MENTAL HEALTH OF ARSENICOSIS PATIENTS

Mahbuba Kaniz Keya, Hamida Akhtar Begum & A. B. M. Zarihul Haque

This study aims at examining the mental health condition of arsenicosis patients as well as explaining the socio-environmental predictors of mental health. Using Probability Proportional to Size (PPS) technique two hundred arsenicosis patients were included in this study. One hundred and ninety four healthy (non-affected) participants were included as controls. General Health Questionnaire (GHQ) was used to explore the mental health condition of the participants and a questionnaire was used for socio-demographic and arsenic related information. Results showed that age and duration of arsenicosis were negatively and income was positively correlated with the mental health. Further, regression analysis showed that socio-environmental factors (age, income, arsenic toxicity and duration of arsenicosis) explained 68% of the mental health condition of the participants most of which was contributed by arsenic toxicity. Moreover, it was found that arsenicosis patients had poorer mental health in comparison to non-affected participants.

Keywords: Arsenicosis. Mental health. Chronic illness. Socio-environmental factors. Hotspots.

Introduction

Chronic and prolonged illness deteriorates psychological well-being of the patients. Researchers attempted to understand the mental health condition during chronic illness (1-4) Chronically ill people face common psycho-social problems. They suffer from anxiety and depression, inability to manage restrictions on work and social life and cope with threats to self-esteem and self-concept. Thus physical illness produces gross changes in life style and deteriorates adjustment and sometimes creates psychological problems such as depression, insomnia, nightmares, anxiety disorder etc. (e.g. 5). Taylor and Aspinwall (4) reported that chronic patients experience intense feeling of disorganization, anxiety, fear and other emotions. Chronically ill individuals also face negative biases (6) and stigma (7). Sometimes physically healthy people led by negative stereotypes avoid interaction with the disabled and the chronically ill (8). These negative attitudes also persuade the disease affected individuals to avoid social interaction with their healthy counterparts and that further limits the availability of satisfying and productive interpersonal exchange. In additions the chronic patients experience reduction of positively reinforcing experiences and personal control which influences psychosocial well-being and quality of life (1, 9). Therefore, chronic

illness, though has its conspicuous physical impacts, has substantial psychological consequences too.

A large number of people in Bangladesh have developed arsenicosis – a life threatening chronic illness caused by arsenic contaminated drinking water (e.g. 10, 17). Arsenicosis is a chronic disease caused by prolonged exposure to arsenic above safe level usually manifested by characteristic skin lesions with or without involvement of internal organs and malignancies (12). Manifestation of dermatological symptoms of skin lesions, discoloration and pigmentation of skin give rise to physical difficulties (13, 14, 15) which cause changes in the victims life –physical distortion of appearance, jobloss, social discrimination and isolation, implicit negative biases (16, 17, 18). These changes are eventually followed by stressful experiences (19). Thus, arsenicosis affects psychological well-being, i.e. mental health of the victims (20). There have been few studies on psychological impact of arsenicosis in Bangladesh, or, for that matter, elsewhere. Keya (21), working in Chapainawabganj hotspot in a pilot study, found that arsenic affected people had poorer mental health in comparison to non-affected. Another study reported that arsenic toxicity was the strongest predictor of perceived stress and arsenic affected people were more stressed than non-affected people (19).

The present study is an attempt to explore the psychological impact of arsenicosis and to understand to what extent arsenicosis threatens patients' psychological well-being or mental health. This study tried to know how the socio-environmental factors (age, income, duration of arsenicosis) are associated with mental health. The specific objectives of this study were to examine the relationship of age, income, duration of arsenicosis (socio- environmental factors) with mental health; to ascertain the impact of socio-environmental factors as the predictor of mental health as well as to identify which socio-environmental factors, such as age, income, arsenic toxicity and duration are the best predictors of mental health; and finally to assess and compare the mental health of arsenic affected and non-affected participants.

Materials and Methods

Study Area Rajshahi and Chapainwabganj districts in northwestern Bangladesh were selected as the study area. Four villages (hotspots of arsenic toxicity) were randomly chosen for the study (Rajarampur and Sutrajitpur of Chapainawabganj, Miapur and Harirampur of Rajshahi).

Study Population A total of 394 participants (200 arsenic affected and 194 non-affected) were randomly selected from 4 arsenic hotspots areas using probability proportional to size (PPS) method. In 2001 – 2003 Watson Partnership project (WPP) (22) surveyed 640 villages of Rajshahi and Chapinawabganj districts in order to screen out arsenic patients and contaminated tubewells. An arsenic survey team of WPP consisting of non-medical workers made the preliminary

identification of the arsenicosis patients to be later randomly checked and validated by medical doctors who prepared the final list of the patients. It would have been more appropriate if all the patients were screened by the medical doctors. No other pertaining data for the study area were available. This secondary data list of arsenicosis patients was used for sample selection. For this study, 75 patients from Rajarampur, 67 from Sutrajitpur union, 32 from Miapur and 26 from Harirampur village were randomly picked up from the list using PPS method. The control group was drawn from all 4 selected areas–those who had not been suffering from arsenicosis symptoms. Using PPS method non-affected participants were selected. Out of total population of the selected area arsenic affected participants were excluded and then using the PPS method $\left(ni = \frac{Ni}{N} \times n \right)$ the non-affected sample size was determined. For this study 38 participants from Rajarampur, 122 participants from Sutrajuitpur, 17 from Miapur and 17 from Harirampur Village were randomly picked up from the household list (BBS).

The demographic characteristics of all participants (arsenic affected and non-affected) are presented in Table 1

Instruments

Questionnaire for Socio-demographic and Arsenic Related Information

A questionnaire based on socio demographic and arsenic related information developed on the basis of various research reports on arsenic poisoning was used for recording socio-demographic information and items relating to arsenic poisoning.

General Health Questionnaire (GHQ)

The Bengali version of General Health Questionnaire (GHQ-12), adapted by Sorcar and Rahman (23) was used to measure mental health of the participants. Originally, GHQ-12 was developed by Goldberg (24) to detect minor psychiatric disorders in community and primary health care settings. GHQ-12 had a high degree of internal consistency with alpha values ranging from 0.82 to 0.90. Validity coefficient of the GHQ-12 was found to be high with GHQ-12, GHQ-30 and GHQ-60.

The answering pattern of the original GHQ- 12 was 'less than usual' or 'more than usual' format. But, in Bengali version this scoring system had to be changed because of its linguistic difficulties. Sorcar and Rahaman adapted the new Likert type scoring system in which true keyed items (all positively worded items) of their questionnaire weights of 0, 1, 2, and 3 were assigned for 'not at all', 'some what', 'to a considerable extent' and 'to a great extent' respectively. The scoring for the false-keyed items was reversed. The total scores ranged from 0 to 48, with low scores being indicative of poor mental health.

The Bengali version of GHQ had been widely used in Bangladesh. Banu and Akhter (25); Sorcar and Rahman (23); Huq *et al.* (26), and and Sorcar and Rahman (27) used this scale as a measure of mental health.

Training of the Interviewers

Orientation programme on interviewing and arsenic related information was arranged before the field data collection. Eight interviewers (both female and male graduate students of psychology) were trained prior to the survey.

Procedure

At the beginning, interviewers went to the arsenic affected villages accompanied by the community members, who introduced them to the villagers that helped them to be acceptable in the locality. The data was collected during September –October, 2003. Before collecting data, information on the nature of the study and the content of the questionnaire was given to the participants. Participation in the study was voluntary and was without monetary compensation. To establish rapport or easy and spontaneous relationships with the participants', interviewers had to repeatedly visit the study area. At the beginning, people had grievances and agitation towards the interviewers because in the past a number of visitors came to them, asked questions and examined them but delivered no concrete services. After repeated visits interviewers assured the participants they would convey patients' miserable conditions to the government and welfare organizations and gradually they started talking to the interviewers. The interviewers started with socio-demographic and arsenic related information and then proceeded with GHQ. Sometimes, participants told their personal miserable experiences to the interviewers, interviewers had to show patience in order to share their experiences and extend support during their deliberations. Thus it took a long time to complete the entire questionnaire. However, non-affected participants took relatively less time to complete it than the affected ones.

Data Analyses

Data analyses were done using SPSS for windows 10.0. To examine the relationships of socio-environmental factors with mental health Pearson's Product moment correlation was used. To identify socio-environmental factors as the predictor of mental health regression analysis was employed; to identify the best predictors of mental health step wise regression analysis was employed. To compare mental health of arsenic affected and non-affected patients one way analysis of variance (ANOVA) was performed. A p value of <0.05 was considered to be significant.

Results

To examine the relationship among socio-environmental factors (income, age, duration of arsenicosis) with mental health Pearson's product moment correlation was computed.

Table 2 also indicates that age, income, duration of arsenicosis variables were significantly correlated with mental health. Age and duration of arsenicosis

were negatively correlated with the mental health, while income was positively correlated with the latter. That means, when income increased mental health condition improved or vice–versa, whereas when age and duration of arsenicosis increased mental health condition deteriorated or vice–versa.

To study socio-environmental factors as the predictors of mental health regression analysis was used. In the analysis socio-demographic factors (age and income) and environmental or disease related factors (arsenic toxicity and duration of arsenicosis) were considered as the predictors of mental health.

Regression analysis was used to examine the variables predicting participants' mental health. Findings of the socio-environmental resources that predict mental health are presented in Table 3.

Regression analysis (Table 3) using age, income, arsenic toxicity and duration of arsenicosis as predictors of mental health revealed that arsenic toxicity ($P \approx .00$), income ($p < .003$) and duration of arsenicosis ($p < .065$) were significant predictors of mental health, but age was not ($p < .212$). Of these, arsenic toxicity had negative effect on mental health. Sixty eight percent (67.7%) of the mental health was explained by these predictors.

For this data it was observed that the independent variables jointly explained 67.7% of the mental health condition. Next, a stepwise regression procedure was used to obtain the individual contribution of any particular variable in presence of other variables. Table 2 shows that arsenic toxicity individually explained 58.60% out of 67.7% of mental health explained by all 4 independent variables. Five percent (5.47 %) explained by duration of arsenicosis, 3.25% was explained by income with a little (.36%) by age. Thus arsenic toxicity was the strongest predictor of mental health.

It shows that the main effect of arsenic toxicity on mental health score was highly significant ($F = (1,392) = 296.2, p \approx .00$). This indicates that mental health varied significantly as a function of the participants' arsenic toxicity (arsenicosis). Inspection of the means presented in Table 4 reveals that arsenic affected participants had poorer mental health ($M = 14.87$) than that of the non-affected participants ($M = 29.28$).

Discussion

The present study revealed that age and duration of arsenicosis were negatively correlated with mental health and income was positively correlated with the latter. A number of research findings confirmed that with the increase in age mental health of the individual deteriorated (e.g. 28, 29). Diener and Suh (28) observed that our subjective well-being tends to worsen as we age. When patients suffer from chronic disease, longer periods of sufferings damage their psychological well-being and accentuated many negative affects on them.

The study also indicated that income was positively correlated with mental health. It was found from the present study that when people's income increased their mental health condition improved or vice-versa. Recent evidence suggests that higher SES (Socio-Economics Status) is associated with more positive mood and cognition (e.g. 30, 31).

A major finding of this study was that socio-environmental factors i.e. arsenic toxicity, age, income and duration of arsenicosis variables explained 68% of the mental health, in which 58.6% was explained by arsenic toxicity alone suggesting that arsenic toxicity was the best predictor of mental health.

Differences in mental health were found between affected and non-affected participants. Arsenic affected persons had poorer mental health than non-affected ones'. A number of research findings support these results (3, 32). Suffering from chronic or acute illness is very damaging to the well-being or mental health of the victims (1). It threatens the health and safety of the victims and affects vocational, social and personal activities as well as general activities of daily living, which deteriorates victims' quality of life and threatens their subjective well-being and mental health. Diener (33) showed that, though the effect was short lived, disease decreased subjective well-being. With the presence of physical sufferings chronic illness involves an overwhelming burden of uncertainty, dependency, disability, pain, worry, stress and emotional distress. These negative emotions precipitate the onset of psychological problems and damage the well-being or mental health. Moos (4) found that patients were often in a state of crisis marked by physical, social and psychological disequilibrium.

When there is low subjective well-being and high stress, highest level of depression arises (34). It can lead to an ineffective immune system, and hence, to more physical illness (35, 32). The findings of the present study were consistent with all these research observations. It was also supported by the previous study on mental health of the arsenic victims by Keya (21), which showed that there existed significant difference in mental health between arsenic affected and non-affected participants.

The results of the present study can also be explained in the light of existing theories of psychological well-being. According to self-determination theory, gratification of three needs (autonomy, competency and relatedness) is essential for psychological well-being. Those who have been suffering from arsenicosis lose their autonomy and competency because of different physical difficulties. Arsenicosis created skin lesions, skin hardening and nodules, gangrene, cardiovascular problems, liver and neurological problems etc. It inflicted almost all organ systems of the human body and the ultimate consequence was cancer. These adverse health effects limit the victims' ability to work, which may lead them to be economically and physically dependent on others for survival. It also limits their free movements and competent roles in family and society.

Moreover, the stigma that skin lesions may be contagious isolated them from their social networks, which is deleterious for mental health. Multidimensional theory of psychological well-being suggests that self-acceptance, purpose in life, positive relations with others, environmental mastery and autonomy are the primary features of positive mental health. Arsenicosis blocked the victims to persuade purpose in life, worthy relations with others and decreased their environmental mastery as well as autonomy. They failed to attain their life goals because of jobloss, family dissolution, social isolation, social disintegration etc., which, according to goal-approach theory can be threatening for the mental health of the victims.

The present research confirmed the deteriorated mental health status of the arsenic victims. This clearly has important policy implications. Specific policies and programs should be undertaken and implemented addressing psychological aspects. Unfortunately, even after more than a decade after the first detection of arsenic patients, a coherent policy on arsenic prevention and mitigation has not been developed. Consequently, policy on psychological health and well-being of the arsenic victims has never been developed.

TABLE 1: Demographic Characteristics

	Affected		*Non-Affected*	
Sample size:	N	= 200	N	= 194
Age (years):	Mean	= 34.84	Mean	= 30.48
	SD	= 14.19	SD	= 10.43
	Range	= 15–80	Range	= 15 – 70
Sex:	Male	= 57.2%	Male	= 55.7%
	Female	= 42.8%	Female	= 44.3%
Marital status:	Single	= 22.8%	Single	= 23.2%
	Married	= 77.2%	Married	= 76.8%
Income (monthly):	Mean	= 2600	Mean	= 3292.84
	SD	= 1255.82	SD	= 1452.73

TABLE 2: Correlation Matrix of Variables

Variables	*Age*	*Income*	*Duration of arsenicosis*	*Mental Health*
Age	1.000			
Income	-.004	1.000		
Duration of Arsenichosis	.177**	-.189**	1.000	
Mental Health	-.125*	.329**	-.585**	1.000

Note: ** ≅. 00, * p< .01

TABLE 3: Regression Analysis Predicting Mental Health on Age, Income, Arsenic Toxicity and Duration of Arsenicosis

$R2 = .677$.

Predictor variables	Coefficients	Standard error	Standard Beta (Bs)	t	Sig	Sr^2
Arsenic toxicity	-20.068	.992	-.762	-20.236	.000	.58604
Duration of Arsenicosis	.287	.155	.067	1.848	.065	.054741
Income	.00102	.000	.107	3.866	.003	.032585
Age	- .0346	.028	-.034	- 1.251	.212	.00369
(Constant)	70.271	2.031		34.592	.000	

Dependent variable = Mental health

TABLE 4: Comparison of Mental Health Score Between Arsenic Affected and Non-affected Participants

	M	SD	SS	df	Mean sum of Square	F.	Sig
Affected	14.87	6.99	20986.81	1	20986.81	462.32	.000
Non affected	29.28	3.09					

References

Devins, G. M. (1994). Illness Intrusiveness and the Psychosocial Impact of Lifestyle Disruptions in Chronic Life-threatening Illness. *Advances in Renal Replacement Therapy*, 1: 251–263.

Taylor, S. E. and Aspinwall, L.G. (1970). Psychological Aspects of Chronic Illness in P. T. Costa and G. R. Vanden Bos (Eds). Psycholocial Aspects of Serious Illness: Chronic Conditions, Fatal Diseases and Clinical Care. Washington DC: American Psychological Association, 7–60 p.

Cohen, S., and Willamson, G. M. (1988). Perceived Stress in a Probability Sample of the United States. In: S. Spacapan and S. Oskamp (eds.). The Social Psychology of Health. Newbury Park, CA: Sage. 31–67.

Moos, R. H. (1977). Coping With Physical Illness. New York: Plenum.

Devins, G. M., Edworthy, S. M., Paul, L. C., Mandin, H., Seland, T. P., Klein, G. M., and Shapiro, C. M. (1993). Restless Sleep, Illness Intrusiveness, and Depressive Symptoms in three Chronic Illness Conditions: Reheumatioid Arthritis, End-stage Renal Disease, and Multiple Sclerosis. *J. of Psychosom Res*, 37: 163–170.

Wright, B. A. (1988). Attitudes and the Fundamental, Negative Bias: Conditions and Corrections. In: H. E. Yuker (ed.). Attitudes Towards Persons with Disabilities. New York: Springer, 3–21 .

Susman, J. (1994). Disability, Stigma and Deviance. Social Science and Medicine, 38: 15–22.

Fichten, C. S. (1988). Students with Physical Disabilities in Higher Education: Attitudes and Beliefs that Affect Integration. In H. E. Yuker (ed.). Attitudes Towards Persons with Disabilities, New York: Springer, 171–186.

Devins, G. M. (1992). Edworthy, S. M., Guthrie, N. G., and Martin, L. Illness intrusiveness in Rheumatoid Arthritis: Differential Impact on Depressive Symptoms Over the Adult Lifespan. *Journal of Rheumatology*, 19: 709–715.

SOES/DCH. Groundwater Arsenic Contamination in Bangladesh: A Summary of Field Survey Information from April 1999 to February 2000.

Smith, A. H., Lingas, E. O. and Rahman, M. Contamination of Drinking Water of Arsenic in Bangladesh. A Public Health Emergency. Bull. WHO, 2000; 79(9): 1093–1103.

Dey, R. K. Arsenic Health Problem, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of Bangladesh. 2000.

McCarty, K., A. Houseman, G. Mahiuddin, Q. Quamruzzaman, M.Rahman, E. Gonzalez, M. Kile, A. Ascherio and D.C. Christiani. Arsenic exposure, diet and skin lesions in Pabna, Bangladesh. In: Fifth International Conference on Arsenic: Developing Country's Perspective on Health, Water and Environmental Issues. Dhaka Community Hospital and School of Environmental Science, Jadavpur University, February 15–17, Dhaka, Bangladesh, 2004.

Ratnaike, R. N. (2002). Arsenic Past, Present and Future. In: Fourth International Conference on Arsenic Contamination of Groundwater in Bangladesh: Cause, Effect and Remedy. Dhaka Community Hospital, Ministry of Environment and Forest and Sustainable Environmental Program, January 12–13, Dhaka, Bangladesh.

National Research Council. Arsenic in Drinking Water. National Academy Press, Washington, D.C. 1999.

Harvard Public Health Review, Good intentions, bad water. Harvard Public Health Review, Summer, 1999; 14–15.

DCH (Dhaka Community Hospita). Arsenic Pollution in Ground Water, Dhaka Community Hospital Trust. Dhaka. 1997.

Sarkar, P. C. (1999). Beliefs and Arsenicosis and their Impact on Social Disintegration in Bangladesh: Challenges to Social Work Interventions. In: Proceedings of Joint Conference of AASW, IFSW, AASW and AAWWF. Brisbane, Australia, 217–221.

Keya, M.K. Perceived Stress and Some Factors Related to Arsenic Toxicity: A Study on Arsenic Victims of Bangladesh, Bangladesh Psychological Studies, Volume 15, December 2005.

Fujino Y, Guo X, Liu J, You L, Miyatake M, Yoshimura, Mental health burden amongst inhabitants of an arsenic- affected area in Inner Mongolia, China. Soc Sci Med 2004, 59: 1969-1973.

Keya, M. K. (2004). Mental Health of Arsenic Victims in Bangladesh, South Asian Anthropologis, 4 (2): 215–223.

Watson Partnership Project (WPP), SDC. Arsenic Program. Internal Report. Bangladesh. 2001-2003.

Sorcar, N. R. and Rahman, A. (1989). Occupational Stress and Mental Health of the Working Women in Dhaka. U. G. C. Report.

Goldberg, D. (1972). The Detection of Psychiatric Illness By Questionnaire. London: Oxford University Press.

Banu, S. and Akhter, S. (1996). Relationship between Family Support and Mental Health among Parents of Mentally Retarded and Non-retarded Children. Bangladesh Psychol Studies, 6, 11–23.

Huq, M., Sorcar N. R. and Uddin M. K. (2000). Association of Age, Experience, Income, and Sex with Occupational Stress, Job Involvement and Mental Health of Health Professionals. *The Dhaka University J. of Psychol*, 24, 27–34.

Sorcar, N. R. and Rahman, A. (1993). Occupational Stress and Mental Health of the Working Women of Different Occupation. *The Dhaka University J. of Business Studies*., 14(1), 69–79.

Diener, E., and Suh, E. (1998). Subjective Well-being and Age: An International Analysis: In: K. W. Schaie and M. P. Lawton, (eds.), *Annual Review of Gerontology and Geriatrics*, Vol. 17. New York: Springer, 304–324.

Lucas, R. E. and Gohm, C. L. (2000). Age and Sex Differences in Subjective Well-being Across Cultures. In: Diener, E. D. and Suh. E. M. (eds.). Culture and Subjective Well-being. A Bradford Book. England, 241–318.

House, J. S., Lepkowski, J. M. Kinney, A. M., Mero, R. P., Kessler, R. C., and Herzog, A.R. (1994). The Social Stratification of Aging and Health. *J. of Health and Soc. Behavior*, 35: 213–234.

Ross, C. E., and Wu, C. L. (1995). The Links between Education and Health. *American Sociological Review* 60: 719–745.

Stone, A. Valdimarsdttir, H. Katkin, E., Burns, J., Cox, D., Neale, J. and Bovdjerg, D. Stress-induced

Autonomic Reactions are Associated with After Mitogen Responses. In: American Psychosomatic. Santa. Fe, CA. 1991.

Diener, E. (2000). Subjective Well-being: The Science of Happiness and a Proposal for a National Index. *American Psychologist*; 34-43.

Triandis, H. C. (2000). Cultural Syndromes and Subjective Well-being. Diener, E. D. and Suh, E. M. (eds.). Culture and Subjective Well-being, A Bradford Book. England.

Cohen, S., Doyle, W. J., Skoner, D. P., Rabin, B. S. and Gwaltney. J. M. (1997). Social Ties and Susceptibility to the Common Cold. *J. of the American Medical Association*; 277 (24), 1940–1944.