Original Article

Delays in Diagnosis and Initiation of Treatment among Adult Tuberculosis Patients Registered Under NTEP in Urban Visa Khapatnam: A Mixed Method Study

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Abstract

Introduction: Our understanding of the health system and patient factors responsible for the time delay in diagnosis and treatment is limited. Further research is needed to analyze the health system factors responsible for delay in diagnosis of TB and to identify key factors related to delay in initiation of treatment, in particular the pathways involving health care providers and patients contributing to the complexity and long delays. Hence the current study was done to identify the magnitude of the problem and reasons for delays in diagnosis and treatment using a mixed-method approach.

Materials & Methods: A Mixed –method study was conducted in 8 selected Tuberculosis units (TUs) of Urban Visakhapatnam district among 102 people with tuberculosis followed by a series of Focus group discussions (FGD), In-depth interviews (IDI) & Key informant interviews (KII) with patients & health care workers associated with T.B service delivery.

Results: Majority (59.8%) were males. The median patient care seeking delay was found to be 30 days. The mean diagnostic delay duration of 1±1.1 days with no treatment delay. The mean total patient pathway duration was 44.3±50.2 days. Lack of awareness, fear and stigma derived qualitatively further explained the quantitative findings.

Conclusion: There were minimal delays in diagnosis and treatment initiation, but a significant proportion of delays were seen in seeking medical care.

Key Words: Tuberculosis, Diagnostic delay, NTEP, Patient pathway, Stigma.

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Introduction

Tuberculosis (TB) is a Chronic Communicable bacterial disease. In 2022, an estimated 10.6 million people fell ill with tuberculosis (TB) worldwide, including 5.8 million men, 3.5 million women and 1.3 million children. TB is present in all countries and age groups. TB is curable and preventable. Multidrug-resistant TB (MDR-TB) remains a public health crisis and a health security threat. Only about 2 in 5 people with drug resistant TB accessed treatment in 2022.[1]

National Tuberculosis Elimination Program (NTEP) emphasizes on achieving the sustainable development goal of ending TB by 2025.[2] Prolonged delays have been associated with furthertransmission of the infection in the community and thus posed a great challenge to TB elimination efforts globally.[3] A recent analysis of TB transmission dynamics and delay has stressed that time delays to diagnosis are the most important obstacles to the control of the TB epidemic.[4] This could be due to several factors, principally found within the categories: patients delaying seeking healthcare or failure of the health care systems to diagnose and treat patient's promptly.[5,6] Our understanding of the health system and patient factors responsible for the time delay in diagnosis and treatment is limited. Hence this study, aimed to identify the magnitude of the problem and reasons for delays in diagnosis and treatment.

Objectives:

1. To assess the proportion of patients who had delays in diagnosis and treatment.
2. To identify the reasons for delays in diagnosis and treatment of adult tuberculosis patients under NTEP.
3. To know perceptions of Health care workers and patients on delays in diagnosis and treatment.

Materials and Methods

Study design: Mixed method study.[7]

Quantitative Component: A Cross-sectional observational study.

Qualitative Component Focused group discussions (FGD), In-depth interviews (IDI),Key informant interview (KII).

Study period: November 2019 to December 2021.

Study participants:

Inclusion Criteria: Out of 26 TU s in Visakhapatnam, adult tuberculosis Patients registered in 8 T, U's during January 2021 to June 2021 and health care providers. Senior Treatment Supervisors (STO), Senior Tuberculosis Laboratory Supervisor (STLS), Medical officers, Accredited social health activist (ASHA), Auxiliary nurse midwife(ANM), TB Health Volunteer(TBHV) associated with tuberculosis service delivery who gave consent.

Exclusion Criteria:

- Seriously and terminally ill patients.
- Patients who were not available at home on three different days of home visit were declared not available

Sample size: Taking a mean total delay of 41.2±27.9 days in a study conducted by **Patki et al[8]** the sample size arrived at132.(Due to ongoing COVID 19 Pandemic we could collect only 102 samples out of desired 132.)

n- Sample size, $\mathbf{Z_{1-\alpha/2}}$ – value of Z at 95% CI=1.96; **d**- Margin of error (or) absolute precision.

$$n \geq \left(\frac{Z_{1-\alpha/2}\sigma}{d} \right)^2$$

Sampling technique: Line listing of all TB cases registered in urban Visakhapatnam was obtained through the Nikshay portal, the required sample was taken from all 8 TU's using a simple random sampling method.

For 3 FGD's 24 Health care workers,12 participants for KII and 22 patients for In-depth interviews were included in the study.

For quantitative data, line listing of all TB patients registered in urban Visakhapatnam (January 2021 to June 2021) was obtained through the Nikshay portal, the required sample was taken from all 8 TU's using a simple random sampling method.

For qualitative data: Specifically Knowledgeable, Vocal, Experienced, and willing individuals were

chosen. Homogenous purposive sampling for participants in FGD's, Random purposeful sampling for patients and health care workers participating in IDI & KII.

Quantitative data was collected using a pretested semi-structured questionnaire while qualitative data was obtained through in-depth interviews, Key informant interviews and focused group discussions with the aid of Field guide for FGD and interview guides for KII and IDI.

Data Collection Method:

Quantitative data: All patients identified from the Nikshay portal were contacted within 30 days of their treatment initiation to minimize the recall bias. Quantitative data was obtained using questionnaire.

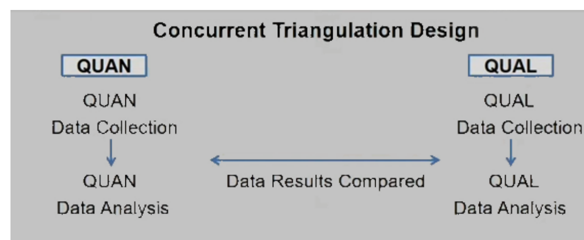
Qualitative Data: Focused Group Discussions were conducted with Medical Officers (MO's), Senior TB Laboratory Supervisor (STLS), Lab technicians (LT'S), ASHA, ANM, TBHV's. A prescheduled field visit was made to T. Us for conduction of FGDs based on the feasibility of study population and field staff. FGD were done in neutral venues like T.B. units or nearby PHC'S. The audio recording was done with the help of a health worker after taking consent. An observer was given the task of recording body language and group dynamics by drawing a sociogram to depict the interpersonal lines of communications to analyze preferences within a group. A total of 3 FGD'S were conducted till data saturation achievement, each FGD lasted for 35 to 50 minutes on an average.

In depth interviews were carried out with patients at their house who were initiated on treatment in the using semi-structured format to collect personal lived -in experiences. A total of 22 IDI's were conducted till data saturation was achieved. Each IDI lasted for 10 to 15 minutes.

Key Informant Interviews (KII) were conducted with the aid of an interview guide to key personnel associated with T.B service delivery. A total of 12 KII were conducted till data saturation achievement, each KII lasted for 10 to 15 minutes on average. A comprehensive data sheet was developed for entering all the data collected. Field notes and Audio recordings of interviews were saved digitally. The study was conducted after approval by the institutional ethics committee (Regd No: REG NO; EC/NEW/INST/2019/397). Confidentiality of the subjects was maintained. All permissions required from District Tuberculosis Control Officer (DTCO), District Medical and Health Officer (DMHO) were taken.

Ethical Considerations: The study was conducted after approval by the institutional ethics committee (Regd No: REG NO; EC/NEW/INST/2019/397). Confidentiality of the subjects was maintained. All permissions required from District Tuberculosis Control Officer (DTCO), District Medical and Health Officer (DMHO were taken.

Data Analysis:



Quantitative component: Quantitative Data was analyzed using Microsoft Excel and SPSS VER 17. Continuous variables are expressed as median and standard deviation, categorical variables are expressed as proportions.

Qualitative component analysis: Thematic analysis was done for FGD, Key informant interviews and in-depth interviews. Qualitative data transcripts were refined and grouped through Atlas.ti software to derive a conceptual framework of expression.

Results

Table 1: shows the mean age of study population was found to be 39.40 ±14.68 years.

Table 2 shows that-A median delay of 30 days (IQR - 43) was observed in Seeking Medical Care.

Table: 3 shows that Lowest proportion of delay (5.4%) and highest proportion of delay (64.9%) in seeking medical care was observed in the age category more than 60years and 18-45 years respectively. The findings were not found to be statistically significant. (p=0.906)

Males (58%) were found to have more delay in seeking medical care than females.

Highest proportion (52%) delay in seeking medical care was found in upper middle class. and lowest (8%) being lower middle class.

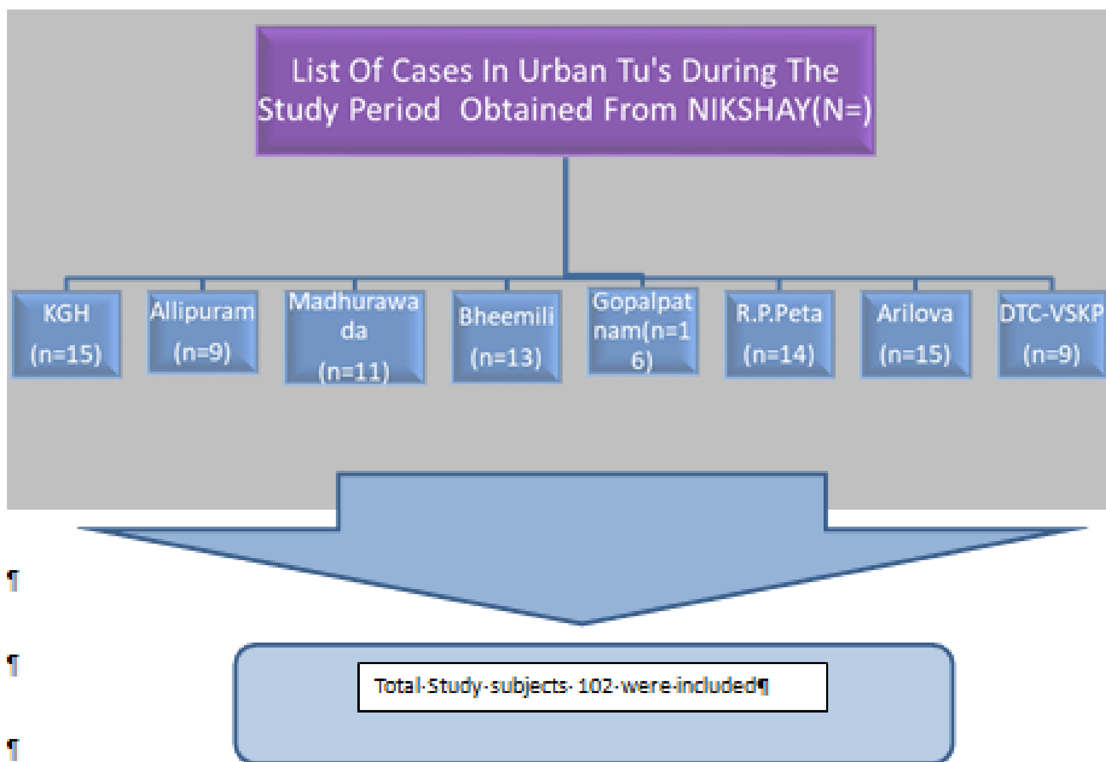


Fig 1 Nikshay portal, the required sample was taken from all 8 TU's using a simple random sampling method.

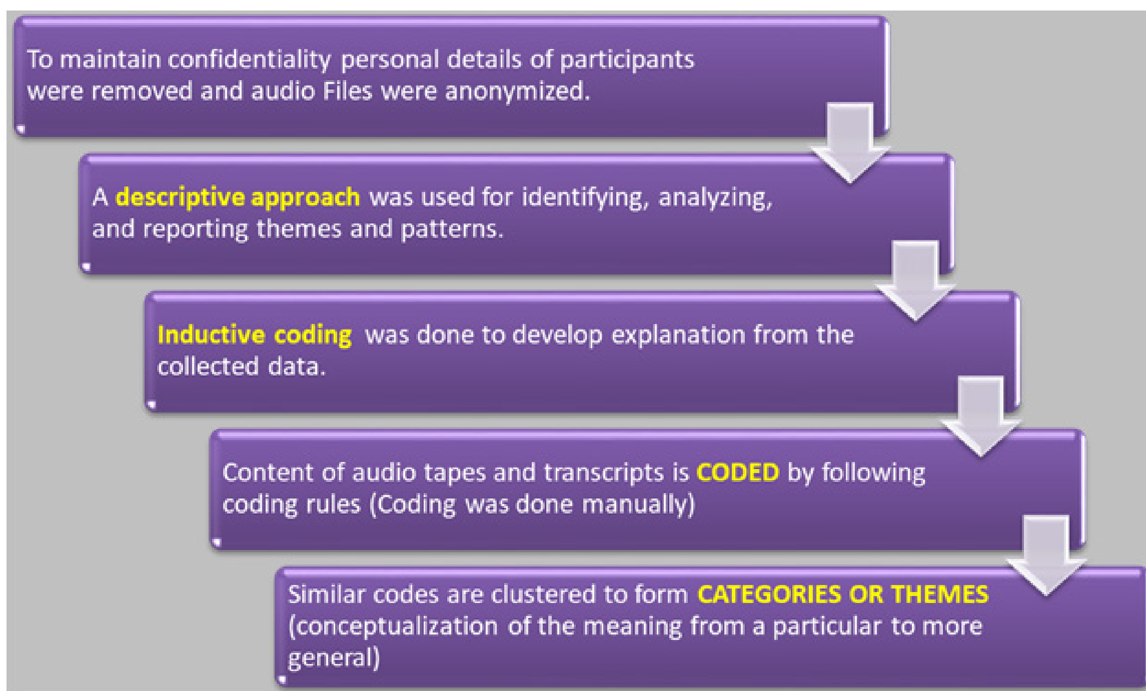


Fig 2: FLOWCHART OF THEMATIC ANALYSIS FOR QUALITATIVE DATA

Quantitative (Cross Sectional Study)

Table 1. Demographic Profile Of Study Population

Variables		Frequency (N)	Percentage (%)
Age (in years)			
18-45		65	63.7
46-60		31	30.4
>60		6	5.9
Gender			
Female		41	40.2
Male		61	59.8
Education			
Literate		71	69.6
Illiterate		31	30.4
Occupation			
Employed		65	63.7
Unemployed		37	36.3
Socio-economic status			
Upper class		26	25.5
Upper Middle		52	51.0
Middle class		17	16.7
Lower Middle		7	6.9
Based on availing Direct benefit transfer			
YES		66	64.7
NO		36	35.3
Patient contribution to family income before and after treatment initiation			
Before	No	37	36.3
	Yes	65	63.7
If yes how many continued after treatment initiation	No	25	38.4
	Yes	40	61.6

TABLE 2. DISTRIBUTION OF DIFFERENT DELAYS IN STUDY POPULATION

DELAY	MEDIAN (DAYS)	MEAN (DAYS)	SD
SEEKING MEDICAL CARE	30	43.01	50.133
DIAGNOSTIC DELAY	1	1.00	1.117
DELAY IN TREATMENT INITATION	0	0.38	0.868
TOTAL PATIENT PATHWAY DURATION	30	44.3922	50.23039

TABLE 3: DISTRIBUTION OF DELAYS IN RELATION TO VARIOUS STUDYVARIABLES

Variable	Delay in seeking medical care				Total Patient Pathway delay			
	Delay (%) 74	No delay N(%) 28	Total 102	P-value	Delay N(%) 38	No delay N(%) 64	Total 102	P-value
Age				0.906				
18-45	48(64.9%)	17(60.7%)	65(63.7%)		27(71.1%)	38(59.4%)	65(63.7%)	0.38
46-60	22(29.7%)	9(32.1%)	31(30.4%)		10(26.3%)	21(32.8%)	31(30.4%)	
>60	4(5.4%)	2(7.1%)	6(5.9%)		1(2.6%)	5(7.8%)	6(5.9%)	
Gender				0.57				0.12
Females	31(41.9%)	10(35.7%)	41(40.2%)		19(50.0%)	22(34.4%)	41(40.2%)	
Males	43(58.1%)	18(64.3%)	61(59.8%)		19(50.0%)	42(65.6%)	61(59.8%)	
Education				0.472				
Literate	53(71.6%)	18(64.3%)			29(76.3%)	42(65.6%)		0.256
Illiterate	21(28.4%)	10(35.7%)			9(23.7%)	22(34.4%)		
Occupation				0.32				0.605
Employed	45(60.8%)	20(71.4%)			23(60.5%)	42(65.6%)		
Unemployed	29(39.2%)	8(28.6%)			15(39.5%)	22(34.4%)		
SES								
Upper class	17(23.0%)	9(32.1%)	26(25.5%)	0.68	8(21.1%)	18(28.1%)	26(25.5%)	0.79
Upper Middle	39(52.7%)	13(46.4%)	52(51.0%)		21(55.3%)	31(48.4%)	52(51.0%)	
Middle	12(16.2%)	5(17.9%)	17(16.7%)		7(18.4%)	10(15.6%)	17(16.7%)	
Lower Middle	6(8.1%)	1(3.6%)	7(6.9%)		2(5.3%)	5(7.8%)	7(6.9%)	

TABLE 4: COMPARISON OF THEMES EMERGED FROM QUALITATIVE INTERVIEWS

Themes	Category	Sub-category	Codes
Reasons for delays	Health Care Workers' Perspective	Patient issues	Awareness, stigma, non-acceptance, lack of family support, rejection, fear, superstitions, lack of education, refusal to do tests, habits, poverty, doctor shopping, Vulnerability, non-formal providers, long treatment duration.
		Field issues	Migrants, over burdened staff, bad experiences.
		Delay	Report delays, stigma, non-acceptance
		Screening	Family, denial, lying, fear, blaming
		Man-power	Less staff, other surveys, target pressure, over burden, online uploading, frequent reviews
		Monetary issues	not aware, others account, funding issues, technical constraints
	Key Informant perspective	Reasons for patient pathway delay	lack of awareness, fear, social stigma, poor technique, non-response, working population.
		Reasons for interruption in treatment	side-effects, fear, migration, provider switching, poor conselling, habits
		Reasons for health system delay	Work load, COVID, less staff, no transport, more population
	patients perspective	Knowledge	Awareness, stigma, fear, provider switching, Side-effects fear, lost reports, perceptions, misinterpretation
		Practices	self-medication, non-formal providers, provider switching, OTC, superstitions, poor response, knowledge, mental stress, lack of time, negligence, lost records
		Social issues	Migration, burden, poverty, lack of family supoort
Proposed solutions	Health Care Workers Perspective	For patients	Drug pack, motivation, education, camps, active screening
		For staff	Target free approach, logistics, frequent trainings, air-purifiers, prophylaxis, human resources
	Patients' Perspective	Programme	Short treatment period, supplementary medications, monetary support

A total of two themes were derived through thematic analysis. 1.Reasons for delays. 2.Proposed solutions

QUALITATIVE (FGD, KII, IDI)

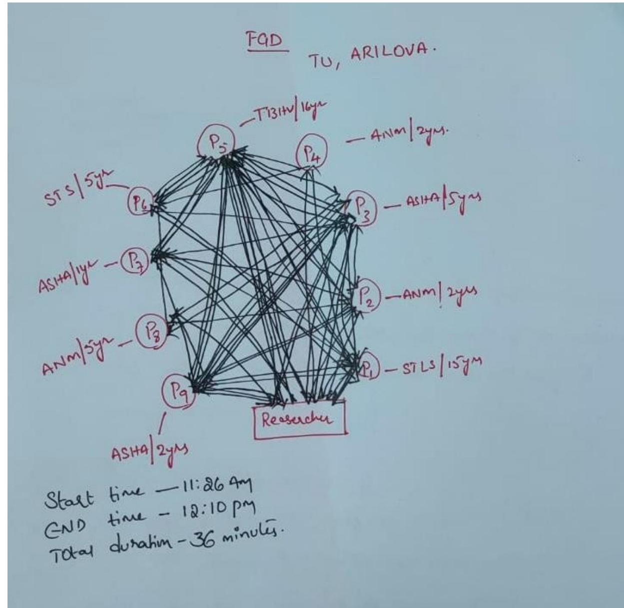


Figure 3: Sociogram of FGD done at ARILOVA T.U.

Focused Group Discussions

From the summary of 3 FGD'S conducted the codes derived were categorized into 6 Sub- categories, which include 1. Patient level issues, 2. Field level issues, 3. Delays, 4. Screening, 5. Man-power issues, 6. Monetary issues. (*Only Few reflections are given here)

1. Patient Issues:

Patient awareness:

"Due to lack of awareness, they will not consider cough>2wks as TB, instead they will say that it may be due to seasonal change or just anormal cough which will subside on its own". (ASHA/Experience 17 years)

2. Field issues:

Proposed Solutions:

"Conducting more awareness meetings may help, recovered patients should come forward to participate in activities like TB champ" TBHV/6years)

3. Delay:

When they were asked about delays in reporting and treating the cases, they responded

Sputum report delay:

"Generally, report will come in 24 hours but if there is more workload sometimes it may be delayed during COVID time. (STLS /18 years)

4. **Screening:**

When the respondents were asked about family screening, they responded as follows:

Family screening:

"We don't have symptoms, why should we give sputum for testing? "(STS/8years)

5. Manpower:

When participants were asked about any other issues, they responded saying,

"We have more population to cover and many other works like fever survey etc., so, a dedicated staff like TBHV will give better results." (STS/8years)

KEY INFORMANT INTERVIEWS:

A total of 12 Key informant interviews (KII) were conducted. From the summary of KII's we developed codes, from codes arrived to 3 subcategories.

1. Reasons for patient pathway delay. 2.Reasons for interruption in treatment. 3.Reasons for Health system Delay.

1. REASONS FOR PATIENT PATHWAY DELAY:

"Lack of awareness could be the reason. Few are giving fake address or wrong mobile numbershence we are facing difficulties for follow up." (STS/5years)

2. REASONS FOR INTERRUPTIONS IN TREATMENT:

"Initially they begin treatment at one place and shift to another place for work or some otherreasons, usually they live in slums and it's very difficult for us to trace them"(STS/5years)

3. REASONS FOR HEALTH SYSTEM DELAY:

When participants were asked what could be the reasons for delays on health system they said,

"There is only one lab technician for both KGH and Allipuram. So, dispatching reports at earlier point is not possible. (STS/4years)

IN-DEPTH INTERVIEWS:

22 IDI were conducted. After Summarizing the codes from transcripts and audio tapes 3 subcategories were generated.

1. Knowledge 2. Patient practices 3. Social issues

KNOWLEDGE

When patients were asked about their awareness and knowledge about T.B in order to explore the reasons for patient pathway delays, they responded

Fear:

"I feared that my family won't accept me if I tested for T.B, so I hide it from them for quite along time"

(Male/38years)

PATIENT PRACTICES:

Self-medication:

"I used to have cough like severe cough with yellow colored sputum since three weeks. Since it's not controlled, I used antibiotics.,"

(Female/23years)

SOCIAL ISSUES:

Burden on families:

"Our income is not meeting our needs, for taking food during this treatment so we are borrowing money" (Female /32)

Migration:

"Initially, I got tested for T.B in Kadapa district I was given medication for a month then we came here" (Female/38 years)

Discussion

A total of 102 patients were assessed for delays in diagnosis and treatment initiation and qualitative inputs were considered to understand perceptions pertaining to delays at different levels.

In present study, the Mean age & Median age were 39.4± 14.68 years & 39 years. Similar findings were seen in a study done by **Lestari et al [5] w**here median age was found to be 35 years. In another study by **Belay et al[9]** the mean age of the study population was 32.7 ±12.3. In India distribution of TB diagnosed incident cases showed a predominance in age groups between 15 to 30 years of age.[10]

In the present study males (59.8%) are more than females (40.2%), similar gender distributions were seen in **Mistry et al[11]** where males were 61% and females were 39%. The male predominance may be because of their greater exposure to the disease mostly due to workplace environment.

In the present study 69.6% of the study subjects were literates and 30.4% were illiterates, similarly in a study by **Mistry et al[12]** had 34% of the illiterate patient's, although, tuberculosis frequently attributed to illiteracy and poor knowledge in our study majority (69.6%) of the participants were literate, this may be due to urban study setting.

In the present study, Males had 58.1% of delay in seeking medical care. Similar findings were seen in **Lestari et al** [5] in which men had longer delays.

The present study demonstrated median patient care seeking delay of 30 days(IQR 60-1) which was similar to a study by **Goel et al** [6] with median patient delay of 30 days (IQR 6.5-58.5) and similar findings were seen in a study by **Roberts et al** [13] where Median delay was found to be 30 days (IQR :11–72 days), whereas in a study by **Belkina et al** [14] it was 27 days (IQR: 6–62 day). Present study findings are synonymous with a study by **Paynter et al** [15] which had median patient delay of 34.5 days. In a systemic review of literature by **Sreeramareddy et al** [16] average patient delay was 31.7 days.

Present study demonstrated a mean delay of 43 days in Seeking medical care which are contrary to the results by **Mistry et al** [12] where mean duration was 15 days in new treatment TB patients, from the same study it was found that patient-related factors responsible for delay are provider shopping, delay in approaching provider after leaving the previous provider, refusal to get tests done, symptomatic treatment for a long duration, delay in advising TB-relevant tests, wrong diagnosis which were similar to codes generated through qualitative approach in current study.

In present study the reasons for patients delays found to be Lack of awareness, lack of perceived risk, Self-medication, over the counters drugs, fear of wages loss which were like qualitative study results by **Goel et al[6]**.

The mean diagnostic delay duration in current study was 1±1.1 days. Whereas higher mean was seen in study by **Patki et al[8]** showed 32.7± 19.8 days.

No treatment delay was observed in present study population, because majority of the patients were kept on treatment on the day of diagnosis itself. Similar findings were seen in study by **Patki et al**[8].

In present study the mean total patient pathway duration was 44.3±50.2 days and a median total delay of 30(IQR 17-60) which were consistent with findings from a study by **Patki et al**[8] where mean total delay of 41.2 ± 27.9 days and median total delay 35.5 (interquartile range [IQR]: 13–44) days was seen.

In the Present study total pathway delay is attributed to patient delay the reasons were stigma, fear, over the counter drugs and visit to non-formal providers which are similar to findings in a study by **Belkina et al.**[14] Contrary to this finding, in a study by **Rajeswari et al** [17] mean total delay was 60 days (range 0-425) which was due to health system delay.

Conclusion

Overall, the study population experienced minimal delays in diagnosis and treatment initiation. However, a significant proportion of delays occurred when seeking medical care in the patients' pathway to the healthcare system. The NTEP program was performing excellently in most aspects in urban Visakhapatnam. Emphasizing contact screening and increasing patient awareness will help the NTEP achieve its vision of "END TB 2025."

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Conflict of interest: Nil

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