindu religion, and native of Karnataka. The lifetime prevalence of psychiatric disorder is 56.2% (confidence interval 49.8–62.6) and current prevalence of psychiatric disorder is 36.2% (confidence interval 30.1–42.3). The most common disorder diagnosed were nicotine abuse/ dependence (current prevalence 9.45% and lifetime prevalence of 19.5%), followed by mood disorder (current prevalence 6.8% and lifetime prevalence of 16.8%), and pain disorder (prevalence rate 7.2%). 31% co-morbidity was found in this study. Prevalence of lifetime and current psychiatric morbidity range between 41.7% (D group) and 58.8% (B group) workers. Prevalence of current psychiatric morbidity ranges between 20.0% (C group) to 43.8% (A group).

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