RESEARCH PAPER

An Analysis of Clinico-Pharmacological Profile of Drug-Resistant Tuberculosis Cases Residing in Kalaburagi District- North Karnataka: A Descriptive Cross-Sectional Study

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ABSTRACT

Background:
Drug-resistant tuberculosis (DR-TB) is another major public health problem, especially in developing countries, which is associated increase in different resistance patterns and drug reactions. A detailed understanding of clinical characteristics in different DR-TB Cases is needed to modify the program on time and strengthen it. There are a few studies that lack scientific evidence on DR-TB in Karnataka state, specifically in the North Karnataka region. The current study was undertaken to assess the clinical profile and adverse drug reactions in DR-TB patients.

Material And Methods:
A descriptive cross-sectional study was carried out at a tertiary care centre in Kalaburagi district from May 2022 to June 2025 by using a census sampling method. All 210 DR-TB cases were considered as the sample size. Data was collected by using a semi-structured questionnaire, 1st interview was done at the time of drug initiation, for sociodemographic profile, clinical symptoms, comorbidities, BMI, Nikshay poshan yojana and drug resistance patterns, and 2nd interview was done after three months to assess the development of adverse drug reactions.

Results:
Among 210 subjects, most of the DR-TB Cases were males (63.3%) with a mean age of 37.87 years, who had completed middle school, were working as labourers (37.1%) and had a low socioeconomic class (36.2%). Diabetes (12.9%) was the major comorbidity. The most prevalent drug resistance pattern was (62.9%) MDR-TB. Cough (77.65%) was the most common presenting symptom, and adverse drug reactions were (33.8%) GI symptoms, headache, arthralgia, etc.

Conclusion:
The study concluded that males of the 3rd to 6th decade, with low socioeconomic status and working as labourers, were more affected. The MDR-TB was the most prevalent DR-TB pattern, and adverse drug reactions were common among DR-TB cases.

Clinical Significance:
The present study was more focused on individual clinical and drug-resistant patterns, side effects, and the utility of the Ni-Kshay Poshan Yojana program (NPY). It also highlighted the need for modification in the treatment regimen.

Keywords: Tuberculosis, Drug Resistance Tuberculosis, Rifampicin Resistance TB, Adverse drug reactions (ADRs), Information, education and communication (IEC)
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INTRODUCTION

Tuberculosis is an important public health issue globally, which is a chronic infectious disease in the world and

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caused by a single acid-fast bacteriological agent, "Mycobacterium Tuberculosis". It mainly affects the lungs, which is called pulmonary TB, and also affects other body parts like the intestine, meninges, bone and joints, lymph glands, skin, and other tissue parts, which is called extrapulmonary TB. [1] Worldwide, 0.45 million people developed MDR-TB/RR-TB disease in 2022. In India, 0.049 million people developed MDR-TB/RR-TB disease in 2022, 0.7 million people developed HIV-TB disease in 2022, and 0.053 million people developed HIV-TB disease in 2022. It is the leading killer of people with HIV and the second most common cause of death from infectious diseases worldwide. 0.187 million people died due to TB (HIV positive) in 2022. In India, 0.011 million people died due to TB (HIV positive) in 2022. [2]

As per the annual report of TB 2023, in Karnataka state, the total number of mono-resistant TB cases is 1126, and the deaths are 118. The total number of RR-TB/MDR-TB cases is 586, and the deaths are 94 in the year 2021. [3] In the year 2020, the drug resistance treatment success rate was about 59%. Most people discontinue their treatment and die. [4] India is associated with a high incidence of TB, HIV with TB, and MDR/RR-TB. During the COVID-19 pandemic. [5] Drug-resistant tuberculosis is another major public health problem, especially in developing countries, because it has a very long duration of disease and treatment; it is not able to achieve a high cure rate even by introducing a short course of chemotherapy. MDR-TB and XDR-TB also accounted for in paediatric age groups, and no estimation of the overall burden of the disease was made because of difficulty in diagnosis and exclusion of children in most DR-TB surveys. [6] Nowadays, the number of DR-TB Cases is increasing, and drug-resistant TB (MDR-TB) poses a major threat to global health security. [7] The Government of India launched the Ni-Kshay Poshan Yojana (NPY scheme in April 2018, providing financial incentives of five hundred rupees monthly via direct benefit transfer (DBT) to all persons affected with TB to support their nutritional requirements during their treatment. [8] All events start from the notification of the treatment outcome. It is an integral part of the documentation of the NTEP program. [9] DR-TB has different types of drug resistance patterns to TB medications. RR-TB is the most common, frequently occurring type of pattern, followed by MDR-TB, and XDR-TB is the least common type of pattern, respectively. [10] It is the longest period of the course of treatment. Medication adherence is one of the most challenging factors. It's associated with various adverse drug reactions. Gastrointestinal upset, fatigue, headache, vertigo, drowsiness, loss of appetite, ringing of the ears, skin lesions (arthralgia), joint pain, oral ulcer, and visual problems were more common adverse drug reactions encountered with DR-TB Cases. [10,11] The different complex challenges involved in managing drug-resistant tuberculosis effectively. [12]

Currently trend of DR-TB increases as years pass, becoming a major public health problem in terms of social security and economics, which is influenced by various social and cultural factors, low adherence to treatment and DOTS services, infrastructural, advanced technologies in diagnosis and treatment, availability of resources, lack of public and private partnerships, and geographical limitations. [10-12] Programmatic management of DR-TB is essential. Baseline clinical parameters in different DR-TB Cases are needed to modify the program on time and strengthen it. Only a few studies and a lack of scientific evidence exist on drug-resistant tuberculosis in Karnataka state, mainly in Kalyan, Karnataka region. It is an economically backward area. A more comprehensive analysis is needed on the Clinico-pharmacological profile and NPY associated with DR-TB; hence, the current study was undertaken.

OBJECTIVES

1. To assess the clinical profile, adverse drug reactions, and Nikshay Poshan Yojana attendance among DR-TB Cases.
2. To find out the prevalence and pattern of drug resistance among DR-TB patients.

MATERIALS AND METHODS:

Study setting: The study was approved by the Institutional Ethics Committee of the medical college, GIMS-Kalaburagi. The ethical clearance number is GIMS/IEC/2022/108. The study was conducted at the drug-resistant tuberculosis centre (DR-TB) affiliated with the tertiary care hospital and district tuberculosis office (DTO) in Kalaburagi, located in Kalyan, Karnataka region. Suspected cases of tuberculosis and drug-resistant tuberculosis from various TB units and healthcare centres in the Kalaburagi district were referred to this centre for treatment initiation. The baseline data of DR-TB Cases were obtained from the register, which was maintained at the district DR-TB Centre -Kalaburagi.

Study Design: A descriptive cross-sectional study

Duration of the study: May 2022 to June 2025

Sample size: All DR-TB Cases registered at the District DR-TB centre, Kalaburagi, during my study period were considered as the study sample size.

Sampling method: A census sampling method

Inclusion criteria:

1. All DR-TB Cases Registered at the District Drug Resistance Tuberculosis Centre, Kalaburagi.
2. All DR-TB Cases who provided consent to participate in the study.

Exclusion criteria:

1. All DR-TB Cases who did not give consent to participate in the study.

Data collection tool and Method:

After getting permission from the District Tuberculosis Officer, data of the subjects were collected by face-to-face interviews, using a pre-tested and semi-structured

questionnaire after obtaining written informed consent in standard format. 1st interview was done at the time of drug initiation, data collected were on their sociodemographic profile, clinical symptoms, comorbidities, BMI, Nikshay Poshan Yojana and drug resistance patterns, and 2nd interview was done after three months to assess the development of adverse drug reactions among DR-TB cases.

STATISTICAL ANALYSIS

Data was entered in Microsoft Excel and analysed using SPSS software, version 16.00. Data was entered in an Excel sheet and analysed using SPSS software 16.0. Results were presented in the form of tables, graphs, frequency, percentage, mean, and standard deviation (SD).

Table 1: Distribution of Demographic Profile among DR-TB Cases

Factors		Frequency(n=210)	Percentage (100%)
Age group (In years)	≤30	82	39.0
	31-60	111	52.9
	61-90	17	8.1
	Mean (SD) age of drug-resistant tuberculosis Cases =37.87±14.51 Years		
Gender	Male	133	63.3
	Female	77	36.7
Education	Illiterate	46	21.9
	Up to middle school	82	39.0
	Up to SSLC	28	13.3
	Up to PUC	30	14.3
	Up to postgraduate	24	11.4
Occupation	Labour's	78	37.1
	Farmers	31	14.8
	Students	28	13.4
	Housewives	37	17.6
	Others (Business, Plumber, Contractor, Decorator, Local leader, Professional, Pensioner, Driver)	36	17.1
Socio-economic class (According to modified B.G. Prasad classification January 2024)	Upper class-I	7	3.3
	Upper middle class-II	35	16.7
	Middle class-III	41	19.5
	Lower middle class-IV	51	24.3
	Lower class-V	76	36.2

Table 2: Distribution of clinical symptoms at the time of admission to the DR-TB centre

Symptoms	Frequency (n=210)	Percentage (100%)
Cough	163	77.6
Breathlessness	100	47.6
Fever	75	35.7
Chest pain	58	27.6
Anorexia	62	29.5
Generalized weakness	71	33.8
Others (Weight loss, Body pain, Haemoptysis, Giddiness, Vomiting, Joint pain, Epilepsy, Headache, Gastric pain)	42	20.0

Table 3: Distribution of comorbidities among DR-TB Cases

Comorbidities	Frequency(n=210)	Percentage (100%)
Hypertension	17	8.1
Diabetic mellitus	27	12.9
HIV	8	3.8
Others (Hypothyroidism)	2	2.0

Table 4: Distribution of categories of DR-TB Cases

Categories of DR-TB		Frequency (n=210)	Percentage (100%)
New cases		153	72.9
Old cases		57	27.1
Categories of ATT in old cases	Relapse	22	10.5
	Defaulter	32	15.2
	Failure of ATT	3	1.4

Table 5: Distribution of utilization of Nikshay Poshan Yojana for different purposes among DR-TB Cases

Utilization of Nikshay Poshan Yojana for other purposes	Frequency (n=210)	Percentage (100%)
Family-related things (groceries, fees, fruits, and veg tables)	116	55
Transport	42	20
Treatment	21	10
Others (alcohol, tobacco, chewing, smoking)	31	15

Table 6: Distribution of Pallor among DR-TB Cases

Pallor	Frequency (n=210)	Percentage (100%)
Present	128	61.0
Absent	82	39.0

Table 7: Distribution of pharmacovigilance (adverse drug reactions monitoring) among DR-TB Cases

Type of health workers	Frequency (n=210)	Percentage (100%)
Doctors	84	40
Pharmacists	59	28
Nurses	42	20
Other community health workers	25	12

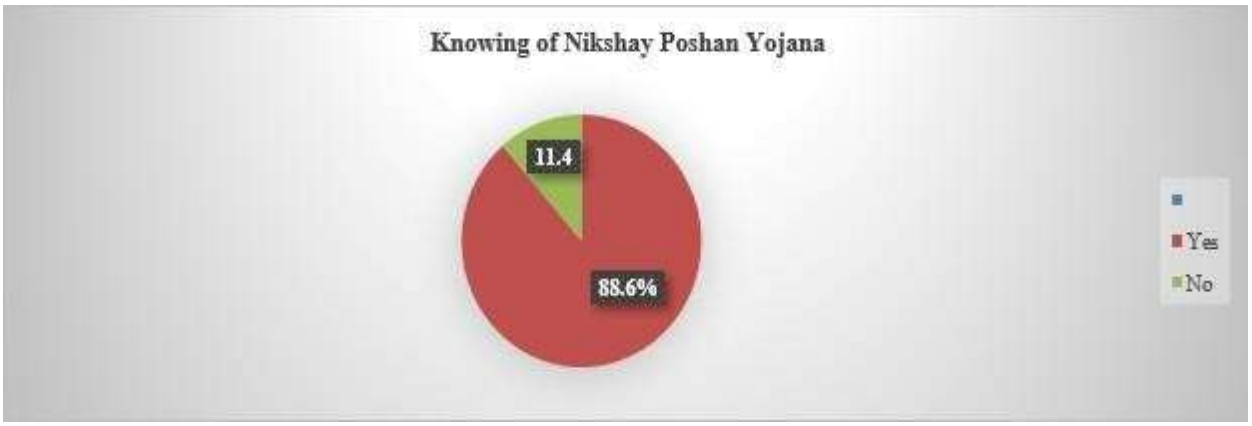

Figure 1: Distribution of knowledge of Nikshay Poshan Yojana among DR-TB Cases (n=210)

Figure 2: Distribution of getting Ni-Kshay Poshan Yojana among DR-TB Cases (n=210)

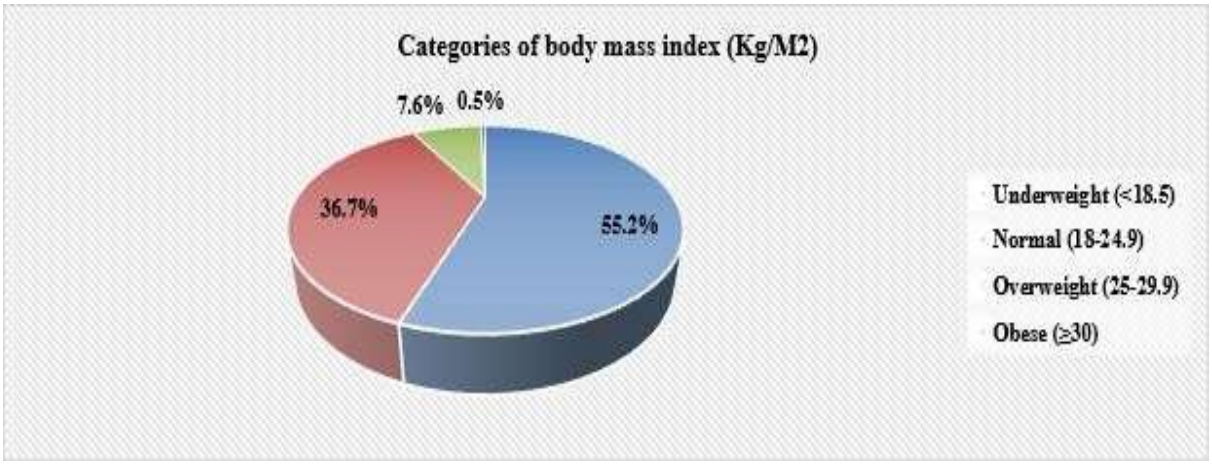

Figure 3: Distribution of body mass index of DR-TB Cases (n=210)

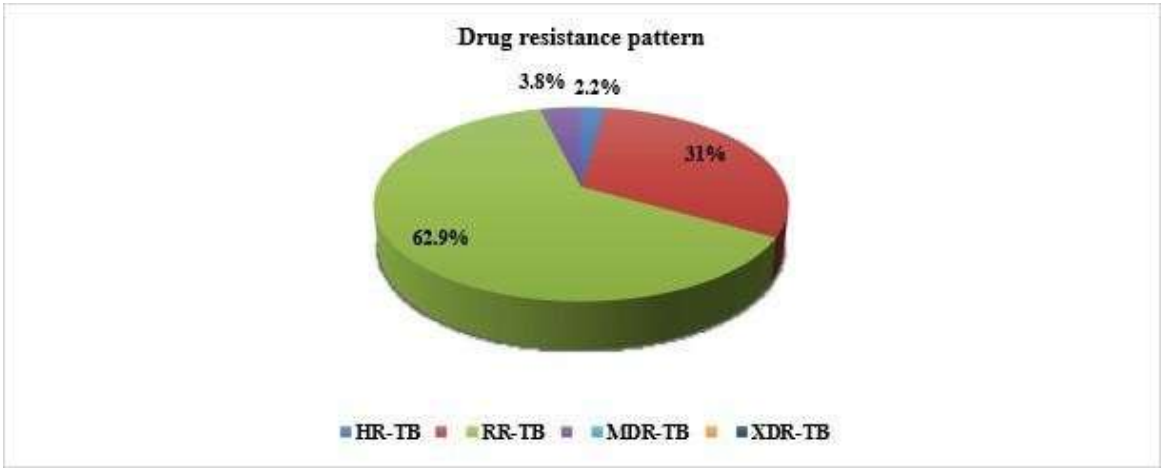

Figure 4: Distribution of drug resistance pattern among DR-TB Cases (n=210)

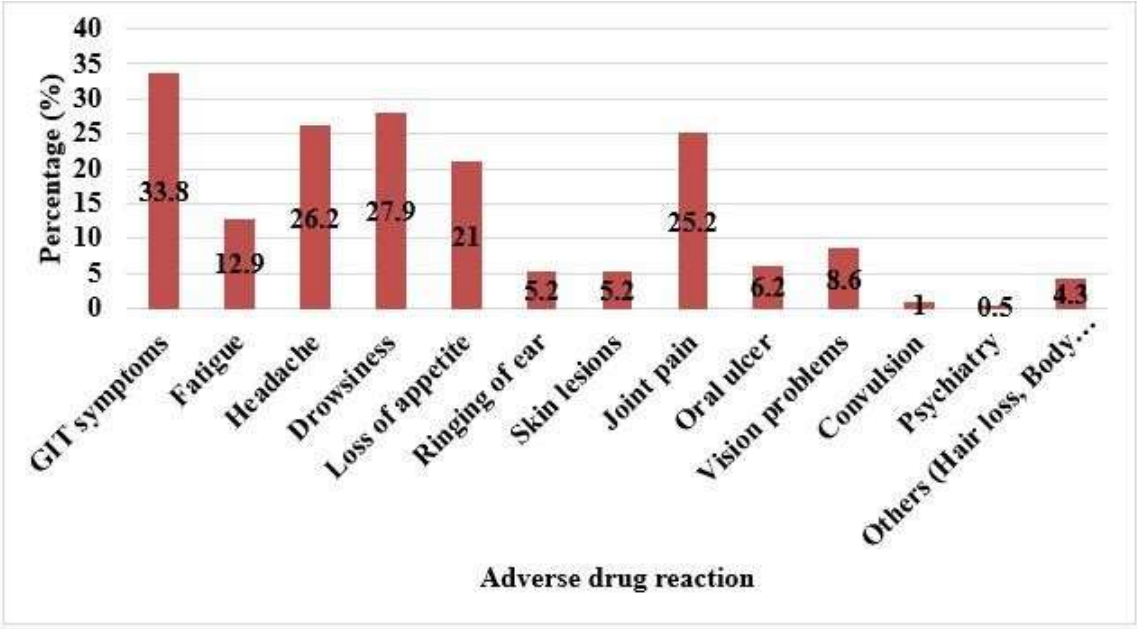

Figure 5: Distribution of adverse drug reactions among DR-TB Cases (n=210)

RESULTS

Out of 210 study participants, more than half of the cases belonged to the 111(52.9%) 31-60 years age group, 82(39%) were in the ≤30 years age group, and 17(8.1%) were in the 61-90 years age group. The mean (SD) age of the drug-resistant tuberculosis cases was 37.87±14.51 years. Most of the study participants were males, 133(63.3%), and females, 48(36.7%). The majority completed education up to middle school, 82(39%), followed by illiteracy 46(21.9%), up to SSLC 28(13.3%), up to PUC 30(14.3%), and up to post-graduate 24(11.4%), respectively. The majority of study participants were labourers 78(37.1%), housewives 37(17.6%), farmers 31(14.8%), students 28(13.4%), and other occupations (business, plumber, contractor, decorator, local leader, professional, pensioner, driver) were 36(17.1%. According to the updated modified B. G Prasad socioeconomic classification, in January 2024**, t**he majority of study participants belonged to the 76(36.2%) lower class-V, 51(24.3%) belonged to the lower middle class-IV, 41 (19.5%) were middle class-III, whereas 35(16.7%) were upper middle class-II, and only 7 (3.3%) cases were constituted upper class-I (**Table 1)**.

Most presented symptoms among the participants were cough 163(77.65%), followed by breathlessness 100(47.6%), fever 75(35.7%), and generalised weakness 71(33.8%), whereas minor symptoms were chest pain 58(27.6%), and other symptoms like weight loss, body pain, haemoptysis, giddiness, vomiting, joint pain, epilepsy, headache, and gastric pain respectively **(Table 2).** In the present study, the majority of DR-TB cases presented with comorbidities of 27(12.9%) diabetic mellitus and 17(8.1%) hypertension. Minor comorbidities were 8(3.8%) HIV and 2(2%) hypothyroidisms **(Table:3).** Out of 210 DR-TB cases, most of them were new cases, 153(72.8%) and old cases, 57(27.1%) whereas old cases of drug-resistant tuberculosis majority were defaulters 32(15.2%) to antituberculosis treatment and others were relapse, 22(10.5%), failure of antituberculosis treatment, 3(1.5%) **(Table:4).** More than 2/3 of drug-resistant tuberculosis cases knew the Ni-kshay Poshan Yojana program 186(88.6%). There was a monthly direct transfer of five hundred rupees for nutrition and transport support **(Figure 1)**. More than half of the drug-resistant tuberculosis cases got the benefit of 107(51%) Ni-Kshay Poshan Yojana **(Figure 2)**. In the study, more than half of drug resistance cases utilized NPY for family related things (grocery, fees, fruits and veg tables) 116(55%), and transport 42(20%) whereas only 21(10%), and 31(15%) participants used for treatment, others (alcohol, tobacco chewing, smoking) respectively Out of 210 study participants, 128(61%) were presented with the presence of pallor. **(Tables 5 & 6).** The majority of participants showed adverse drug reactions monitored by doctors 84(40%), pharmacists 59(28%), nurses 42 (33.8%), and other community health workers 26(12%), respectively **(Table 7)**.

In the study, more than half of the drug resistance cases presented with underweight 116, 55%), and normal weight 77, 36.7%), whereas only 16(7.6%) and 1(0.5%) participants had overweight and obese, respectively. The mean (SD) body mass index of drug-resistant tuberculosis was 18.84 ± 3.64 Kg/m$^{2.}$ Out of 210 cases, the first most common drug pattern was 132(62.9%) MDR TB, the second most common was 65 (31%) RR-TB, whereas minor drug resistance was 8(3.8%) XDR-TB and 5(2.2%) HR-TB, respectively **(Figures 3 and 4)**. The drug resistance to tuberculosis was associated with various adverse drug reactions due to long-term treatment. The majority participants showed adverse drug reactions of GIT symptoms (nausea, vomiting) 71(33.8%), headache 55(26.2%), arthralgia-joints pain 53(25.2%), loss of appetite 44(21%) whereas minor drug reactions were fatigue 27(12.9%), drowsiness 27(12.9%), vision problem 18(8.6%), oral ulcer 13(6.2%), ringing of ear 11(5.2%), skin lesions11(5.2%) and 9(4.3%) participants showed other drug reactions like hair loss, body pain, pedal oedema, loss of taste, decrease in sleep, throat pain respectively**(Figure:5)**.

DISCUSSION

The present study was done to find the clinical profile, symptoms, drug resistance patterns, and adverse drug reactions associated with 210 drug-resistant tuberculosis cases registered in rural and urban areas of Kalaburagi district, Kalyan, Karnataka region. Drug-resistant tuberculosis was a major public health problem.

DEMOGRAPHIC CHARACTERISTICS

More than half of the subjects belonged to the 111 (52.9%) 31-60 years age group. Manila Sharma et al. did a similar study (2019) in South Delhi, and the majority were in the 21-60 years of age group. Gaurav Derashri et al did a similar study (2022) in Madhya Pradesh. It showed more prevalence among the economically productive age group. It may be due to the high exposure rate of various risk conditions. [10,11] The majority were male gender 113(63.3%), as compared to females, 48(36.7%). Venkatesh U et al. did a similar study (2015) in Uttar Pradesh. They also found that the majority were males as compared to females. Gaurav Derashri et al did a similar study (2022) in Madhya Pradesh. It may be due to high exposure to various outside risk conditions. [11, 12] Most of the cases were studied up to the middle class, as compared to the illiterate. A similar study was done by Manila Sharma et al. (2019) in South Delhi. They also found similar findings, like the majority of cases were studied up to the middle class. Nalini Parva et al. did a similar study (2022) in Orissa. They also found that more than 2/3 of subjects were literate.

A higher level of education helps in more healthcare-seeking behaviour, is easier to educate, and results in less development of infectious diseases. [10,13] The majority of the cases worked in different labour industries than the other. Nalini Parva et al. did a similar study (2022) in Orissa. They also found that a high proportion of

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participants were labourers. Gaurav Derashri et al did a similar study (2022) in Madhya Pradesh. They found that more than half of the patients were labourers. It may be due to high exposure to risk conditions, lack of periodic screening and health care services, and less use of personal protective and occupational safety measures (masks and hand gloves). [11,13]

A higher proportion of DR-TB were low socio-economic class (36.2%), followed by lower middle socio-economic class (24.3%), as compared to other socio-economic classes. Venkatesh et al. did a similar study (2015-2016) in Uttar Pradesh. Their study also had similar findings that more than half of the study participants were from the lower class. Amit M Shah et al. did the same study (2018) in Gujarat. Their study also showed that the majority were from a lower socio-economic class, followed by a lower middle socio-economic class. Drug-resistant tuberculosis infectious disease, was more common in low-income countries. It is due to living in unhygienic conditions, less availability of high-quality health care services, and an increase in economic burden. [12,14]

COMORBIDITIES

The second highest proportion of comorbidity was 8.1%, Hypertension. Nalini Parva et al did the same study (2022). They found similar findings. The second highest proportion of comorbidity was Hypertension (24%). The Majority of drug-resistant tuberculosis cases presented with comorbidities (12.9%), including diabetic mellitus. Ladha N et al. did a similar study (2022) in Rajasthan. Their study also had a similar finding that (3.3%) of participants had a presence of diabetic mellitus. Atre et al. did a similar study (2011) in Maharashtra. Their study also found that a smaller proportion of study participants had Diabetes Mellitus. Venkatesh et al. did a similar study (2015-2016) in Uttar Pradesh. Their study found that 7% of study participants had Diabetes Mellitus. [12,13,15,16] SS Shivekar et al did the same study (2013-2018) in Tamil Nadu and Pondicherry. Atre et al. did a similar study (2011) in Maharashtra. Their study also found that a smaller proportion of study participants had smoking as a substance abuse. Venkatesh et al. did a similar study (2015-2016) in Uttar Pradesh. Their study found that (3.8%) of study participants were HIV positive. [12,16,17]

CATEGORIES OF DR-TB

The majority had new cases (72.8%) and old cases (27.1%), whereas old cases of drug-resistant tuberculosis were defaulters (15.2%) to antituberculosis treatment, and others were relapse (10.5%), failure of antituberculosis treatment 3(1.5%), respectively. Nalini Parva Das et al. did the same study (2022) in Odisha. They also found the same results. The majority had new cases (64%), followed by old cases (36%), respectively. Out of previous cases, high proportions were defaulters. Pandhi N et al. (2018) in Panjab, Manila Sharma et al. (2019) in South Delhi, and Bhatt G et al. did the same study (2013) in Gujarat. They also found that the majority were defaulters in old cases. It may occur in new cases due to a lack of health services, low economic status, poor adherence to drugs, late detection of cases, and multiple uses of higher antimicrobial drugs. [10,13,18,19]

CATEGORIES BODY MASS INDEX

More than half of the drug resistance cases presented with underweight (52.2%), followed by normal weight (36.7%), whereas 7.6% and 0.5% participants had overweight and obese, respectively. Santosh Kumar et al. did the same study (2016-2017) in Uttar Pradesh. Most of them had (61.9%) Low BMI. Basu et al did the same study (2016-2017) in West Bengal. Most of the cases had (56.6%) Low BMI. Atre et al. did a similar study (2011) in Maharashtra. Their study also found that a higher proportion of study participants had low BMI (70.7%), followed by (29.3%) Normal weight. BMI was influenced by multiple factors like lifestyle, socioeconomic conditions, and physical activities. It varies with geographic areas. [16,20,21]

PALLOR

Most (61%) of the cases were pallor. Basu et al. did a similar study (2016-2017) in West Bengal. Their study also found a higher proportion (94.3%) of pallor. A similar study was done by Amit M Shah et al. (2018) in Gujarat. Their study also found that the majority of them had pallor (59.6%). It may be that drug-resistant tuberculosis is a chronic infectious disease that leads to loss of appetite, low BMI, malabsorption, and malnutrition. [14, 21]

NI-KSHAY POSHAN YOJANA

2/3rd of drug-resistant tuberculosis cases knew the (88.6%) Nikshay Poshan Yojana program. There was a monthly direct transfer of ₹ 500 for nutrition and transport support. More than half of drug-resistant tuberculosis cases benefited from the benefit of (51%) Nikshay Poshan Yojana. Jayashree K et al did a nationwide survey (2018-2022) in India. More than 2/3rd of cases were known and successfully treated (76.1%). Half of the people have had one instalment in the past. Begum J et al did the same study (2019) in Andhra Pradesh. They found that less than half of the people were aware of the (NPY) Nikshay Poshan Yojana, and 1/3rd of cases received one instalment in one month. [22,23] In the study, more than half of drug resistance cases utilized NPY for family related things (grocery, fees, fruits and veg tables) 116(55%), and transport 42(20%) whereas only 21(10%), and 31(15%) participants used for treatment, others (alcohol, tobacco chewing, smoking) respectively. The common reasons for less awareness and lack of getting NPY benefits were lack of communication, stigma, unawareness, ignorance, illiteracy, a multistep approval process, and technical issues were a few themes that emerged as difficulties encountered while utilisation. [22,23]

SYMPTOMS OF DRUG-RESISTANT TUBERCULOSIS

The majority of study participants presented with cough followed by breathlessness, fever, and generalised weakness, whereas minor symptoms were chest pain and other symptoms like weight loss, body pain, haemoptysis, giddiness, vomiting, joint pain, epilepsy, headache, and gastric pain, respectively. A similar study was conducted

by Rai D K et al. (2016-2017), Bihar. Their study also found that the majority presented with cough, breathlessness, fever, anorexia, and minor haemoptysis. The same study was conducted by Nalini Prava et al. (2022) in Orissa. They found that most of the cases had symptoms like coughs and generalised weakness. A similar study was done by Nagendra Singh Chauhan et al. (2015) in Uttar Pradesh. Their study also showed major symptoms of DR-TB were cough, breathlessness, fever, and chest pain. [13, 24,25]

DRUG-RESISTANT PATTERN

Half of the cases showed multi-drug resistance (isoniazid and rifampicin), followed by rifampicin, whereas a minority was extensively drug-resistant and isoniazid-resistant. A similar study was conducted by SS Shivekar et al. (2013-2018) in Tamil Nadu. More than half of the cases had multidrug resistance, followed by rifampicin and isoniazid drug resistance, respectively. More et al did a similar study (2017) in Maharashtra. They found that more than 2/3rd of them had MDR-TB. The same study was done by Bhatt G. et al. (2103), Gujarat. They found that more than 2/3rd of them were MDR-TB. A similar study was conducted by Venkatesh et al. (2015-2016) in Uttar Pradesh. Their study also showed that a majority of more than half of the cases had MDR-TB, followed by RR-TB, HR-TB, XDR-TB, etc. The same study was done by Dholankia N Y et al. (2010), Maharashtra. They also found that the majority were multi-drug resistant, followed by mono-resistant to first-line drugs, whereas minor extensive drug-resistant. The drug resistance may be developed due to environmental factors influenced by changes in the genes of microorganisms, poor treatment adherence, and previous history of use of multiple times of higher doses of antibiotics. [12,17,19,26,27]

ADVERSE DRUG REACTIONS AND MONITORING

Drug-resistant tuberculosis required long-term treatment, and most of the cases underwent mild to severe types of drug side effects. The study participants had most common side effects were GIT symptoms (nausea, upset, gastritis, vomiting), headache, arthralgia (joint pain, loss of appetite, whereas minor drug reactions were fatigue, drowsiness, vision problems, oral ulcer, ringing of the ear, and skin lesions. The same study was conducted by Nalini Prava Das et al (2022) in Orissa. They also found that the same findings, such as gastrointestinal upset, fatigue, headache, and vertigo, were observed, whereas minor problems like psychiatry, vision problems, oral ulcers, skin lesions, convulsions, etc. A similar study was conducted by Gupta et al. (2108), Rajasthan. They also found the same findings, like the majority had gastrointestinal symptoms of nausea, vomiting, joint pain, and headache. Latha S. et al. also did the same study (2021) in North Karnataka. They also found that the majority showed GIT symptoms like nausea, vomiting, joint pain, arthralgia, headache, etc. The drug-resistant treatment was of long duration, and more drugs were added in fixed-dose combinations; hence, drug reactions or side effects were induced during antitubercular therapy. To modify the regimen, symptomatic treatment was needed. [13,28,29] The majority of participants showed adverse drug reactions monitored by doctors (40%), pharmacists (28%), nurses (33.8%), and other community health workers 26(12%). The majority of mild to moderate DR-TB cases were monitored at the community level and PHC level, whereas more emphasis of monitoring severe ADR at the tertiary care level, and strengthening of training, emergency services, referral, and follow-up systems. [13,28,29]

LIMITATIONS

There may possibility of recall bias, which cannot be excluded because of the subjective nature of the participant's responses. The data were collected in a cross-sectional survey. Hence, we cannot describe causality to any of the factors.

CONCLUSION

Drug-resistant tuberculosis was more prevalent in males of the economically productive age group, with a mean age of 37.87 years. More than half of the patients had an education up to middle school, worked in various labour industries and belonged to a low socio-economic class according to the modified B.G. Prasad classification in January 2024. More common symptoms were cough, breathlessness, fever, and generalised weakness, whereas minor symptoms were anorexia and chest pain, weight loss, haemoptysis, giddiness, vomiting, epilepsy, joint pain, body pain, headache, and gastric pain, respectively. Diabetic mellitus and hypertension were major comorbidities, whereas HIV and hypothyroidism were minor comorbidities.

More than half of the patients were new, few among them were relapse cases of tuberculosis treatment. More than 2/3 of patients knew about the Nikshay Poshan Yojana, whereas only half of the patients got regular benefits. The higher proportion had malnutrition with pallor. The majority of patients had a multi-drug-resistant pattern, followed by rifampicin-resistant, extensively drug-resistant, and isoniazid-resistant. A higher proportion of patients had drug side effects like gastric symptoms, headache, arthralgia, loss of appetite, fatigue, and drowsiness; a few had oral ulcers, vision problems, skin lesions, etc.

RECOMMENDATIONS

The periodic implementation of information, education, and communication activities to TB, DR-TB patients, and the general population about disease, prevention, and control measures. For low BMI patients, early periodic examination, counselling, and follow-up supervision, supplementation of nutritional kit, and advice on locally available food rich in protein, micro, and macronutrients to DR-TB patients by health workers. Also, ensure that all DR-TB patients get a direct transfer of five hundred rupees monthly under the Ni-kshay Poshan yojana.

For drug reactions, comorbidities, and admission to the hospital, the relevant investigation, referring to specific specialists, and administering a modified regimen, in case of drug reactions, regular counselling, and follow-up,

which determines increases in the drug adherence and cure rate. The provision of specific preventive measures, like morning temperature, daily 20-30 minutes of physical exercise, yoga, meditation, and support from the community and family members.

The importance of the nutritional status of drug-resistant tuberculosis patients. Emphasis should be laid on the need to mainstream nutrition awareness in public health programs, and regular follow-up is needed for the Ni-Kshay Poshan Yojana program. The periodic training, supervision, monitoring, and strengthening of the pharmacovigilance centre at the tertiary care to primary care. A strong collaboration between the DR-TB centre and the pharmacology department for close monitoring of drug reaction, regular monitoring, and clinical posting of MD-Pharmacology residents, pharma-D residents, medical interns, and pharmacy interns.

Early initiation of treatment regimens, community participation, voluntary organisation, public and private coordination, use of advanced digital health technologies, improvement of the research field, and publishing the updated program guidelines for all health workers. Drug resistance is a public health problem and is increasing in the Kalyan Karnataka region; hence, special focus is needed. More research, evidence synthesis, and training are needed for regional research and training centres in the Kalyan Karnataka region.

CLINICAL SIGNIFICANCE

The present study was more focused on individual clinical and drug-resistant patterns, side effects, and the utility of the Ni-Kshay Poshan Yojana program (NPY).

ETHICALAPPROVAL

The study was approved by the institutional ethical committee, IEC, GIMS -Kalaburagi, GIMS/KLB/PH/IEC/111/2022-23

LIST OF ABBREVIATIONS

ADR: Adverse Drug Reactions

ATT: Antitubercular Treatment

BMI: Body Mass Index

DBT: Direct Benefit Transfer

DOTS: Directly Observed Treatment, Short Course

DR-TB: Drug-Resistant Tuberculosis

DTO: District Tuberculosis Officer

GI: Gastrointestinal

HIV: Human Immunodeficiency Virus

HR-TB: Isoniazid-Resistant Tuberculosis

IEC: Information, Education and Communication

MDR-TB: Multi-Drug-Resistant Tuberculosis

NPY: Ni-Kshay Poshan Yojana

NTEP: National Tuberculosis Elimination Program

PHC: Primary Health Centre

RR-TB: Rifampicin-Resistant Tuberculosis

TB: Tuberculosis

XDR-TB: Extensively Drug-Resistant Tuberculosis

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