

Research Article

Mental Health Problems among Male Tannery Workers: A Study of Kanpur City, India

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- Working environment

Abstract

Occupational health and mental health are the interconnected elements of the overall well-being of workers. The objective of the study was to estimate the prevalence and determinants of mental health disorder among male tannery workers. This study uses the GHQ-12 scale to measure the symptoms of mental health disorder among the male tannery workers, who were engaged in this occupation for at least one year. The primary data used in this paper was collected through a cross-sectional household survey of 286 male tannery workers, during January - June 2015. The results showed that over two-fifths of illiterate workers (42%) had severe mental health disorder. Those who were in the 25-35 years' age group and 36 and above years were 1.70 and 1.84 times in more likely to have mental health problems in Model-I. Education has emerged as a significant predictor. Increasing education level leads to decreasing mental health problems. It can also be seen that male tannery workers who were employed on the permanent basis were 0.33 ($p < 0.005$) times less likely to have mental health problems in Model-II. It is evident from the result of moderate to high exposure to ergonomic stressors (69%) had the severe impact on mental health disorder. Male tannery workers who had moderate/high exposure to ergonomic stressors were 6.21 ($p < 0.001$) times more likely to have the mental health problem in Model-III. This study exposed the factors which are consistently associated with mental health disorders such as the age of tannery workers, education, type of job contract, exposure to ergonomic stressors.

ABBREVIATIONS

GHQ- General Health Questionnaire; PPS- Probability Proportional to Size; SD- Standard Deviation; SC/ST- Schedule Caste/ Schedule Tribes; OLR - Ordered Logistic Regression Analysis

INTRODUCTION

Occupational health and mental health are the interconnected elements of the overall well-being of workers. The World Health Organization has estimated that mental and behavioral disorders accounted for 12 percent of the global burden of disease in 2000 and it is projected to increase to 15 percent by 2020 [1]. Around one-fourth of the people from a given geographical area, community, setting, socio-economic background and gender experienced the mental disorder at some point in time in their lives [2]. Occupational health is not a critical issue of concern in most developing countries like India, and this may be due to competing for social, economic and political challenges that are

often accorded higher priority. An important factor could be a financial gain of the employer. Research in occupational health in developing countries should recognize the social and political contexts of workplace relationships, especially in the light of the fact that the majority of developing countries lack the political mechanisms necessary to translate scientific findings into effective policies [3].

Tanneries have attained considerable notoriety for the polluting nature of their work and the serious occupational health risks that they pose. Male tannery workers are regularly exposed to many harmful chemicals and physical hazards. These include exposure to and contact with chromium-bearing chemicals and reactants. The poor and unsafe working conditions act as stressors and increase the susceptibility of the workers. There is the high risk of developing mental health problems in such working conditions. With growing industrialization and socio-economic progress, and the attendant changes in lifestyle, occupational health concerns are gaining importance in developing countries.

India is facing a growing burden of non-communicable diseases, which has become a significant public health problem being responsible for a high proportion of morbidity and mortality in India.

Workplace environment and psychological health are interconnected, they affect the overall well-being of workers in all over the world. Mental health is an important but unrecognized health problem among the general population as well as employees in the unorganized sector and small-scale industries, especially in the developing world. There is virtually no awareness about the indicators and symptoms of mental health problems. This study focuses on male tannery workers involved in different type of work in the tannery industry. The hazardous and polluting environment in tanneries has been described earlier in this paper. Workers are exposed to considerable health risks on account of the processes and constant exposure to -and contact with - various toxic and harmful chemicals such as chromium and chromium bearing chemicals, acids, vegetable tannins, aldehydes, etc.

Some research articles connect occupation-related stress and mental disorder among workers in different occupations worldwide. A study of military personnel by Health Survey for England in phases 1 and II showed that the odds of their developing common mental disorders were approximately double as compared to the general population [4]. A British Household Panel Survey revealed that men who worked in night shifts for four years and more are at increased risk of mental ill-health such as anxiety/depression [5]. A study of nurses, social workers, doctors, clinical psychologists, drug and alcohol counselors, and others, in a total 194 staffs, showed that the prevalence of psychological morbidity among male was 82 percent [6]. Another study, based on 309 drought-affected farmers and their spouses, results showed younger farmers (25-54 years) were experiencing significantly higher levels of distress [7].

A cross-sectional study based on psychological strain and exposure to work-related stressors in the Naval services showed that the rates were 32 percent in 1999 and 33 percent in 2004 with no statistically significant difference between them ($P>0.05$) [8]. The study utilized the Mental Health Inventory (MHI-5) subscale of the SF-36 version 2 health status questionnaire to measure mental health. The results show the categorical compositional variables with their associated mean (SD) mental health scores. The mean mental health scores ranged between 61 and 76 [9]. A study of Armed Forces personnel revealed a high prevalence of self-reported psychological ill-health in the UK. The mean GHQ-12 score was 11 [10].

Findings from a postal survey of social workers of England and Wales in 2006 reveal that around half (47%) of respondents ($n=111$) scored 4 or above on the GHQ-12, indicating a potential psychological disorder. The mean score was 27 (s.d. =6.0). When the lower cut-off for the identification of probable common mental illness (2/3) was used, the GHQ-12- positive rate rose to 55 percent ($n=130$) [11]. This study had interviewed the UK hospital consultants from five specialties. The survey was done in 1994 and 2002. The proportion of consultants with psychiatric morbidity rose from 27 percent in 1994 to 32 percent in 2002 [12]. Results from a cross-sectional study of 1206 police officers

identified stress as due to inherently stressful nature of the work and the personal risks they are exposed. A study found a significant association between male police officers and mental ill-health [13].

A study has interviewed nurses, social workers and teachers from the Northern Ireland. Results portray that less than one-third of the nurses (27% on GHQ-28 and 23% on GHQ-12) reported symptoms of mild psychiatric morbidity, and had lower levels than either teachers (31% on GHQ-28; 32% on the GHQ-12) or social workers (37% on the GHQ-28; 31% on the GHQ-12) [14]. A postal survey of doctors, long considered as being at risk of occupational stress showed that about 29 percent of the study's respondents scored above the threshold score of 3, which is indicative of psychiatric morbidity. About 22 percent of the surveyed doctors scored above the most conservative threshold of 4 [15]. Results of anxiety scale and incidences of anxiety status showed significantly higher anxiety scores among men [16]. A study which investigated the psychopathology among ambulance personnel, the result showed that the mean scores on a GHQ-28 scale were 3.9 and SD was 5.2 [17]. The results from a study revealed the highest percentage of GHQ-cases was found among doctors and managers (30%), followed by district nurses (27%), health visitors (24%) and practice nurses (22%) [18]. A comparative study of psychological distress among junior doctors, senior registrars and consultants in three Manchester teaching hospitals revealed that 31 percent doctors reported scoring above threshold [19]. A study of general practitioners for stress and psychological symptoms, around half (52%) scored 3 or more on the GHQ-12, which indicates a high level of symptoms of mental stress. Problems with physical and mental health were associated with several aspects of workload including the number of hours they worked per week [20]. A postal survey was conducted for 483 miners working in Nottinghamshire mines industry and 753 non-miners. It was found that in comparison with working non-miners, current miners, unemployed and former miners were more likely to have a score of 3 or more on GHQ-12 (Odds ratios: 3.0; 3.8 and 1.9) respectively [21]. Results of a study of burnout and psychiatric disorders among senior oncologists and palliative care specialists showed that an estimated 28 percent suffered psychiatric disorders as indicated by their GHQ-12 scores [22]. Many factors contribute to the mental health problem among the workers engaged in the different occupation. The unsafe working conditions play an important role as ergonomic stressors which increase their susceptibility to mental disorders. In India, very few household studies were conducted on occupational health risks of male tannery workers. So for, the objective of the survey was to estimate the prevalence and determinants of mental health disorder among male tannery workers.

MATERIALS AND METHODS

This study uses the GHQ-12 scale to measure the symptoms of mental health disorder among the male tannery workers, who were engaged in this occupation for at least one year. The primary data used in this paper was collected through a cross-sectional household survey of tannery workers, during January - June 2015. The survey was conducted as a part of a Ph.D. program in the Jajmau area of Kanpur city of Uttar Pradesh, India. Due to

the functioning of a large number of tanneries, Kanpur is also known as the 'Leather City of the World'.

Participants

Following a scientifically determined sample size, a total of 300 households from each group, i.e., male tannery workers and male non-tannery workers were selected for the study. However, despite multiple visits, a total of 286 male tannery could be interviewed. The sample selection process involved three stages. At the first stage, the Jajmau area was divided into multiple clusters based on its geographical topology and seven clusters having the maximum concentration of tannery workers were selected based on priory knowledge of the researcher. At the second stage, three areas were chosen according to the probability proportion to size (PPS) on the basis of the highest number of households of tannery workers in the area. At the third and final stage, the listing of the households with at least one tannery worker was completed. In cases where a household had more than one person working in a tannery, selection of respondent was made through a KISH table.

From each of the three areas selected in stage two, a sample of 100 households was selected through systematic random sampling. The selected areas were Budhiyaghat, Tadbagiya and Ashrafabad in Jajmau, suburban Kanpur. Non-tannery workers for the survey were selected following a similar process. Tools for the study were prepared from research already done in this field. Before finalization, all the research tools were translated into local language and piloted among tannery and non-tannery workers. Subsequently, with an incorporation of the learnings the research tools were finalized. Face to face interviews were conducted with the help of a structured questionnaire. The study also used a questionnaire developed by National Institute for Occupational Safety and Health (NIOSH) and the Standardized Nordic Questionnaire.

Ethical issues were addressed before the respondents were interviewed. Formal written consent was obtained from all participants, and confidentiality of data was assured with the help of a coding system to hide the identity of respondents. The study collected household information on a source of drinking water, toilet facilities, hygiene and sanitation aspects, type of house, household assets, religion, caste, food habits, and exposure to media. Information on mobility in the tannery occupation, working conditions, environmental exposure, health risk, preventive measures, and substance use was also obtained. The study also collected comprehensive information on various health problems like respiratory, dermatological, ocular, gastrointestinal, musculoskeletal and mental ones. The respondents also provided details of health expenditures due to hospitalization and as outpatients.

Statistical techniques

Bivariate analysis was used to examine variations in mental disorder by socio-economic and work-related characteristics using the Chi-square statistic to test for statistical independence.

Ordered logistics regression Analysis

Ordered logistic regression analysis (OLR) were used with an ordered dependent variable. This study has a dependent

variable, mental health status, which is categorized into three groups – normal, moderate and severe mental health condition. For the assessment of mental health score odds was calculated by the model [23].

MEASURES

Dependent variable

General health questionnaire (GHQ - 12) was used to scrutinize the mental health status of male leather tannery workers. The General Health Questionnaire consists of 12 items, each item measuring the severity of mental disorders over the few weeks preceding the study. Each item was assessed on a four-point scale (Not at all, no more than usual, rather more than usual, much more than usual). This study used GHQ-12 on four points Likert scale (from 1 to 4). We have arranged the response of GHQ-12 items by keeping all the item in the same direction. GHQ - 12 is a dimensional indicator of common mental disorders from which a score is produced, and this score was divided into three equal measures. However, researchers have categorized mental health score into normal, moderate and severe groups by using the principal component analysis (PCA).

Independent Variables

Predictor variables used in the study are: age (years), education (illiterate, up to primary, middle school, high school & above), marital status (currently married, never married, widowed/widower), religion (Hindu, Muslim), caste (SC/ST, Other Backward Classes, none of these, don't know). The variable, media exposure (no exposure, any exposure), was constructed by using a set of questions on frequency of reading newspapers, magazines, watching movies (in cinema hall), T.V., radio, frequency of using the Internet was listed with the support of principal component analysis. Standard of living index (low, medium, high) was also developed with the help of principal component analysis by using the following items: electricity, bed, chair, table, cot, cooker, sewing machine, LPG gas, mobile, water pump, electric fan, color television, mixture grinder, refrigerator, radio, watch, cycle, motorcycle and bank account. Work experience component in current job included: nature of contract (temporary or permanent), type of work (beam house, wet finishing, dry finishing, miscellaneous work), average daily working hours, average working days in a week, The Mental Health score from work-related stress was generated with help of principal component analysis by asking responds to rate their work as exemplified by the following statements: "the work you do is very time demanding", "your job involves a lot of travelling", "the work you do make you feel bored", "the work you do demands a lot of physical hard work", "the work you do involves lot of tension" and "the work you do make you feel frustrated" according to the Likert scale (strongly disagree, disagree, agree, strongly agree). Ergonomic stressors (no exposure, low exposure, moderate exposure, high exposure, very high exposure) were based on the qualitative rating of exposure assessment as [0] No exposure: does not occur (< 10% of work time) [1] Low exposure: less than 25% of daily work time [2] Moderate exposure: 25-49% of daily work time [3] High exposure: 50-74% of daily work time [4] Very high exposure: 75% or more of daily work time. Ergonomic stressors were recoded into three categories – no exposure, moderate exposure, and Moderate/High exposure.

RESULTS

Descriptive findings of the study are presented in Table (1). The mean age of male tannery workers was 38 years (SD=1.4). About 66 percent of the male tannery workers were illiterate and only 11 percent had a high school or higher education. Average work experience of male tannery workers was 18 years. The vast majority of male tannery workers (89%) worked on temporary job contracts, and the mean duration of their job was 10 (SD=0.9) years. The respondents worked in various tannery processes. Little over eight percent were engaged in beam house work, 24 percent in wet finishing, 50 in dry finishing and 17 percent in miscellaneous kinds of work. The male tannery workers also reported that they worked almost every day of the week with a 9-hour working day as the norm. On average they worked 6.5 days (SD=0.6) a week and 9.5 hours (SD=0.2) a day. About two-thirds of the workers were Muslim (66%) and the remaining Hindus. The majority of the tannery workers (65%) belonged to the SC/ST group and only 6 percent from the general caste group. Over one-fifth of the tannery workers (23%) did not have any exposure to the media.

Table (2) shows the prevalence of self-reported symptoms of mental health problems experienced by the male tannery workers in last one month preceding the survey for each of the 12 items in the GHQ-12 scale. The prevalence of symptoms of mental health are described on a Likert scale (not at all, no more than usual, rather more than usual, much more than usual). The results portray the experience of symptoms of mental health problems from the following statements. Male tannery workers reported not at all "able to concentrate" (31%), "Playing a useful part" (30%), "Could not overcome difficulties" (28%), and "Able to enjoy a day to day activities" (30%). The majority of the male tannery workers experienced rather more than usual reported in following statements "Felt constantly under strain" (24% of the respondents), "Feeling unhappy and depressed" (32%), "Loss confidence" (30%), "Poor self-esteem" (27%). They also experienced "Loss of sleep over worry" (30%). Small proportion of male tannery workers reported "Capable of making decisions" (22 percent 'not at all' and 11 percent 'more than usual'), "Able to face problem" (25 percent 'not at all' and 8.1 percent 'more than usual'), and "Feeling reasonably happy" (34 percent 'not at all' and 5.3 percent 'more than usual') in the survey.

Prevalence of mental health disorder among male tannery workers by some selected background and work-related characteristics are presented in Table (3). Mental health variables were categorized into three groups - normal, moderate and severe. The distribution of male tannery workers by the prevalence of mental health disorders portrays that over two-fifths of them were normal having no mental disorder, while 29 percent were having a moderate problem and 31 percent of them were suffering from the severe mental disorder. Prevalence of severe mental disorder among male tannery workers is not uniform across different age groups. About 35 percent of the male tannery workers among that age '36 years and above' were having the severe mental disorder. By and large, a similar situation is noted even among those age 25-35 years. The chi-square test also showed a statistically significant association between increasing age and prevalence of mental disorder among

Table 1: Socio-economic and work related characteristics of tannery workers of Kanpur city, India, 2015.

Variables	Tannery (%)	workers (N)
Age in years (Mean ± SD)	38.5 ± 1.4	286
Education		
Illiterate	66.3	189
Up to primary	13.3	38
Middle school	8.8	25
High school & above	11.6	33
Work experience in current tannery (Mean ± SD)	10.1 ± 0.9	285
Work experience in previous tannery (Mean ± SD)	7.9 ± 1.3	99
Job contract		
Temporary job (daily wages)	89.1	254
Permanent job	10.9	31
Type of work		
Beam house work	8.4	24
Wet finishing work	24.2	69
Dry finishing work	50.5	144
Miscellaneous work	16.8	48
Average working hours in day (Mean ± SD)	9.5 ± 0.2	285
Average working days in a week (Mean ± SD)	6.5 ± 0.6	285
Religion		
Hindu	33.8	96
Muslim	66.2	188
Caste		
SC/ST	65.4	187
Other backward class	18.5	53
None of them	5.6	16
Don't know	10.5	30
Media exposure		
No exposure	22.9	66
Any exposure	77.1	220
Standard of living index		
Low	37.7	107
Medium	31.3	89
High	31.0	88

male tannery workers ($\chi^2=14.6$, $p<0.006$). The results also show a strong relationship between education level and mental health problems among the male tannery workers.

The majority of the male tannery workers (58%) who had education high school & above had normal mental health problems. However, over two-fifths of illiterate workers (42%) had severe mental health disorder. It is clear that mental health disorder has an inverse relationship with education level. The results are statistically significant ($\chi^2=36.5$, $p<0.000$). About 45 percent of the Muslim tannery workers reported severe mental health disorder and had statistically significant ($\chi^2=49.2$, $p<0.000$) association with the religion. Around half of the male tannery workers (47%) belonging to the middle strata in the standard of living index were found to have severe mental health disorder with a value of chi-square test ($\chi^2=20.3$, $p<0.000$). The type of job

Table 2: Prevalence of GHQ-12 self-reported mental health problems experienced by male leather tannery workers in last one month preceding the survey, Kanpur city, India, 2015.

GHQ-12 scale items	Not at all	No more than usual	Rather more than usual	Much more than usual	Number (N)
Able to concentrate	31.0	21.1	40.5	7.4	284
Loss of sleep over worry	43.0	30.3	21.5	5.3	284
Playing a useful part	29.9	18.3	40.5	11.3	284
Capable of making decisions	22.5	28.9	38.0	10.6	284
Felt constantly under strain	57.0	15.9	23.9	3.2	284
Could not overcome difficulties	28.2	23.9	39.1	8.8	284
Able to enjoy day-to day activities	30.3	23.9	34.5	11.3	284
Able to face problems	25.0	21.8	45.1	8.1	284
Feeling unhappy and depressed	50.0	11.3	32.4	6.3	284
Losing confidence	53.9	10.9	29.9	5.3	284
Thinking of self as worthless	59.5	9.9	26.8	3.9	284
Feeling reasonability happy	33.8	24.3	36.6	5.3	284

Table 3: Prevalence of mental health problems by some selected socio-economic and work related characteristics among male tannery workers of Kanpur city.

Variables	Normal	Moderate	Severe	Number (N)	Chi-square
Age in years					
16-24	44.8	51.7	3.5	29	14.6, p<0.006
25-35	38.8	28.2	33.0	103	
36+	40.8	24.3	34.9	152	
Education					
Illiterate	33.7	24.1	42.3	187	36.5, p<0.000
Up to primary	44.7	34.2	21.1	38	
Middle school	64.0	36.0	0.0	25	
High school & above	57.6	39.4	3.0	33	
Marital Status					
Currently married	39.4	23.3	37.3	236	30.9, p<0.000
Widowed/Widower	71.4	28.6	0.0	14	
Newer married	38.5	61.5	0.0	26	
Religion					
Hindu	58.3	37.5	4.2	96	49.2, p<0.000
Muslim	31.4	23.9	44.7	188	
Caste					
SC/ST®	43.0	23.7	33.3	186	40.7, p<0.000
Other backward class	28.9	26.9	44.2	52	
None of them	81.3	18.8	0.0	16	
Don't know	23.3	66.7	10.0	30	
Media exposure					
No exposure®	36.9	32.3	30.8	65	0.7, p<0.708
Any exposure	41.6	27.4	31.1	219	
Standard of living index					
Low®	41.1	36.5	22.4	107	20.3, p<0.000
Medium	38.2	14.6	47.2	89	
High	42.1	33.0	25.0	88	
Job contract					
Temporary job (daily wages)	38.7	26.9	34.4	253	12.6, p<0.002
Permanent job	54.8	41.9	3.2	31	
Type of work					
Beam house work®	33.3	29.2	37.5	24	8.9, p<0.181
Wet finishing work	37.1	21.4	41.4	70	
Dry finishing work	45.5	30.8	23.8	143	
Miscellaneous work	34.0	31.9	34.0	47	

Work Related Stress					
Low	16.7	29.7	53.6	138	104.1, p<0.000
Moderate	73.4	14.9	11.7	94	
High	44.2	50.0	5.8	52	
Ergonomic stressors					
No exposure	60.0	35.0	5.0	80	111.1, p< 0.000
Low exposure	51.5	35.0	13.6	103	
Moderate/High exposure	13.9	16.8	69.3	101	
Total	40.5	28.5	31.0	284	

Table 4: Results of the proportional odd model using mental health as three ordered categories in model I, Model II, model III.

Variables	Model I		Model II		Model III	
	Odds ratio	Standard Error	Odds ratio	Standard Error	Odds ratio	Standard Error
Age in years						
16-24						
25-35	1.70	0.87	1.29	0.67	0.98	0.55
36+	1.84	0.97	1.31	0.71	0.89	0.52
Education						
Illiterate						
Up to primary	0.48**	0.18	0.47**	0.18	0.65	0.27
Middle school	0.18***	0.09	0.19***	0.09	0.26**	0.13
High school & above	0.40**	0.18	0.44*	0.20	0.35**	0.17
Marital Status						
Currently married						
Widowed/Widower	0.13***	0.08	0.15**	0.10	0.26*	0.19
Newer married	1.11	0.57	1.06	0.55	0.88	0.49
Religion						
Hindu						
Muslim	4.30***	1.21	4.31***	1.24	2.32**	0.73
Caste						
SC/ST®						
Other backward class	1.46	0.49	1.51	0.52	1.00	0.38
None of them	0.07***	0.05	0.06***	0.04	0.21**	0.16
Don't know	1.13	0.44	1.21	0.48	0.93	0.39
Media exposure						
No exposure®						
Any exposure	1.05	0.33	1.11	0.36	1.54	0.55
Standard of living index						
Low®						
Medium	1.52	0.48	1.62	0.52	1.25	0.43
High	1.02	0.33	1.18	0.40	0.79	0.30
Job contract						
Temporary job (daily wages)						
Permanent job			0.33**	0.15	0.55	0.26
Type of work						
Beam house work®						
Wet finishing work			1.59	0.80	0.94	0.52
Dry finishing work			1.06	0.50	0.89	0.45
Miscellaneous work			1.43	0.75	0.89	0.51
Work related Stress						
Low						
Moderate					0.13***	0.05
High					0.44**	0.18
Ergonomic stressors						
No exposure						
Low exposure					1.47	0.52
Moderate/High exposure					6.21***	2.50

contract among the male tannery workers on the temporary job (or daily wages) basis (34%) is significantly associated ($\chi^2=12.6$, $p<0.002$) with severe mental health disorder. More than half of the tannery workers (54%) with a low level of work-related stress had the severe mental health disorder, and this result has significant ($\chi^2 =104.1$, $p<0.000$) association with work-related stress. It is evident from the result of moderate to high exposure to ergonomic stressors (69%) had the severe impact on mental health disorder, and the value of chi-square test showed the statistically significant ($\chi^2=111.1$, $p< 0.000$) association with ergonomic stressors.

Table (4) presents the results of ordered logistics regression analysis to understand the factors affecting the mental health of male tannery workers. Model-1 deals with the socio-economic variables including (age, education, marital status, religion, caste, media exposure and standard of living index). Moreover, Model-II included work-related variables (the type of job contract and type of work) additional to socio-economic variables and Model-III comprised exposure variables with the socio-economic and work-related variables in this study. The results show that the age of male tannery workers has a significant effect on the mental health disorder. Those who were in the 25-35 years' age group and 36 and above years were 1.70 and 1.84 times in Model-1, and 1.29 and 1.31 times in Model-II more likely to have mental health problems. Education has emerged as a significant predictor. Increasing education level leads to decreasing mental health problems. Those who had studied up to primary, middle school and high school & above were 0.48 ($p<0.05$), 0.18 ($p<0.001$), 0.40 ($p<0.05$) times in Model-I; 0.47 ($p<0.05$), 0.19 ($p<0.001$), 0.44 ($p<0.01$) times in Model-II; and 0.65, 0.26 ($p<0.005$), 0.35 ($p<0.005$) times in Model-III were less likely to have mental health problems. Muslim tannery workers were 4.30 ($p<0.001$) times in Model-1, 4.31 ($p<0.001$) times in Model-II and 2.32 ($p<0.005$) times in Model-III more likely to have the mental health problem. It can also be seen that that male tannery worker who was employed on a permanent basis were 0.33 ($p<0.005$) times less likely to have mental health problems in Model-II. Male tannery workers who had moderate/high exposure to ergonomic stressors were 6.21 ($p<0.001$) times more likely to have a mental health problem in Model-III.

DISCUSSION

The objective of the study was to estimate the prevalence and determinants of mental health disorder among male tannery workers. The study population of male tannery workers exposed to the severe mental disorder. The mean age of male tannery workers was 38 years and work experience in a current job was ten years which substantiate the observation that the male tannery workers are involved in this occupation for a long time. They took up the occupation mostly because a parent or close relative was already engaged in this occupation (inter-generational occupation). Therefore, it could be said that tannery work is a traditional occupation carried from generation to generation, which has continued within a social class (religion or caste) due to poor mobility for the persons engaged in this work.

Workplace environment plays important health risk factors among leather tannery workers. Leather tannery workers are susceptible to many chemicals and physical hazards, just

because they are liable to be affected by their exposure to lots of hazardous materials and processes during tanning work in very hazardous work environment. Chromium exposure during the tanning process, leather dust, exposure to chemical agents, ergonomic stressor increases their susceptibility. They are even involved in different works like material transfer, wet finishing, dry finishing, etc. and these workers come in touch with leather hide during the different work process, which is very hazardous in nature and releases many hazardous tissues during the tanning process. Consistent involvement of tannery workers in an unsafe work environment in tannery leads to the severe mental health disorder. Increasing age and longer duration of working in tannery have emerged as significant predictors of mental disorders. Problems with mental health were associated with several aspects of workload. This finding also documented in the several other studies [24-26]. Results of ordered logistics regression analysis also revealed that the age of male tannery workers had a statistically significant effect on the mental health disorder.

Education has emerged as a significant predictor of mental health. The majority of the tannery workers belongs to the deprived section of the society. They are not getting an adequate education because of the poor educational status of parents, low economic status, and large family size. The study showed that nearly two-thirds of male tannery workers were illiterate, which could be the reason for poor awareness about the hazardous nature of work. Various studies show that the increasing education level reduces chances of having mental health problems [27-28]. Results demonstrated that there is a profound relationship between educational attainment and mental health disorder. It shows that mental health improves with increasing education level. It is also evident from the study that a substantial proportion of illiterate male tannery workers (42%) have severe mental health disorders. It is also apparent that the critical issue of occupational stress may be due to lack of autonomy, which can be linked with the education level. Somehow tannery workers are bound to work in this occupation because of their low level of education and decision-making ability. It is more likely that illiterate people and those with low educational attainments are not aware of the dangers of exposure to chemicals, ergonomic stressors and use of preventive measures in different tanning processes. So education is the emerging issue that is well connected with the mental health status in many sense.

The constant exposure to high concentration of harmful chemicals can be considered to be an ergonomic stressor, which is generally high among the tannery workers. The male tannery workers with moderate/high exposure to ergonomic stressors were 6.21 times more likely to have a mental health problem. It requires concern over the case of temporary tannery workers who are compelled to work long hours due the lack of skills and fear of losing jobs in the industry. Our results shows that high percentage of temporary male tannery workers with severe mental health disorder than that of permanent workers. Those exposed to moderate/high stressors (69%) had severe mental health disorder which corroborates with the results of other studies on work environment and stress [29-31]. Then, the frequency and extent of exposure can be a reliable predictor of the probability of the affected persons developing mental health

problems that suggest a pressing need for the counseling and provide the information on hazardous chemicals used in working environment. So that male tannery workers can reduce the chances of harmful exposure by using appropriate preventive measures and hence to improve their overall health and wellbeing. Several studies have documented the causal linkages between mental health and the exposure at the workplace [32-34]. Therefore, the mental disorders found among the male tannery workers that participated in the study may be considered as a significant effect of their working environment.

CONCLUSIONS

This study concludes that the surveyed male tannery workers had severe mental disorders. This study exposed the factors which are consistently associated with mental health disorders such as the age of tannery workers, education, type of job contract, exposure to ergonomic stressors, etc., which have a statistically significant association with the mental health problems among the male tannery workers. There is pressing need to promote awareness of mental health issues as well as their causes, especially the workplace environment.

ETHICAL APPROVAL

We have received the ethical clearance from the committee. The study was approved by the Student Research Ethics Committee of International Institute for Population Sciences Mumbai, India.

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