

Socio-demographic and Economic Factors Associated with Adherence to Anti-Tuberculosis Treatment

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Abstract

Introduction: Tuberculosis is one of the most significant health problems in Bangladesh. Adherence to TB treatment is crucial to achieving cure while avoiding the emergence of drug resistance. Non-adherence to anti-tuberculosis treatment may result in persistent infectiousness and a higher rate of treatment failure, relapse and drug resistance and therefore, it's a significant barrier to the success in tuberculosis control.

Objectives: To determine the socio-demographic and economic factors influencing adherence to anti-tuberculosis treatment among tuberculosis patients.

Materials and Methods: This case control study was carried out among purposively selected 47 cases and 94 controls in selected DOTS centres of Dhaka city from January 2010 to July 2010. Data were collected by face to face interview using a semi-structured questionnaire.

Results: Males were 2.5 times more likely to be non-adherent and among them day-labourer and main earning member were more commonly non-adherent ($p < 0.05$). Low per capita income and irregularity of monthly income were significantly ($p < 0.01$) associated with non-adherence.

Conclusion: Non-adherence is associated with the risk factors that are modifiable by the correction of socio-demographic and economic characteristics as a whole. So the highest priority in fighting against non-adherence therefore must be to reduce poverty for its prevention especially targeting the patients of low economic status.

Key-words: Tuberculosis, Adherence, Anti- TB treatment.

Introduction

Tuberculosis (TB) is an ancient disease that has affected mankind for more than 4,000 years¹. TB remains a leading cause of morbidity and mortality in developing countries, including Bangladesh. In developing countries, about 7% of all deaths are attributed to TB which is the most common cause of death from a single source of infection among adults. It is the first infectious disease declared by the WHO as a global health emergency². In Bangladesh tuberculosis is a major public health problem. It is estimated that 300,000 new cases crop up each year, of which about half of them are infectious TB. It is further estimated

that about 70,000 people die every year and an incidence of 223/100,000 people per year³. TB occurs more frequently among low-income people living in overcrowded areas and persons with little schooling. Drug resistance, in combination with other factors, results in increased morbidity and mortality due to tuberculosis. The WHO reported alarming rise of notably multi-drug-resistant (MDR) TB but also of extreme drug-resistant TB (XDRTB) globally⁴.

In Bangladesh, the MDR rate is 3.5% among new cases and 20% among previously-treated cases⁵. The death rate in MDR cases is high (50-60%) and is often associated with a short span of disease (4-16 weeks)⁶. Several factors have been identified for the development of MDR. These include non-adherence to therapy, lack of direct observed treatment, interrupted drug supplies, poor quality of drugs, and widespread availability of anti-TB drugs without prescription, poor medical management and poorly-managed national control program⁷. In terms of TB control, adherence to treatment may be defined as the extent to which the patient's history of therapeutic drug-taking coincides with the prescribed treatment⁸. Non-adherence to anti-tuberculosis treatment is a major barrier to the global control of TB⁹. Poor patient adherence is the most important cause of treatment failure in tuberculosis programs¹⁰. Non-adherence may result in persistent infectiousness on the part of the patient and higher rates of treatment failure, relapse, and drug resistance. Adherence to TB treatment is crucial to achieving cure while avoiding the emergence of drug resistance. Regular and complete medication intake gives individual TB patients the best chance of cure and also protects the community from the spread of TB. To find out factors influencing the adherence to anti-tuberculosis treatment this study was designed.

Material and Methods

A case control study was designed and purposively 47 cases were selected from DOTS centers at Middle Badda, Mirpur-1, Hazaribag areas of Dhaka city under 2nd Urban Primary Health Care Project (UPHCP) from January 2010 to July 2010 who were non-adherent TB patients with defaulted or interrupted treatment for two consecutive weeks or more. Un-matched 94 controls who were all new TB patients, received four months or more anti TB therapy and didn't miss more than two consecutive weeks doses were taken as adherent to anti TB treatment. Patients of both sexes between the ages of 16-80 years were selected for the study and patients with any psychiatric/mental

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disorders, non-pulmonary TB patients, patients having category II treatment were excluded from the study. The sample size were estimated by Epi info software based on the anticipated odds ratio of 3.7 % and case control ratio 1:2, at confidence level 95% with 80% power of test. Data were collected by using semi-structured questionnaire with face to face interview & a checklist in their homes, preferably, not in presence of others so that respondents could answer the questions freely. Statistical package for Social Science (SPSS) version 17 for Windows was used to analyze the data.

Results

A total of 141 participants were enrolled into this case-control study. Among them, 47 non-adherent and 94 adherent anti-TB treatment patients were as case and control respectively. In age distribution of the respondents, cases (83%) were more than the controls (74.5%) in < 45 years of age, although the age difference between the cases and controls was statistically not significant (p>0.05). Cases (33.98±14.93) were on average two years younger than the controls (32.11±12.31). Males participated more than the females and the proportion was higher significantly (p<0.05) in cases (78.7%) than controls (59.6%). It was observed that, females were 2.5 times (OR=0.40, 95% CI 0.18-0.90) less likely to develop non adherence than the males. Illiterate and primary education (34.0% vs 24.5%) was in higher proportion among cases than controls (34% vs 23.4%). But controls (41.5%) were more in higher secondary level than the cases (29.9%) which was found insignificant (p>0.05). Day-laborer was more common in cases (40.4%) than the controls (16.0%). On the other hand, the controls were predominant in business (19.1%), service (38.3%) and unemployed (13.8%) than the cases. The difference was tested by χ^2 test and found significant (p=0.014). The day-laborers were four times (OR=4.12, 95% CI=1.11-15.25) more likely to become non-adherent than the unemployed. The proportion of residing in kacha house was higher in cases (31.9%) than the controls (16.0%). The χ^2 test revealed that there might be association between types of house and adherence to anti tubercular therapy (p<0.05). Odds ratio showed that those lived in semi-pucca and pucca houses were two times and four times, respectively, less likely to be non-adherent than those lived in kacha house (Table-I).

About 63.8% of the cases were main earning member and 39.4% of controls. The difference between two groups were tested by χ^2 test and found highly significant (p<0.01). The odds ratio showed that the main earning members were 2.7 times (OR=2.72, 95% CI=1.32-5.61) more likely to develop non-adherence than those who were not. Average monthly income Taka ≤6000 were more common among the cases than the controls. The difference in income was found highly significant (p<0.01). Odds ratio showed that, with the increase in family income chance (OR=0.26 95% CI=0.08-0.80) of becoming non-adherent to treatment might decrease. The independent sample t-test showed also highly significant (p<0.001) difference in average monthly income between cases and controls. Higher proportion of cases (57.4%) had no regularity in their monthly income than the controls (27.7%). But the controls (72.3%) were more than the cases (42.6%) in

regular monthly income of their family. It was also found highly significant (p=0.001). Among the respondents who had regular family income were 3.5 times (OR=0.28, 95% CI =0.14– 0.59) less likely to be non-adherent than with irregular income. In most of the cases (87.2%) per capita income was ≤US\$1/day than the controls (70.2%). Statistically the difference was significant (p<0.05). The odds ratio showed that per capita income >US\$1 per day were three times (OR=0.35 95% CI=0.13-0.91) less likely to be non-adherent than those per capita income ≤US\$ 1 per day (Table-II).

Binary logistic regression model was constructed taking non-adherence as dependent variables and all the variables which showed significant association during univariate analysis as independent. This model revealed that, regularity of income (p<0.05) and poverty (p<0.05) remained significant risk factors, whereas sex, occupation, main earning member lost significance in this combined model. The model was significant ($\chi^2=34.88$, p<0.001) and could correctly classify 91.5% controls, 51.1% cases and overall prediction was 78% (Table-III).

Table-I: Socio-demographic characteristics of respondents

Characteristics		Case (n=47)		Control(n=94)		Statistics
		Number	%	Number	%	
Age in years	16 -30	29	61.7	52	55.3	$\chi^2=1.294$ df =2 p>0.05
	31-45	10	21.3	18	19.2	
	>45	8	17.0	24	25.5	
	Mean ±SD 32.11±12.308 33.98±14.927 t= -0.743					
Sex	Male	37	78.7	56	59.6	$\chi^2=5.117$ df = 1 p<0.05
	Female	10	21.3	38	40.4	
Level of education	Illiterate	16	34.0	23	24.5	$\chi^2= 6.405$ df = 3 p>0.05
	Primary	16	34.0	22	23.4	
	Secondary	14	29.9	39	41.5	
	≥Higher secondary	1	2.1	10	10.6	
Occupation	Unemployed	4	8.5	13	13.8	$\chi^2=12.48$ df = 3 p<0.05
	Service	17	36.2	36	38.3	
	Business	3	6.4	18	19.1	
	Day-labourer	19	40.4	15	16.0	
Type of house	Kacha	15	31.9	15	16.0	$\chi^2=6.819$ df = 2 p<0.05
	Semi-pucca	26	55.3	53	56.3	
	Pucca	6	12.8	26	27.7	

Table-II: Distribution of the respondents by economic characteristics

Characteristics		Case (n=47)		Control(n=94)		Statistics
		Number	%	Number	%	
Main earning member	No	17	36.2	57	60.6	$\chi^2=7.522$ df = 1 p<0.01
	Yes	30	63.8	37	39.4	
Average monthly income in Taka	≤ 3000	15	31.9	16	17.0	$\chi^2=12.664$ df = 3 p<0.01
	3001-6000	22	46.8	29	30.9	
	6001-9000	6	12.8	25	26.6	
	>9000	4	8.5	24	25.5	
	Mean ±SD 4940.4±2399.27686.2±5211.1 t= -4.281					
Regularity of monthly income	Not regular	27	57.4	26	27.7	$\chi^2=11.851$ df = 1 p<0.001
	Regular	20	42.6	68	72.3	
Poverty status	≤US\$1/day	41	87.2	66	70.2	$\chi^2=4.96$ df = 1 p<0.05
	>US\$1/day	6	12.8	28	29.8	

Table-III: Logistic regression model for identification of best predictors of non-adherence to anti TB therapy

Characteristics	χ^2 Wald	Significance	OR (ExpB)	95% CI for EXP(B)	
				Lower	Upper
Regularity of income					
Not regular**	-	-	1	-	-
Regular	5.219	0.022	0.353	0.145	0.863
Poverty status					
≤US\$ 1/day**	-	-	1	-	-
>US\$ 1/day	4.980	0.026	0.255	0.077	0.847

** = Reference group, OR= Odds Ratio, CI= Confidence Interval, EXP (B)=Exponential B

Discussion

In this study, male was higher in proportion non-adherent (78.7%) than adherent (59.6%). It was observed that, males were 2.5 times (OR=2.51) more likely to develop non adherence than the female, more commonly < 45 years of age were non-adherent. The possible reason might be male had the poor attitude to anti TB therapy than female. This finding has got similarity with the finding of a study in Thailand¹¹ found female patients were more likely to have excellent compliance than male patients (74.5%VS 62.0%) and statistically significant. Female patients were 1.87 times more likely to have excellent compliance than male patients (Adjusted OR = 1.87, 95% CI: 1.17-2.99, p=.009).

Concerning the education, non-adherence was in higher proportion illiterate than adherence group (34% vs 24.5%). This finding consistent with another study in India¹² found that literacy rate was significantly lower among patients in defaulted in comparison with completed group(p =0.01). In this study most of the respondents lived in urban areas and those lived in semi-pucca and pucca houses were 2.0 times and 4.31 times respectively less likely to be non-adherent than those lived in kacha house. This study also found that widows were more non-adherent which was consistent with the statement of a Chinese study¹³ carried out in Jiangsu province that, Univariateanalysis showed that patients, who were illiterate, divorced/widowed were more likely to be non-adherent. The crude ORs (95%CIs) were 2.38(1.37-4.13), 2.42(1.30-4.52) respectively.

The present study revealed that, non-adherence to anti-tuberculosis drug was more common among the day-laborers who were 4.1 times more likely to become non-adherent than the unemployed. Per capita income was ≤ US\$ 1/day in most of the non-adherent group(87.2%) than the adherents and adherents were three times less likely to become non-adherent than those per capita income >US\$ 1 per day. Higher proportion of non-adherent had no regularity in their monthly family income and among the respondents who had regular family income were 3.57 times (OR=0.28, 95% CI =0.14–0.59) less likely to be non-adherent than with irregular income. The main earning members were 2.72 times (OR=2.72) more likely to develop non-adherence than those who were not the main earning member. The possible reasons might be job as well as economic insecurity. Similar findings were found in several studies in Nepal¹⁴ and Thailand¹¹.

Conclusion

This study found that there were significant differences between adherent and non-adherent groups in terms of socio-demographic

and economic factors as poverty and regularity of income were more likely to be the risk factors for adherence to anti-TB treatment. The cause of non-adherence to treatment in this population appears to be multi-factorial. Socio-demographic and economic factors for adherence to anti-TB treatment are more or less similar in the developing countries. These risk factors for non-adherence are modifiable by the correction of socio-demographic and economic characteristics as a whole. So, the highest priority must be to reduce poverty in fighting against non-adherence for its prevention.

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