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MENTAL MORBIDITY IN INDUSTRIAL WORKERS OF KHETRI COPPER COMPLEX[1]

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SUMMARY

There is dearth of researches pertaining to prevalence of mental morbidity in Industrial setups, particularly in our country.

They are important as psychological ill health of workers may adversely effect the productivity in developing country like India.

Khetri Copper Complex in Rajasthan was selected for present study. Aims were to determine the period prevalence of mental morbidity among workers and role of sociodemographic, psychological variables in such disorders. 300 workers were randomly selected from various departments. Each worker was given specially designed proforma and Goldberg's General Health Questionnaire. Workers scoring 12 or more were given "A standardised psychiatric interview schedule" suspected cases were examined by senior consultants to assign them diagnostic categories (I. C. D.-9).

Period Prevalence in this study was 186.66/1000. As regards diagnostic categories, 75% were neurotic and 12.5% psychotics. Role of socio demographic, psychological and psychiatric variables in the development of these disorders has been discussed.

Findings of this study are in expected direction and results obtained can be easily explained in terms of formulations given by other researchers in this field.

Recommendation and plans for further research are discussed.

Research pertaining to mental health in India has been overlooked in so many areas, particularly in industrial settings and therefore, problems of mental health in industrial setups should receive priorities in research by mental health professionals.

Industrial workers come from diverse social backgrounds. Their customs, manners and languages are different. They have little in common in the way of resources and skills and their aptitude for developing socially acceptable modes of mastering ways of life for that new setting is at best uncertain. Such a climate is bound to influence the mental health of that community.

Ganguli (1968) initiated research in this area. He surveyed 327 workers comprising 10% of the total workers of cotton textile factory in Delhi. Results of his study revealed that a prevalence rate for psychoneurotic disorders as 125/1000; for disorders of character, behaviour and intelligence as 12/1000 and for mild forms of psychosis 3/1000 and total prevalence rate for all mental disorders was reported to be 140/1000. When we compare this prevalence rate of mental illness in other segments of population in our country, we find that this is the highest rate of mental illness ever reported. Dube from Agra (1964) for example, reported prevalence of mental illness as 23/100. Whereas the mental healthy advisory committee of India (1966) suggested probable prevalence of mental illness of 21/1000 in general, 18 and 14/1000 for semi-rural

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and rural areas respectively. These figures are much lower than 72/1000 reported by Sethi *et al.* (1967) in a survey of 300 urban families at Lucknow. Sethi *et al.* (1974), have found a period prevalence of 62/1000 for 850 urban families in Lucknow. Thacore (1973), has reported a prevalence rate of psychiatric illness over a period of one year as 82/1000 in an urban community. Verghese and Baig (1972) reported the prevalence rate for psychoneurotic disturbances among those older than 12 years was 48/1000 in southern part of India. Elnagar *et al.* (1971) from West Bengal, while studying 184 rural families reported a prevalence rate of 2.1% for families and 27/1000 for the population studied. Nandi *et al.* (1973) reported prevalence rate of 102/1000 after surveying a village population predominantly inhabited by Muslims in West Bengal. Thus, when we compare Ganguli's figure of psychiatric prevalence in industrial setup with above studies we find that presons in industrial setup seem to have higher rate of mental illness as compared to persons in other setups.

Besides Ganguli, problems of mental illness in industrial set up aroused interest in other investigators as well. Bhaskaran *et al.* (1973) working at heavy machine building plant of Heavy Engineering Corporation at Ranchi randomly selected 200 workers and found that the prevalence rate for psychoneurosis was 160/1000. Mathur (1953) reported a study of sickness absenteeism in Kanpur Textile workers as 13.4%. On the other hand Gandhi *et al.* (1971) observed sickness absenteeism in same industrial workers as 4.3%.

Inspite of some of these epidemiological observations, it is our clinical impression based on the patients coming from Khetri Copper Complex that mental disorders particularly neurosis is far more common among industrial workers than reported by these studies. Whether it is true or artifact, it occured to us to undertake an epidemiological study of mental mrobidity in this industrial set up (Khetri Copper Complex) to fulfil the following aims and objectives:

AIM AND OBJECTIVES

1. To determine the period prevalence of mental disorders in workers of Khetri Copper Complex-an industrial setup.
2. To understand the significance, if any, between various population characteristics (socio-demographic variables) and mental disorders that may shed some light on the development of mental disorders in such a setup.

MATERIAL AND METHOD

Study Area : The present study was carried out in the Khetri Copper Plant. Its location is 11 Kms. North of Jaipur in the state of Rajasthan. Khetri Copper Plant is located 190 Kms. South West of New Delhi. Its altitude is 370 metres above sea level. Average rainfall in this area is reported to be 500 mms. per year and its temperature in summer is 40°C (maximum) and 12°C (minimum) and in winter 25°C (maximum) and 2°C (minimum). One of the authors (S. K.) stayed here from Jan. 82 to June 82 to carry out this work.

Khetri Copper Plant has got permanent workers strength of 3476. It is a unit of Hindustan Copper Limited (HCL) a Government of India Enterprise. HCL was established on 9th November 1967. It was assigned the task of exploration, prospecting, and mining activity for minerals, in particular copper, extraction and fabrication of metals and manufacture of products, alloys and byproducts including sulphuric acid and fertiliser.

A modern township-Khetrinagar has

been constructed for residential requirements of employees working in the complex. At present there are 3476 residential quarters in the township alongwith other amenities such as a well equipped 50 bed hospital with 26 extra beds in a separate children ward, primary and secondary schools, shopping centres, sports ground, community centres, guest house and a club, There are six types of quarters i.e. A, B, C, D, E, F and some new NTA (New Transitory Accommodation). Five fair price provision stores are there to supply essential commodities at fair and reasonable rates in Khetrinagar.

Khetri has come to be regarded as an industrial oasis in the desert. The setting up of the complex, apart from affording employment opportunities to the agricultural community in the region, has transformed this sleepy village into a busy industrial town.

This complex as a whole has following 14 departments: 1. Prospecting Diamond drilling 2. Mining 3. Concentrator Plant 4. Smelter 5. Refinery 6. Wirebar Casting Plant 7. R & D 8. Services such as electrical, maintenance, civil and instrumentation 9. Personnel and administration 10. Township and administration 11. Sulphuric acid plant 12. Phosphoric acid plant 13. Single Super Phosphate and 14. Triple Super Phosphate fertiliser.

The above description of Khetri Copper Complex suggests that it is a big organisation and to survey all the workers would engage any researcher for years toegether. So it was decided to study 300 workers (8.64%) of this organisation. Persons below the level of chargeman were taken as workers, Details of sampling: A Sample of 300 workers was drawn from the following '9' parent departments consisting of a total population of 3476 workers randomly.

List of names of all these workers was obtained with the help of executive head of personal department and thereafter a total sample of 300 workers keeping the ratio of percentage in the above departments were randomly selected with the help of Fisher's Random Tables. Departmentwise composition of 300 selected workers is given in the following table:

Sample composition according to department

S. No.	Department	workers strength	No . of workers selected
1.	Mining	1978	172
2.	Smelter	400	35
3.	Refinery	255	22
4.	Concentrator	218	20
5.	Fertiliser	240	19
6.	Mechanical	195	16
7.	Electrical	128	11
8.	R & D	36	3
9.	Central Instrumentation	26	2
	Total	300	

Procedure of data Collection : Study was conducted in several phases.

First Phase : In the first phase of the study, we got acquainted with the structure and setup of Khetri Copper Complex. We were extended full cooperation by the management. Particularly the Chief Medical Officer and Deputy General Manager were very helpful in introducing the workers of different departments which were included in the sample. All the 300 workers of sample were individually administered Goldberg's Health Questionnaire (G. H. Q., 1972) alongwith recording informations on identification data,

socio-demographic and economic variables through a proforma designed for this purpose. It took about 6 weeks to complete administration of G. H. Q. and recording of population characteristics of the sample. This was the first phase of the study.

Second Phase : During this phase, the workers scoring 12 or more on G.H.Q. were revisited and were clinically interviewed with the help of "A standardised Psychiatric Interview Schedule for use in community surveys" (Goldberg *et al.*, 1970). This interview was performed to ascertain the label of actual psychiatric casenessness as recommended by Goldberg. With this procedure it was found that 64 workers who scored 12 or more on G. H. Q., only 56 could qualify the actual label of psychiatric casenessness and 8 respondents who scored 12 or above were only false positives and therefore they were dropped from the group of psychiatric workers. This work could be accomplished in about 4 weeks.

Third Phase : 56 workers who were identified as suspected psychiatric cases, both on G. H. Q. and standardised psychiatric interview schedule were clinically examined by Psychiatric consultants to assign them diagnostic nomenclature as recommended by I. C. D.-9 (1978). For this purpose all these cases were referred to Psychiatric Centre Jaipur to contact the Chief Consultant for advise and treatment. All the cases visited the centre and were examined by two consultants for individual diagnostic labels.

Final Phase : In this phase an attempt was made to contact all the normal workers after six months duration to enquire about their health, and ill health. No new psychiatric case was found in these subjects. During this phase an effort was also made to find out the factors contributing to the development of mental disorders by contacting the families of workers who were affected by mental illness.

OBSERVATIONS AND RESULTS

Results are shown in the following tables:—

TABLE I—*Period Prevalence of Psychiatric Illness in Industrial workers*

	N
Number of workers studied	300
Number of workers scoring 12 or above on G. H. Q.	64
Number of false positives on G. H. Q.	8
Number of actual psychiatric cases as ascertained both on G. H. Q. and Psychiatric interview schedule	56
Rate per 1000 of psychiatric cases	186.66

The above table indicates period-prevalence of mental illness as 186.66/1000 in an industrial setup.

TABLE 2—*Diagnostic break up of psychiatrically ill workers* (N=56)

Code No.	Diagnosis	N	Percentage
300.00	Anxiety state	20	35.70
300.4	Neurotic depression	17	30.40
296.1	Psychotic depression	4	7.10
303	Alcoholic addiction	4	7.10
295	Schizophrenia	3	5.40
300.3	Obsessive compulsive neurosis	2	3.60
300.1	Conversion reaction	1	1.80
300.5	Neurasthenia	1	1.80
306	Psychosomatic disorder	1	1.80
302.2	Personality disorder of schizoid type	1	1.80
302.7with 300.4	Impotence with secondary depression	1	1.80
300.4 with 303	Neurotic depression with alcohol & Bhang addiction.	1	1.80
304.3			

Of the ill workers, majority are seen to be suffering from anxiety state (35.75%)-and Neurotic or reactive depression (30.36%). Alcoholic addiction is seen to be the only diagnosis in 4 (7.15%) cases.

TABLE 3—*Socio-demagraphic variable in Psychiatrically ill and Normal workers.*

	Psychiatrically ill workers (N=56)	Normal workers (N=244)
Age (in yrs.)		
20-29	22	89
30-39	24	135
40-49	7	18
50 and above	3	2
$X^2=7.62$, N.S.		
Marital status		
Married	47	228
Single	4	15
Widowed	5	1
$X^2=28.68$, $p<.001$		
Education		
Upto Primary	2	14
Upto Matric	11	10
Higher Secondary	28	165
First year or Inter	5	29
Graduate	8	23
Diploma	2	3
$X^2=21.28$, $p<.00$		
Fathers Occupation		
Farmer	24	104
Sweeper	—	1
Not doing anything	20	94
Not alive	11	31
Retired	—	5
Teacher	—	1
Clerk	—	1
Law Officer	—	1
Shopkeeper	1	3
Engineer	—	2
$X^2=6.76$, N.S.		
Family Income (per capita in Rs. per month)		
300 and above	8	37
150-299	25	135
70-149	23	68
31-69	—	4
$X^2=4.55$, N.S.		
Income aspirations		
Same	49	230
More	7	14
$X^2=3.20$, N.S.		
Financial problem		
Present	13	15
Absent	43	229
$X^2=15.72$, $p<.001$		
Domicile		
Urban	16	64
Rural	40	180
$X^2=1.00$, N.S.		
Migration (from states other than Rajasthan)		
Present	21	58
Absent	35	186
$X^2=4.42$, $p<.05$		
Family structure		
Nuclear	32	173
Joint	24	71
$X^2=4.12$, $p<.05$		
Family Size		
Small	24	135
Large	32	109
$X^2=3.43$, N.S.		
Religion		
Hindu	55	239
Muslim	1	2
Christian	—	3
$X^2=1.13$, N.S.		
Length of Service at K.C.C. (in yrs.)		
1-5	8	45
6-10	20	60
Above 10	28	139
$X^2=2.97$, N.S.		

TABLE 4—*Psychiatric and Psychological variables in Psychiatrically ill and Normal workers)*

	Psychiatrically Ill workers (N=56)	Normal workers (N=244)
Psychiatric illness in family members		
Present	19	34
Absent	37	210
$X^2=40.98$, $p<.001$		
Serious physical illness in family		
Present	24	11
Absent	32	233
$X^2=117.00$, $p<.001$		
Alcoholism in family		
Present	16	6
Absent	40	238
$X^2=45.73$, $p<.001$		
Present or past serious illness in worker		
Present	31	22
Absent	25	222
Alcohal addiction in worker		
Present	10	10
Absent	46	234
$X^2=13.95$, $p<.001$		
Any other addiction in worker		
Present	4	3
Absent	52	241
$X^2=5.71$, $p<.02$		
Mental retardation in family		
Present	8	14
Absent	48	230
$X^2=4.91$, $p<.05$		
Interpersonal relationship in family		
Hostile	14	[illegible]
Harmonious	38	235
Tense	4	--
$X^2=86.02$, $p<.001$		
Interpersonal relationship with workers		
Harmonious	45	238
Hostile	11	6
$X^2=5.80$, $p<.02$		
Job satisfaction		
Present	13	4
Absent	43	240
$X^2=2.46$, N.S.		
Job stress		
Present	17	13
Absent	39	231
$X^2=32.25$, $p<.001$		
Accident record		
Present	8	2
Absent	48	242
$X^2=25.69$, $p<.001$		
Living alone at the township		
Present	34	91
Absent	22	130
$X^2=4.09$, $p<.05$		
Parental Deprivation		
Present	12	7
Absent	44	237
$X^2=26.53$, $p<.001$		

DISCUSSION

Present study was an attempt to identify problems of mental ill-health in industrial workers from Khetri Copper Complex-one of the important public

sectors in our country. Results of the study revealed that 187 workers per 1000 could be identified as suffering from one or other kind of mental disorders which is considerably a high figure. When one attempts to compare the findings of this study with that of others in the field, one is at a loss because of scarcity of such studies in the field. The most often quoted study in this area is that of Ganguli (1968). This particular study included 16% industrial workers of Delhi Textile Mill and found period prevalence rate as 140 per 1000. This study was carried out about one and a half decade ago. During this period lot of social changes have occurred in the community on account of urbanization, industrialization and social changes in value system. Changing family structures have also altered the situation materially.

Workers conciousness and awareness regarding their working situation and mass agitation have increased tremendously in last decade or so. However the workers of mining industry are supposed to be in a more hazardous situation than the workers of the textile factory. At K. C. C. 57% workers are engaged in mining department and the sample of present study cansists workers from mining department also, These workers have to go to underground for mining at various depths ranging from 180 meters to 3000 meters., which are completely dark and to adapt there is a problem. There is also risk of injury or collapse of rocks which may take workers life. This constant danger creates a peculiar type of tension in the workers' mind and may be the root of causation of mental disorder in many workers of mining industry.

In view of these explanation it is conceivable that a figure of 187 per 1000 is not as high as it appears when compared to a figure of 140 per 1000 of Ganguli's study. There is another study by Bhaskaran *et al.* (1970) who reported prevalence rate of 160 per 1000 in industrial workers at Heavy Machine Building Plant of Heavy Engineering Corporation at Ranchi which is again lower than that has been obtained from present study.

Comparing the present study with that of Western studies, we find that the prevalence rate of mental morbidity of this study do not appear high at all. For example, Frasen (1947) reported prevalence rate of 140 per 1000 in industrial workers. Canavedo and Validivia (1961) recorded rate of mental illness as high as 740 per 1000 in union leaders and as high as 550 per one thousand in managers. Such high figures may be possible on account of difference in sampling techniques, setup and criteria of psychiatric morbidity.

When we examine the patterns of psychopathology in industrial workers, it is found that about two third of total cases were related either with psychoneutoric anxiety or neurotic depression. These observations are in line with the finding of Ganguli (1968) and Frasen (1947). It may be that the person with psychotic pathology may not be retained in their job situation and terminated before they develop florid symptoms or they have the job on there own and therefore such cases may be represented less in number.

Present study also investigated the role of psychosocial, demographic and psychiatric variables in the development of mental disorders in industrial set up. Findings of the study revealed that among the socio-demographic variables (Table 3) marital status, education level, financial problems, family structure and migration turned out to be statistically significant. That is to say that psychiatrically ill workers had significantly greater frequency of single and widowed;

less education, more financial problems, coming more from joint family structure, and migrated more from other states of India than their counterparts who were free from such psychiatric ailments. Several studies documented that problems of mental health are more in patients who are unmarried, uneducated, migrated, poor and affiliated to joint family system (Nanda, 1981; Bhaskaran *et al.*, 1970; Murphy, 1965; Kliener and Parker, 1965). Socio-demographic variables which had no contribution in the development of psychiatric illness of workers in this study were related to age, father's occupation, per capita family income, income aspiration, domicile, province of origin, familysize, caste, religion and length of service.

As regards to significance of psychiatric and psychological variables (Table-5) it was observed that psychiatrically ill workers had significantly more family history of psychiatric illness, serious physical illness, alcoholism, mental retardation and hostile and tense interpersonal relationship; hostile interpersonal relationship with work mates, present or past history of serious illness, alcoholism and addiction, job stresses, accident proneness and accident records in workers; greater history of living alone at Khetri township and higher parental deprivation as compared to their normal counterparts. These observations are in line with some of the impressions given by Nanda (1981) on industrial workers.

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