Predictors of Medication Non-Adherence in Patients with Pulmonary Tuberculosis

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Abstract
Objectives: To assess level of information about TB and identifying factors affecting medication non-adherence in patients with pulmonary tuberculosis.**Methods:** The sample was consisted of 147 TB patients. Out of these, (n=67) were adherent and (n=87) were non-adherent. Cross-sectional research design was used. TB level of information questionnaire and Urdu translated Medication adherence Rating Scale (MARS) and Satisfaction with Medication Questionnaire were used.**Results:** The result revealed that distance to hospital, waiting time in hospital negatively predicted Medication adherence. However, TB level of information and treatment effectiveness positively predicted medication adherence. Follow-up patients and patients with higher educational status had good level of information.**Conclusion:** Patients should be provided health education on TB and favorable environment to improve adherence with TB treatment.
Keywords: Medication Adherence, Satisfaction with medication, Level of Information about TB.

Introduction

Tuberculosis (TB) is one of the most infectious disease and major public health issue. Although the latest treatment strategies have been developed to control Tuberculosis, it is still associated with increasing rate of morbidity and mortality globally. Every year, nearly 8 million people diagnosed with TB, among them 2.5 million people die due to the disease worldwide[1] and Pakistan is ranking sixth worldwide among countries where Tuberculosis is prevalent[2].

Adherence with Anti-TB medication is the major barrier in successful treatment. In all over the word significant number of the patients stop taking their medication before completing the full treatment course, which results in the prolonged illness, transmission of bacteria to the general population, development of drug-resistant TB, and death. Due to the poor treatment adherence, it is difficult to reduce the burden of tuberculosis, consequently rise in the number of drug-resistant, relapse, treatment failure cases[2,3, 4, 5, 6, 7, 8]

There are several socio-demographic, environmental and disease related factors that prevent patients from fully adhere with the TB treatment such as male gender, low educational level, poor living conditions, low monthly income[9] travelling long distance to get medication[7], lack of social support[10].Lack of proper guidance about the disease, side effects[7], early recovery feelings, disbeliefs in the curability of TB, poor knowledge about the TB treatment duration and the possible negative effects of TB medication non-adherence [10,11].

Lack of knowledge about disease; symptoms, duration of treatment, modes of transmission, preventive methods, complication due to discontinuation of medication not only affect adherence behavior but also is the main cause of the transmission of disease in to the general population due to myths regarding sharing utensils and food as modes of transmission and unhealthy practices improper sputum disposal and covering mouth while coughing and sneezing [12, 13, 14, 15, 16]

Another important determinant of adherence is patient's satisfaction which is influenced firstly with accessibility to the adequate medical facilities then physician's competence and attitude as well as the cost of the treatment. Lastly, satisfaction with medication which constitutes patient's assessment about the consequences associated with medication. Satisfaction with medication is not only related to adherence, but also important to improve health status [17]. Furthermore, awareness about the disease enhances the patient's level of satisfaction and improves the adherence with medication [18]. In situations where, medication is playing significant role in whole treatment plan, there is need to identify factors affecting medication adherence are manageable for both physicians and patients also should be complied with in both medical practice and research.

Objectives

1. To assess the predictors of medication non adherence and level of information in patients with Pulmonary Tuberculosis.

Method& Materials

Data was collected from 147 registered TB patients Men (n=90) and women (n=57) including follow up, defaulters, relapse cases, and Multi Drug-resistant TB. Scio-demographic Information sheet was constructed to obtain information such as age, gender, education and monthly family income, smoking, distance to hospital, travel cost, waiting time in hospital and attitude of Doctors and staff etc. Clinical data included: information about the age at diagnosis, duration of disease and treatment and family members with TB.

Urdu translated version of the Medication Adherence Rating Scale [19] was used to measure adherence with medication. It comprised 10 dichotomous statements ranged from 0 to 10. Patients who obtained cumulative score of 5 or less were considered as adherent and patients who obtained cumulative score of 6 or more were classified as non-adherent.

Tuberculosis Level of information Questionnaire was developed to assess the knowledge of patients about TB. The questionnaire consisted of 33 items, which focused nature of TB, risk factors, causes, types and symptoms, modes of transmission, preventive measures, diagnosis and treatment and complication due to discontinuation of TB treatment. Most of the items in the questionnaire were framed using three answers ('Yes', 'No', 'Don't know'). A score of 2 was given to correct answers. Incorrect answers were scored as zero and score of 1 was given to 'don't know'. The total score was obtained by adding all correct answers.

Urdu translated version of Treatment Satisfaction with Medicines Questionnaire [20] was used to assess patient's level of satisfaction with Anti-TB medication. It consisted of 17 items with six subscales including side effects, convenience of use, medical care, impact on daily activities, and overall satisfaction. Summing up the scores of all items produced total score ranging from 0 to 68 (α= .81).

Results

Statistical tests were performed by SPSS 21 (Statistical Package for Social Sciences).Chi-square test for Independence, Independent Sample t-test and Logistic Regression was performed.

Table 1 presented demographic and clinical characteristics of Adherent and Non-Adherent TB patients. It was observed females TB patients, patients with higher educational level, belonged to urban areas and follow up TB patients were more adherent. Significant Mean differences were also found between adherent and non-adherent patients in terms of age, monthly family income and duration of TB.

Table 1: Demographic and Clinical Characteristics of Participants (N=147)

Variables	Adherent (n=67)	Non-Adherent (n=80)	Statistical Tests	*P*
	f(%)	*f* (%)		
Gender				
Men	35(38.9)	55(61.1)		
Women	32(56.1)	25(43.9)	χ^2=4.18	.041*
Education				
Illiterate	21(43.8)	27(56.3)		
Primary	7(20.6)	27(79.4)		
Metric	16(61.5)	10(38.5)		
Secondary School	10(50)	10(50)		
BA/BSc	13(68.4)	6(31.6)	χ^2=15.44	.004***
Family Background				
Rural	31(36.9)	53(63.1)		
Urban	36(57.1)	27(42.9)	χ^2=5.94	.015*
Family System				
Nuclear	35(39.8)	53(60.2)		
Joint	32(54.2)	27(45.8)	χ^2=2.97	.084
Marital Status				
Single	31(31.4)	38(37.6)		
Married	36(35.6)	42(42.4)	χ^2=.022	.88
Occupation				
Unemployed	12(32.4)	25(67.6)		
Student	16(48.5)	17(51.5)		
Employed	24(48)	26(52)		
House Wife	15(55.6)	12(44.4)	χ^2=3.89	.27
Members of family living in house				
0-4	6(30)	14(70)		
5-10	26(44.8)	32(55.2)		
More than 10	35(50.7)	34(49.3)	χ^2=2.70	.25
Type of Patients				
Follow Up	29(72.5)	11(27.5)		
Defaulters	16(43.2)	21(56.8)		
Relapse	9(23.7)	29(76.3)		
MDR-TB	3(23.1)	10(76.9)		
Treatment Failure	10(52.6)	9(47.4)	χ^2=22.14	.000***
Duration of TB (Months)	12.40(9.93)	16.03(9.954)	t(145)=2.19	.030*
Age *M(SD)*	27.87(7.74)	23.95(8.03)	t(145)=-2.99	.003***
Monthly Family Income *M(SD)*	24253.73(6827.62)	19887.50(5470.27)	t(145)=-4366.23	.000***

*p<.05, **p<.01, ***p<.001

The logistic Regression model was statistically significant, $\chi^2(8) = 167.33$, $p < .005$. Distance to hospital and waiting time in hospital to get medicines negatively predict medication adherence.
Whereas, level of information about TB and treatment effectiveness positively predicted medication adherence.

Table 2 Logistic Regression Analysis for Factors Predicting Anti TB Medication Adherence (N=147)

Variable	*B*	*SE*	*P*	*OR*	*95% CI*	
					Upper	*Lower*
Distance to Hospital	-3.27	1.30	.012**	.038	.00	.48
Travel Cost	1.44	1.26	.253	4.23	.35	50.23
Waiting Time in Hospital	-2.55	1.10	.020*	.07	.00	.67
Level of information about TB	.30	.10	.004***	1.35	1.10	1.66
Satisfaction with medication						
Side effects	.16	.43	.707	1.17	.49	.2.78
Treatment effectiveness	1.17	.59	.048*	3.24	1	10.44
Convenience of Use	-.34	.55	.536	.71	.23	2.10
Impact on Activities of daily living	1.08	.57	.056	2.97	.97	9.07
Medical Care	.13	.60	.822	1.14	.35	3.72
Global Satisfaction	-.99	.77	.198	.37	.08	1.68
Constant	-19.24		.005	.00		
χ^2						167.33
Df						10
R^2						75

Note; *p<.05, **p<.01, ***p<.001, Adherence (0=non-adherent, 1=adherent) Distance to Hospital (0= near, less than 10 km, 1= far more than 10 km), Travel Cost (0= less than 100 RS, 1= more than 100 RS), Waiting Time in Hospital (0= less than 4 hours, 1= more than 4 hours),

The median score of 45 was used as the cut off for defining good or poor levels of knowledge. Patients who received scores higher than the median were classified as having good knowledge; whereas those receiving a score less than or equal to the median were classified as having poor knowledge.

Table 3 Chi square Analysis for Education, Type of Patients and TB Episode

	Level of Information about Tb		χ^2	P
Variables	Good level of Information	Poor level of Information		
Education			24.88	.000
Illiterate	7(12.3%)	41(45.6%)		
Primary	14(24.6%)	20(22.2%)		
Metric	10(17.5%)	16(17.8%)		
Secondary School	14(24.6%)	6(6.7%)		
Graduation	12(21.1%)	7(7.8%)		
Type of patients				
Follow-ups	24(43.6%)	16(17.4%)	17.65	.001
Defaulters	8(14.5%)	29(31.5%)		
Relapse	9(16.4%)	29(31.5%)		
Multi-Drug Resistant TB	5(9.1%)	8(8.7%)		
Treatment Failure	9(16.4%)	10(10.9%)		
TB Episodes				
First Time	17(29.8%)	57(63.3%)	15.69	.000
Second Time	26(45.6%)	22(24.2%)		
Third Time	14(24.6%)	11(12.2%)		

*p<.05, **p<.01, ***p<.001

Results of the Chi Square analysis revealed that there is significant association between Level of Information about TB and Educational status as most of the Illiterate patients had poor Level of Information and Graduated patients had good Level of information about TB. There is also significant association between Level of Information about TB and types of TB. Most of the Follow Up patients who are regular in their Treatment had Good Level of Information about TB. Significant association was found between Level of Information about TB and TB episodes, Patients who had TB first time in their life had poor Level of Information.

Discussion

Although, Government of Pakistan has made considerable effort to control tuberculosis such as providing free of cost medicines to every patients. However, the incidence of TB is still high approximately 497 out of 100,000 [21]. This increasing rate of incidence can be due to non-adherence with medication due to limited knowledge about

disease. The findings of present study showed that more than half of the patients were non-adherent with TB medication. Consistent with some previous studies non-adherence rate was higher in patients with lower educational status 10, living in rural areas and lower monthly family income[22, 23]. High non-adherence rate was also observed in males and patients with longer treatment course[23,12]. Tuberculosis is believed to affect young people who are more productive for the economy of the country[21] the results are similar to the present study where the mean age of the patients was 27 years.

Travelling to long distance and long waiting time spent in hospital to get medicines was found to be negatively related to medication adherence. These findings are similar with previous researches, which concluded that when patients are willing to adhere with medication their socio-economic status prevent them doing such as patients has to travel long distance and spending whole working day in hospital to wait doctors and take medicines, they might stop taking medication due to consequent loss in income level and employment insecurity [24,25,26].

The present study also examined knowledge of TB in patients. Results showed that patients had limited knowledge about the complications of discontinuing TB treatment, side effects of medicines and modes of transmission of bacteria which results in non-adherence among patients and may contribute to the high burden of TB in the country. The findings are similar in previous researches where poor knowledge about disease and treatment was the important predictor of non-adherence[12, 13, 14, 15, 16].In terms of satisfaction with medication, adherent patients were more satisfied with their treatment as compare to non-adherent. Present study found that patient's perception about the effectiveness of TB treatment improves adherence in patients. These finding are consistent with previous studies conducted on patients with epilepsy and hypertension, results of these studies showed that patients will be more adherent and satisfied if they perceive their treatment effective and convenient [27,28].

The present study has identified important barriers that patients face in taking intensive treatment course. Some of the factors are personal and some are beyond patient's control. In both situations, behavior such as adherence may change if TB program consider patient-oriented approach and provide comprehensive health education to the patients. Present study had several limitations such as newly diagnosed and Extra-Pulmonary TB patients were ignored. Future studies should focus on psychological and behavioral factors that hinders adherence with medication.

Conclusion

Poor knowledge about TB and dissatisfaction with medication along with structural and demographic factors plays an important role in predict medication non-adherence.

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