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Determinants of multidrug resistance among tuberculosis patients in Govt. Hospital at Puducherry

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Abstract

Background: Global tuberculosis (TB) control efforts are facing the additional challenge of multidrug-resistant TB (MDR-TB). Drug-resistant tuberculosis (DR-TB) is a significant public health issue that considerably determines the ongoing TB control efforts in India. The purpose of this study was to investigate the determinants of MDR-TB among tuberculosis patients in Govt. hospital at Puducherry.

Methods: The quantitative research approach was adopted for the study. Based on descriptive design the study was conducted in selected Government Hospital at Puducherry. The study was conducted among 40 non-compliance TB cases. The samples were selected by using Purposive Sampling Technique. Based on structured questionnaire, the data were collected among noncompliance patient affected with tuberculosis.

Results: The findings of the study reveals that there is a significant association found between patients with TB related factors with $P<0.05$ such as gender in association with patient who continually lived with previous history MDR-TB and site of TB Infection during first course of treatment (0.016) and (0.0460) respectively; age in association with smear positive during first course of Treatment and habit of smoking(0.048) and (0.004) respectively, level of education and counseling given by health worker to TB patients (0.033), Occupation in association with drug side effect (Vomiting), interrupted Anti TB treatment for atleast a day and reason for interruption for atleast a day (0.027), (0.054) and (0.02) respectively. From the findings of the study to achieve the integrated tuberculosis treatment success rate as per WHO target, the obstacle as mentioned to be managed and to provide standardized facility to achieve medications and mobilization of resources for the treatment will avoid the occurrence of MDR-TB.

Conclusion: India has set an ambitious goal of TB elimination by 2025. The large burden of MDR-TB will limit progress towards that goal. Rarely, does the 'prevention is better than cure' carry as much weight as it does with MDR-TB. We believe that a multipronged strategy focusing on improving diagnostic capacity, guaranteeing high-quality treatment and preventing transmission will be central to meeting the challenge of MDR-TB in India.

Keywords: Drug resistance, tuberculosis, determinants

Introduction

Tuberculosis (TB) is an infectious airborne disease and major health problem worldwide. Globally, TB is the second most lethal disease, next to AIDS. Additionally, a growing concern is the development of multi drug resistant (MDR) forms of TB, which have developed due to partial or incomplete treatments and it has been as substantial obstacle to global tuberculosis control.

MDR-TB is defined as disease with mycobacterial strains that are resistant to two of the most effective and important anti-TB drugs: isoniazid and rifampin. These two drugs are considered first-line drugs and are recommended for the treatment of all individuals with drug-susceptible TB disease. The occurrence of MDR-TB is mainly attributable to human error, although genetic factors are also believed to contribute to a certain extent. In countries like India MDR-TB is becoming a challenge because of poor adherence to treatment and an increase in the use of illegal and unapproved treatment regimens for MDR-TB. To make things worse, in these TB and MDR-TB high burden countries patients stay in their communities for longer periods without being diagnosed or getting proper treatment. Even after diagnosis, because there are few diagnostic and treatment facilities and a lack of trained health professionals and drugs, patients do not start treatment immediately. This delay potentially allows easy spread of the disease to a large number of individuals within a short time.

Need for the study

The emergence of MDR-TB is a threat for the populations of resource-limited countries. Worldwide, there were 650,000 multidrug-resistant tuberculosis (MDR-TB) cases in 2010, and in 2008 the World Health Organization estimated that 150,000 deaths occurred annually due to MDR-TB. Overall, the 27 high MDR-TB burden countries accounted for 85% of all MDR-TB cases. China, and India, was the top two countries accounting 50% MDR-TB cases. Multi-drug resistance (MDR) has been a cause of concern for tuberculosis (TB) control in both developed and developing countries. Although risk factors for multi-drug resistant tuberculosis are known, few studies have differentiated between acquired and transmitted resistance. It is important to identify factors associated with these different mechanisms to optimize control measures.

The aim of this study is to determine the occurrence of Multi Drug Resistance among TB patients who had taken first line anti-TB treatment in Government hospitals at Puducherry.

Objectives of the study

- To find out the determinants of multidrug resistance among tuberculosis patients in Govt. hospital.
- To find out the association between determinants of multidrug resistance with selected demographic variables

Review of literature

MajaStosic (2018) [7], conducted case-control study on "Risk factors for multidrug-resistant tuberculosis among tuberculosis patients" in 31 healthcare institutions in Serbia MDR-TB and TB patients were treated. The data was collected using structured questionnaire with face to face interview. Results shown that total of 124 respondents, 31 cases and 93 controls were participated in the study. Finding identified are independent risk factors for the occurrence of MDR-TB as follows defaulting from treatment (OR = 3.33; 95% CI = 1.14–9.09), stigma associated with TB (OR = 2.97; 95% CI = 1.18–7.45), subjective feeling of sadness (OR = 4.05; 95% CI = 1.69–9.70), use of sedatives (OR = 2.79; 95% CI = 1.02–7.65) and chronic obstructive pulmonary disease (OR = 4.51; 95% CI = 1.07–18.96).In order to reduce burden of drug resistance, strategies of controlling MDR-TB should emphasize multi-sectorial actions, addressing health care and social needs of TB patients.

Rajendra Prasad conducted study on (2017), "Extensively drug-resistant tuberculosis in India: Current evidence on diagnosis & management" Emergence of extensively drug-resistant tuberculosis (XDR-TB) has significantly threatened to jeopardize global efforts to control TB, especially in HIV endemic regions. XDR-TB is mainly an iatrogenically created issue, and understanding the epidemiological and risk factors associated with it is of paramount importance in curbing this menace. Emergence of this deadly phenomenon can be prevented by prompt diagnosis and effective treatment with second-line drugs in rifampicin-resistant TB (RR-TB) as well as multidrug-resistant TB (MDR-TB) patients. Optimal treatment of RR-TB, MDR-TB and XDR-TB cases alone will not suffice to reduce the global burden. The TB control programmes need to prioritize on policies focusing on the effective as well as rational use of first-line drugs in every newly diagnosed drug susceptible TB patients so as to prevent the emergence of drug resistance.

Methodology

Research Approach: Quantitative Research approach was adopted for this study.

Study Design: Study was conducted based on Descriptive Design

Study Setting: The study setting were selected Government hospital at Puducherry.

Study Population: The population of the study includes Non-Compliance patients affected with TB case.

Sample and Sample Size: who fulfilled the inclusion criteria were selected as sample. The Sample Size was 40.

Sampling Technique: The samples were selected by using Purposive Sampling Technique

Sampling criteria
Inclusion criteria

- Those who have multidrug resistance
- Those who got admitted in Govt. hospitals

Exclusion criteria

- Those who don't have adequate data to confirm the diagnosis of MDR like X-ray, AFB
- Pregnancy and lactating mothers
- Co morbid Chronic infections

Data collection method

The data was collected after getting permission from the concerned authorities. The objectives of the study were explained to the participants and written consent was taken from them. Data was collected by structured questionnaire on demographic data and TB related conditions. Source of the data collection is from primary source.

Data analysis

The collected data was analyzed using descriptive and inferential statistics. Description of subjects with respect to demographic variables was presented using frequency and percentage. Data was presented in tables and diagrams.

Results

Table 1: Distribution of demographic variables N-40

S. No	Demographic variables		No. of patients	Percentage
1	Gender	Male	31	77.5%
		Female	09	22.5%
2	Age	5-25years	03	7.5%

		26-45years	19	47.5%
		46-72years	18	45.0%
3	Marital Status	Single	09	22.5%
		Married	28	70.0%
		Divorced	03	7.5%
4	Education	Uneducated	16	40.0%
		Primary	12	30.0%
		Higher Secondary	06	15.0%
		Degree	06	15.0%
5	Occupation	No Work	05	12.5%
		Student	03	7.5%
		Daily Laborer	18	45.0%
		Government Worker	11	27.5%
		Private Worker	03	7.5%
6	Rooms In Residence	Single room	06	15.0%
		Two-Three rooms	32	80.0%
		Four – five rooms	02	5.0%
7	Family Size (in members)	1-3	09	22.5%
		4-6	26	65.0%
		7-11	05	12.5%

Table 2: Association of gender and TB patients who have lived with MDR-TB patient N-40

Gender	Ever Lived With MDR-Tb Patient		Fisher's Exact Test ($p<0.05$)
	Yes	No	
Male	2	29	0.016
Female	4	5	
Gender	**Site of TB infection during first episode**		Fisher's Exact Test ($p<0.05$)
	Pulmonary	Extra Pulmonary	
Male	31	0	0.046
Female	7	2	
Age	**Smear Positive During First Anti-Tb Treatment**		Pearson Chi-Square ($p<0.05$)
	Yes	No	
5-25years	2	1	0.048
26-45years	19	0	
46-72years	17	1	
Age	**Ever Smoked Cigarettes**		Pearson Chi-Square ($p<0.05$)
	Yes	No	
5-25years	2	1	0.004
26-45years	2	17	
46-72years	11	7	
Education	**Ever Counseled By Health Worker**		Pearson Chi-Square ($p<0.05$)
	Yes	No	
Uneducated	16	0	0.033
Primary School	12	0	
Higher Secondary	5	1	
Degree	4	2	
Occupation	**Suffered The Most Common Drug Effect (Vomiting)**		Linear-By-Linear Association ($p<0.05$)
	Yes	No	
No work	4	1	0.054
Student	0	3	
Daily	8	10	
Private worker	3	8	
Businessman	0	3	
Government workers	0	0	
Education	**Ever Interrupted Anti TB For Atleast A Day**		Linear-By-Linear Association ($p<0.05$)
	Yes	No	
Uneducated	16	0	0.02
Primary School	10	2	
Higher Secondary	4	2	
Degree	4	2	
Occupation	**Ever Interrupted Anti TB For Atleast A Day**		Pearson Chi-Square ($p<0.05$)
	Yes	No	
No work	4	1	0.053
Student	1	2	
Daily	16	2	

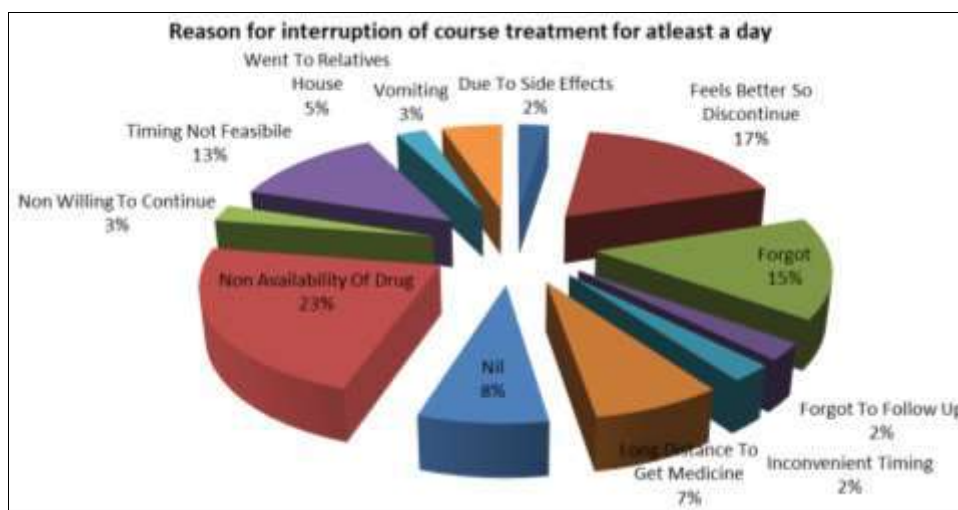| Private worker	11	0	
Government workers	0	0	
Businessman	2	1	

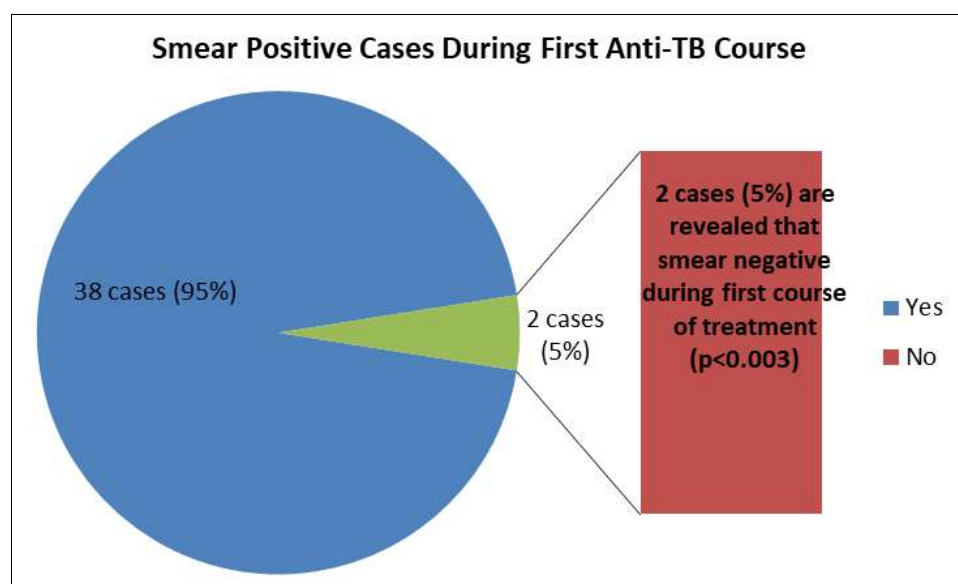**Fig 1:** Reason for interruption of Anti-TBT reatment course for atleast a day

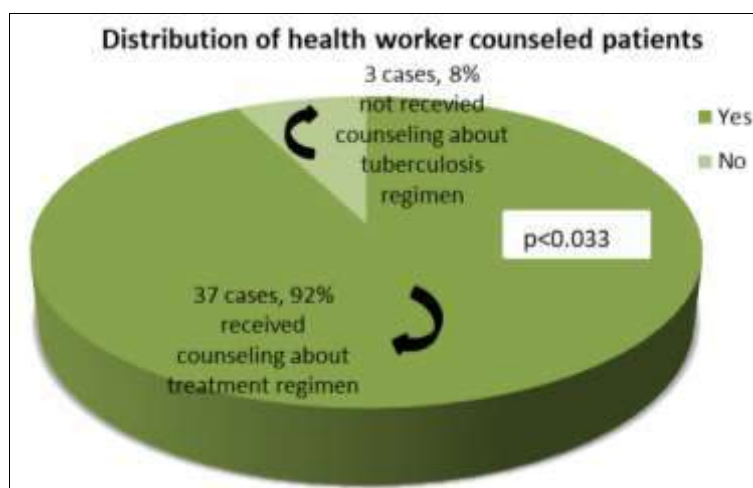**Fig 2:** Distribution and association of smear positive during first anti-Tb treatment N-40

Fig 3: Distribution and association of demographic variable and counseling received by patients N-40

This study was aimed at determining the predictors of MDR-TB cases in government hospital at Puducherry. It was found that that there is a STRONG significances present in many TB related factors with $P<0.05$ as in follows: Association found between gender with patient lived with positive MDR-TB cases was 0.016, cases experienced Tuberculosis Infection rate during first episode of treatment was (0.0460), cases with smear positive during first Anti-Tb Treatment (0.048), total no. of cases had habit of smoked cigarettes was (0.004), patient education level and ever given understandable level of counseling by health worker was (0.033), level of patient occupation and their experience of most common drug effect (like Vomiting) (0.054), patient occupation field any interrupted Anti TB intake for atleast a day was (0.02).

Number of rooms available in patient house (opportunistic infection to others) with smear positive during first Anti-TB Treatment (0.003), patient ever had habit of cigarettes smoking (0.035), weight measured by health worker before starting treatment (0.012), patient perception about the care provided (0.007) respectively. From the findings of the study to achieve the integrated tuberculosis treatment success rate as per WHO target the following obstacle should to managed and providing standardized facility to achieve medications and mobilization of resources for the treatment will avoid the occurrence of MDR-TB.

Discussion

The first objective of the study was to find out the determinants of Multidrug resistance among TB patients in Government Hospital at Puducherry

All TB patients were assessed for determinants of MDR TB. Among those 40 patients were identified as affected with MDR TB. Those determinants are site of TB infection during first course of treatment, smear positive during first course of treatment, poor counseling of health worker about anti TB treatment, smoking habit, patient perception about the Anti –TB treatment, encountered drug side effects like vomiting, interrupted of anti-TB treatment. It also reveals that MDR TB has been developed due to the treatment discontinuation caused by various reasons in their life.

The second objective of the study was to associate between determinants of MDR with selected demographic variable

The findings of the study reveals that there is a significant association found between patients with TB related factors with $P<0.05$ such as a) Gender and patient lived with MDR TB patients: out of 40 cases nearly 39 males were lived with MDR-TB, b) Gender and Site of Infection: many males cases were found to be suffered with pulmonary tuberculosis; c) Age and Smear positive cases: patients with age group26-45 years had smear positive of 78%, 46-72 years of age had smear positive of 48% during first course of Treatment; d) Age and smoking habit: 26-45 years of age group patients more chances of smoking habit; e) level of education and Anti-TB counseling received by patient; majority of patients are uneducated and primary school among those only 40% of patients received proper counseling about anti-TB treatment; f) Occupation association with drug side effect(Vomiting); most of the patients are private workers and are commonly suffered

with episode of vomiting, g) Occupation and reason for the interruption of anti-Tb are shown in Figure: 3 respectively.
To achieve the integrated tuberculosis treatment success rate as per WHO target the following hurdles to be extracted and standardized facility to achieve medications availability to all patients on time and mobilization of resources for the treatment will reduce the occurrence of MDR-TB. Hence there is an increasing burden for RNTCP to achieve towards the eradication of tuberculosis.

Conclusion and Recommendations

India has set an ambitious goal of TB elimination by 2025. The large burden of MDR-TB will limit progress towards that goal. In conclusion, we found that incomplete treatment which includes treatment discontinuation due to treatment failure, adverse reactions to anti-TB medicine, and hospitalization for TB complications during previous TB treatment are the main factors leading up to MDR-TB. We believe that a multipronged strategy focusing on improving diagnostic capacity, guaranteeing high-quality treatment and preventing transmission will be central to meeting the challenge of MDR-TB in India[7].Therefore, strict adherence to DOTS, basic TB infection control practices, appropriate management of TB patients are imperative to control the spreading of MDR-TB [11].

Nursing Implications: The investigator has derived the following implications from the study which are of primary concern in the field of followings.

Nursing practice: Nurses have a vital role in helping persons to cope up with continuous MDR. Nurses can explain the importance of MDR treatment, its impact on health in case of discontinuation of treatment. Nurses need to counsel the infected persons to cope up with continual treatment of MDR.

Nursing education: Nurse Administrators in the hospitals can conduct in-service education for nurses about trends and significance of MDR.

Nursing research: There is a need for extensive research in this area for the reason exist beyond MDR.

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