Assessment of Depression among Pulmonary Tuberculosis Patients: A Cross-Sectional Study from Pakistan

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Abstract: Background: Depression is a condition that is often co-morbid to tuberculosis and can lead to increased morbidity and mortality associated with tuberculosis. The current prevalence of depression worldwide among individuals receiving treatment for TB ranged from 11.3% to 80.2%, with a mean weighted prevalence of 48.9%. The aim of the current study was to assess depression among tuberculosis patients in Pakistan. **Methods** A descriptive cross-sectional study design was used to evaluate depression among pulmonary tuberculosis patients in Pakistan. All the public and private tertiary healthcare facilities treating TB located in Rawalpindi and Islamabad were included in the study. Patient health questionnaire-9 (PHQ-9) was used to collect data from 382 patients of pulmonary tuberculosis. Non-parametric tests, Mann-Whitney and Kruskal-Wallis, were performed to find out the difference among different variables. **Results & Conclusion:** Kruskal-Wallis and Mann-Whitney (p ≥ 0.05) were performed to find out the differences among different variables. Significant difference between different income levels (p=0.002), duration of treatment (p=0.01), phase of treatment (p=0.03) and type of treatment (p=0.001) were observed. Moderate depression was observed among patients at baseline and had duration of treatment less than a month. The present study concluded that majority of patients suffering from tuberculosis suffered from some sort of depression. This depression was more evident at baseline phase of therapy. Patients undergoing directly observed therapy appeared to be more depressed due to increased stigma along with increase in financial burden. Counseling and psychotherapy can play a massive role in combating depression and improving medication adherence in TB patients.

Keywords: Depression, Pulmonary Tuberculosis, Patients, PHQ-9, Pakistan

1. Introduction

Depression is a condition that is often co-morbid to tuberculosis and can lead to increased morbidity and mortality associated with tuberculosis. The current prevalence of depression worldwide among individuals receiving treatment for TB ranged from 11.3% to 80.2%, with a mean weighted prevalence of 48.9%. Prevalence rates of depression and mental disorders among TB patients in low income countries ranged between 46 and 80 % [1]. Depressed tuberculosis patients are less likely to seek medical care or adhere to their treatment regimens. The untreated patients can become a source of transmission of infection leading to spread of disease whereas; irregularities in treatment can lead to drug resistance. Depression is usually seen highly associated with persistent cough, older age and poor financial status [2, 3]. A study

conducted in India utilizing PHQ-9 questionnaire to assess prevalence and severity of depression among tuberculosis patients registered under DOT treatment reported that more than 60% of tuberculosis patients were suffering from depression mainly due to socioeconomic status and adverse effects of anti-tuberculosis drugs [4]. Beside this another study conducted in Ethiopia used K-10 to assess the presence of psychological distress among tuberculosis patients after 1-2 months of treatment followed by assessment at 6 months of treatment. TB patients suffered from psychological distress throughout the course of treatment but it was more pronounced at the start of treatment [5]. Another study conducted in South Africa using the same scale also reported high prevalence of psychological distress among tuberculosis patients [6]. A study conducted in India used Beck depression inventory to evaluate prevalence of depression among tuberculosis patients and reported that 82% of respondents suffered from depression. The depression was related to severity of disease, duration of illness and response to chemotherapy [7]. Another study conducted in India used global mental health assessment tool primary care version (GMHAT/PC) and reported that tuberculosis patients suffered from psychiatric morbidity such as depression, anxiety, stress, hypochondriasis and obsessively compulsive disorder. Males and patients aged 46-60 years had more chances of mental illness. Moreover, patients with duration of treatment of more than 3 months and category IV illness had more chances of mental co-morbidity [8].

World Health Organization ranks Pakistan at 5th number among high burden countries for tuberculosis in the world for the year 2015 [9]. According to WHO, in the Eastern Mediterranean Region Pakistan accounts for 61% of the TB burden [10]. High rate of depression among Tuberculosis patients in Pakistan has been associated with increased severity of symptoms and feelings of less control over the illness [11, 12]. Misconception regarding tuberculosis has been found to be a major reason for depression. Other reasons reported were disturbances in life processes, long duration of treatment and illness [13, 14]. Very limited data is available regarding assessment of depression among tuberculosis patients in Pakistan. Even after initiation of directly observed therapy (DOT) and free availability of medicines in Pakistan, control and eradication of TB could not be achieved. Therefore, the present study was designed to assess depression among tuberculosis patients in Pakistan.

2. Methodology

2.1 Study Design

A descriptive cross-sectional study design was used to evaluate depression among pulmonary tuberculosis patients in Pakistan. All the public and private tertiary healthcare facilities treating TB located in Rawalpindi and Islamabad were included in the study. Study respondents included patients suffering from pulmonary tuberculosis aged 18 years or above, receiving self-administered or directly observed types of treatment, in baseline, initial or continuous phase of treatment, smokers and non-smokers both were included in this study. Patients aged less than 18 years, patients with extrapulmonary or miliary tuberculosis and patients with any compelling conditions were excluded from this study.

2.2 Study Approval

National bioethical committee is present for this type of research and it states that only institutional head approval is required for this type of study [15]. Beside this approval was obtained for the study from the Ethical Committee of Hamdard University (Ref. No. HU/ DRA/2016/978). Moreover in Pakistan, questionnaire-based studies do not need any endorsement from Ministry of Health. Despite that, prior information was sent to the Ministry of Health, Government of Pakistan for the execution of this research. For data collection approval from MS of the hospitals and respective prescribers was taken. Informed and verbal consent for participation was also taken from the respondents. Respondents were ensured for the confidentiality of information verbally as well as confidentiality under taking was signed by the principal investigator.

2.2.1 Sample Size & Sampling Procedure

Calculation of sample size was performed by using Rao soft sample size calculator to determine the size of sample representing the population of pulmonary tuberculosis patients. Calculated sample size was 382 to achieve 95 % confidence interval with 5% margin of error. As no list of tuberculosis patients was available, convenience sampling technique

was used to select the respondents. According to convenience sampling all the respondents that were available at time of data collection were selected.

2.2.2 Data Collection Tool and Scoring

Prospective data was collected from primary sources directly from respondents. Data was collected directly from the respondents at their respective healthcare facility. Data collection tool used in this study was Patient health question-naire-9 (PHQ-9).Written permission had been obtained from optum (organization) of PHQ-9 for using PHQ-9. Scoring of PHQ-9 ranges from 1-27 with greater score representing increased depression severity. Score from 1-4 indicates no depression, score from 5-9 indicates mild depression, score from 10-14 indicates moderate depression, score from15-19 indicates moderately severe depression and score from 20-27 indicates severe depression. Two focus group discussions were conducted at different time intervals with experts from hospitals, and academia for content validation of the tools. Besides this, pilot testing had been conducted at 10% of sample size to test reliability of the tools after data collection. Value of Cronbach's alpha for PHQ-9 was 0.921 which is satisfactory considering that 0.68 is the cut off value for being acceptable.

2.3 Data Collection and Analysis

Questionnaires were self administered by the researchers and were collected back on the same day to avoid study bi-asness. After data collection, data was cleaned, coded and entered in SPSS version 16. Skewness test was performed and histograms with normal curves were used to check normal distribution of data. Descriptive statistics comprising of frequency and percentages were calculated. Non-parametric tests, Mann-Whitney and Kruskal-Wallis, were performed to find out the difference among different variables.

3. Results

Out of 382 respondents, 46.6% (n = 178) were male and 53.4% (n = 204) were female. Of the total respondents, 16.8% (n = 64) were illiterate and 39.5% (n = 151) were matric. Regarding the job status of the respondents, 38.2% (n = 146) were employed whereas 30.6% (n = 117) were unemployed. Out of all the respondents 22.5% (n = 86) were smokers whereas 77.5% (n = 296) were non-smokers. On the other hand, 86.1% (n = 329) had duration of illness of less than 1 year, 34.8% (n = 133) were in initial phase of treatment and 48.4% (n = 85) were under directly observed therapy (Table 1).

Indicator		Total n (%)	Indicator		Total n (%)
Age	18-30Y	206 (53.9)	**Marital status**	Married	224 (58.6)
	31-40Y	119 (31.2)		Unmarried	141 (36.9)
	41-50Y	39 (10.2)		Divorced	10 (2.6)
	>50Y	16 (4.2)		Widowed	7 (1.8)
Gender	Male	178 (46.6)	**Cigarette Smoking**	Smoker	86 (22.5)
	Female	204 (53.4)		Non-smoker	296 (77.5)
Job status	Employed	146 (38.2)	**Qualification**	Illiterate	64 (16.8)
	Unemployed	117 (30.6)		Primary	129 (33.8)
	House Keeper	111 (29.1)		Matric	151 (39.5)
	Retired	8 (2.1)		Intermediate	38 (9.9)
Current salary	Rs.<10,000	92 (24.1)	**Duration of illness**	< 1 Y	329 (86.1)

	Rs.10,000-20,000	214 (56)		1.1-2 Y	46 (12)
	Rs.21,000-35,000	64 (16.8)		2.1-3 Y	3 (0.8)
	Rs.36,000-50,000	12 (3.1)		>10 Y	4 (1)
Duration of treatment	<1 month	111 (29.1)	**Phase of treatment**	Baseline	109 (28.5)
	1-3 months	130 (34)		Initial phase	133 (34.8)
	4-6 months	104 (27.2)		Continuous phase	140 (36.6)
	7-9 months	18 (4.7)	**Type of treatment**	Self-administered	197 (51.6)
	10-12 moths	13 (3.4)		Directly observed therapy	85 (48.4)
	>13 months	6 (1.6)			

Table 1 Demographic Characteristic of the Respondents

The results showed that respondents felt more than half of the days symptoms of depression as: little interest or pleasure in doing things (n=106, 27.7%), felt down, depressed or hopeless (n=113, 29.6%), trouble falling asleep or sleeping too much (n=79, 20.7%), felt tired or have little energy (n=135, 35.3%), had poor appetite (n=56, 14.7%), felt bad about themselves (n=34, 8.9%), had trouble concentrating on things (n=13, 3.4%), acted fidgety (n=7, 1.8%) and thought that they would be better off dead (n=3, 0.8%) more than half the days. On the other hand, respondents felt more not at all the symptoms of depression as: little interest or pleasure in doing things (n=108, 28.3%), felt down, depressed or hopeless (n=110, 28.8%), trouble falling asleep or sleeping too much (n=147, 38.5%), felt tired or have little energy (n=31, 8.1%), had poor appetite (n=186, 48.7%), felt bad about themselves (n=257, 67.3%), had trouble concentrating on things (n=251, 65.7%), acted fidgety (n=325, 85.1%) and thought that they would be better off dead (n=368, 96.3%) not at all (Table 2).

Indicators	Nearly every day n (%)	More than half the days n (%)	Several days n (%)	Not at all n (%)
Little interest or pleasure in doing things	22 (5.8)	106 (27.7)	146 (38.2)	108 (28.3)
Feeling down, depressed, or hopeless	19 (5)	113 (29.6)	140 (36.6)	110 (28.8)
Trouble falling asleep or sleeping too much	25 (6.5)	79 (20.7)	131 (34.3)	147 (38.5)
Feeling tired or having little energy	85 (22.3)	135 (35.3)	131 (34.3)	31 (8.1)
Poor appetite or overeating	2 (0.5)	56 (14.7)	138 (36.1)	186 (48.7)
Feeling bad about yourself- or that you are a failure or have let yourself or family down	0	34 (8.9)	91 (23.8)	257 (67.3)
Trouble concentrating on things, such as reading the newspaper or watching television	2 (0.5)	13 (3.4)	116 (30.4)	251 (65.7)

Moving or speaking so slowly that other people could have noticed. Or the opposite-being so fidgety or restless that you have been moving around a lot more than usual	4 (1)	7 (1.8)	46 (12)	325 (85.1)		
Thoughts that you would be better off dead, or of hurting yourself in some way	0	3 (0.8)	11 (2.9)	368 (96.3)		
If you checked off any problems, how difficult have these problems made it for you to do your work, take care of the things at home, or get along with other people?	74 (19.4)	162 (42.4)	117 (30.6)	29 (7.6)		

Table 2 Assessment of Depression among Pulmonary TB Patients

Kruskal-Wallis and Mann-Whitney (p $\geqslant$ 0.05) were performed to find out the differences among different variables. Significant difference between different income levels (p=0.002), duration of treatment (p=0.01), phase of treatment (p=0.03) and type of treatment (p=0.001) were observed. Moderate depression was observed among patients at baseline and had duration of treatment less than a month. However, no significant difference (p $\geqslant$ 0.05) among other demographic variables was observed (Table 3).

Demographics			Depression			
	n	Mean rank	Score (0-27)	Test statistics	P-value	Severity
Gender	Male= 178	191.65	Male= 6	18129.500 [a]	0.980	Mild
	Female=204	191.37	Female= 6			Mild
Marital status	Married= 224	176.15	Married= 6.2	14258.500 [a]	0.117	Mild
	Unmarried=141	193.88	Unmarried= 7.1			Mild
	Divorced = 10	196.88	Divorced = 7.1			Mild
	Widowed = 7	197.88	Widowed = 8			Mild
Age	18-30 yrs= 206	192.12	18-30Y= 6	3.849 [b]	0.491	Mild
	31-40 yrs=119	192.59	31-40Y= 6			Mild
	41-50 yrs=39	169.10	41-50Y= 5			Mild
	more than 50 yrs=16	232.00	>50Y= 7.8			Mild
Qualification	Illiterate=64	209.88	Illiterate= 7.3	3.412 [b]	0.491	Mild
	Primary=129	186.85	Primary= 6.3			Mild
	Matric=151	189.38	Matric= 6.5			Mild

Characteristic						
	Intermediate=37	181.55	Intermediate= 6.1			Mild
Job status	Employed= 146	197.54	Employed= 6.7	5.174 [b]	0.160	Mild
	Unemployed= 117	196.76	Unemployed= 6			Mild
	House Keeper= 111	174.31	House Keeper= 7			Mild
	Retired= 8	243.00	Retired= 8.3			Mild
Cigarette smoking	Smoker= 86	198.69	Smoker= 6.8	12110.000 [a]	0.491	Mild
	Non-smoker= 296	189.41	Non-smoker= 6.5			Mild
Income	Rs. <10,000= 92	216.23	Rs.<10,000= 7.7	14.639 [b]	**0.002**	Mild
	Rs. 10-20,000= 214	173.57	Rs.10,000-20,000= 5.8			Mild
	Rs. 21-35,000= 64	205.04	Rs.21,000-35,000= 6.9			Mild
	Rs. 36-50,000= 12	249.46	Rs.36,000-50,000= 8.6			Mild
Duration of treatment	< 1 month= 111	283.33	<1 month= 10.5	121.729 [b]	**0.001**	**Moderate**
	1-3 months= 130	177.12	1-3 months= 5.9			Mild
	4-6 months= 104	131.06	4-6 months= 4			**None**
	7-9 months= 18	158.67	7-9 months= 3.4			**None**
	10-12 months= 13	115.85	>13 months= 3.6			**None**
Phase of treatment	Baseline= 109	285.43	Baseline= 10.6	119.456 [b]	**0.003**	**Moderate**
	Initial phase= 133	173.58	Initial phase= 5.7			Mild
	Continuous phase= 140	135.40	Continuous phase= 4			**None**
Type of treatment	Self-administered= 197	173.07	Self-administered= 6	14591.500 [a]	**0.001**	Mild
	DOT= 185	211.13	Directly observed therapy= 7.1			Mild

Table 3 Comparison of Depression among Pulmonary TB patients by Demographic Characteristics

a.Mann–Whitney test; b.Kruskal–Wallis test; PHQ-9 score and depression severity 1-4 = None, 5-9= Mild, 10-14= Moderate, 15-19= Moderately severe, 20-27= Severe

4. Discussion

Tuberculosis has remained a major public health problem worldwide resulting in increased morbidity and mortality. Due to prolonged therapy and infectious nature of the disease, physical, mental and social distress is common among TB

patients leading towards poor disease outcomes and depression. The results of the present study highlighted that most of the respondents enrolled in the current study had little interest or pleasure in doing things felt down, depressed or hopeless, had sleep problems, felt tired and had poor appetite on several days. Moreover, results of the present study revealed that patients in baseline phase of therapy were more depressed. This might be due to the fact that immediately upon learning about their diagnosis, patients develop anxiety and as symptoms are less likely to resolve during 1st month of treatment, thus, depression prevails. Similar results were reported in studies conducted in UK, Ethiopia and South Africa where high levels of psychological distress and depression were reported by TB patients at baseline phase of treatment [5, 6, 16]. The results of the present study also highlighted that patients earning 36-50,000 were more depressed. These findings are in line with a study conducted in India that reported high levels of depression in patients who were relatively well-off or had high per capita income [4]. Furthermore, the results of the present study revealed that TB patients undergoing directly observed therapy were relatively more depressed. This might be due to frequent visits to the healthcare facilities which might increase the financial and psychosocial burden of DOT patients. A study conducted in USA also reported that DOT may increase the stigma in TB patients along with increase in financial burden [17].

5. Limitations of the study

The results of this study are limited to two cities of Pakistan and should not be generalized to other parts of the country. The main issues faced during the study were time and financial constraints. Reluctance of the respondents to share views was another obstacle faced during data collection.

6. Conclusion

The present study concluded that majority of patients suffering from tuberculosis suffered from some sort of depression. This depression was more evident at baseline phase of therapy. Patients undergoing directly observed therapy appeared to be more depressed due to increased stigma along with increase in financial burden. Counseling and psychotherapy can play a massive role in combating depression and improving medication adherence in TB patients. Thus, all stakeholders need to work together to identify and rectify factors leading TB patients towards depression in order to improve quality of life and better compliance to TB therapy.

7. Future Research

By using findings from the current study, studies can be conducted to explore factors related to in-crease levels of depression among tuberculosis patients undergoing directly observed therapy. Lon-gitudinal studies can be proposed to explore the factors affecting HRQOL and depression among TB patients. Impact of depression on medication adherence of TB patients can also be explored. Beside this intervention studies based on improvement of depression among TB patients in Pakistan can also be conducted.

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