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Rifampicin-resistant Tuberculosis and Associated Factors Among Pulmonary Tuberculosis Patients in Mahakali Provincial Hospital, Nepal

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Abstract

The study aims at assessing the prevalence of RR-TB and identify associated factors among pulmonary TB patients using GeneXpert MTB/RIF assay data from January to December 2023. Tuberculosis (TB) continues to pose a significant global health threat, with rifampicin-resistant (RR) strains presenting a formidable challenge to disease control efforts. This study based the retrospective cross-sectional study conducted at Mahakali Provincial Hospital in Nepal. Out of 2587 presumptive TB cases, 11.8% were confirmed positive for TB, with males constituting a significantly higher proportion (66.1%) than females (33.9%). Among TB-positive cases, 3% showed resistance to rifampicin, predominantly affecting males (77.8%). Age group analysis revealed higher TB detection rates in the 46-60 years group, while rifampin -resistance tuberculosis (RR-TB) cases were more evenly distributed across age groups without statistical significance. Ethnicity and residential locality did not show significant associations with RR-TB. Multivariate logistic regression highlighted gender as RR-TB and associated factors among pulmonary tuberculosis patients in a Mahakali Provincial Hospital, Nepal. Rifampicin-resistant TB (RR-TB) remains a significant challenge at Mahakali Provincial Hospital, with a 3% prevalence, predominantly affecting males. Gender is a key factor in RR-TB prevalence. To manage and reduce RR-TB effectively, it is necessary to implement targeted interventions for high-risk groups, particularly males, and to enhance diagnostic capabilities.

Keywords: Rifampicin resistance, mycobacterium tuberculosis, GeneXpert MTB/RIF assay, pulmonary tuberculosis, drug-resistant tuberculosis

Introduction

Tuberculosis (TB) is a highly contagious bacterial (Mycobacterium tuberculosis Complex) infection that usually attacks the lungs, causing cough, fever, respiratory difficulties and weight loss. TB can also affect other parts of the body, such as the brain, the kidneys, the bones, the skin, the spine, lymph nodes, and multiple parts of the body at the same time. TB is preventable and treatable, yet it remains one of the deadliest infectious diseases in the world. Getting tested and treated for TB can protect yourself, family and friends, and community (CDC, 2023).

Tuberculosis (TB) remains a significant global burden, impacting millions of lives annually. Despite advances in healthcare, TB persists as a major public health challenge, particularly in low and middle-income countries where access to healthcare services and resources is limited. About a quarter of the global population is estimated to have been infected with M. tuberculosis. In 2022, an estimated 10.6 million people fell ill with tuberculosis (TB) worldwide. A total of 1.3 million people died from TB in 2022 (including 167,000 people with HIV). Worldwide, TB is the second leading infectious killer after COVID-19 (above HIV and AIDS) (WHO, 2023 a). SAARC region with 24 % of the Global population accounts for 40% of the Global mortality due to TB. India, Pakistan and Bangladesh feature among the thirty TB burden countries and account for an estimated 3.97 million people who fell ill with TB which is about 35.7% of the Global TB Burden (WHO, 2023 b). Tuberculosis is a major public health problem in Nepal. As per the global TB report 2023, Nepal accounts for an estimated 70000 people with TB and 18000 deaths in 2022 (NTCC, 2023).

In the ensuing years, however, certain strains of Mycobacterium have emerged that have evolved resistance to common treatments through genetic alterations. The emergence of rifampicin-resistant (RR) and Multi-Drug-resistant (MDR) strains of Mycobacterium tuberculosis is a critical challenge to global tuberculosis control (Pinto & Menzies, 2011, Malenfant & Brewer, 2021). Globally, there were an estimated 450,000 cases of MDR/RR-TB in 2021, up 3.1% from 437000 in 2020. The main explanation for this increase is an overall increase in TB incidence between 2020 and 2021, which is estimated to have occurred as a result of the impact of the COVID-19 pandemic on TB detection. An estimated 191000 deaths occurred due to MDR/RR-TB in 2021 (WHO, 2022 c).

Early case detection of Mycobacterium tuberculosis (MTB) and appropriate case management are key steps to minimize the high risk of human-to-human transmission of the disease and to the success of TB treatment (Sah et al., 2020). Since 2010, the World

Health Organization began to recommend the utilization of GeneXpert MTB/RIF assay that simultaneously detects TB and rifampicin resistance rapidly in people with signs and symptoms of TB (Ou et al., 2017) Which is an automated molecular test with real-time polymerase chain reaction (PCR) technology (Mulu et al., 2017).

Moreover, the prevalence of MTB and RR/MTB and its contributing factors described in the literature vary largely across countries, which may also differ from Nepal. However, till to date, the prevalence of MTB and RR-TB has not been addressed extensively in the Sudurpaschim Province. Therefore, the present study was aimed at assessing the rate of RR-MTB using the GeneXpertMTB/RIF assay and further to identify the influencing factors associated with it.

Research Methodology

This was a retrospective cross-sectional study where data were evaluated retrospectively from the patients over one year from January 2023 to December 2023. Study was conducted at Mahakali Provincial Hospital located in Bhimdatt Municipality of Kanchanpur district. It is the provincial-level hospital where the patients were referred from the primary health Centre within and outside of the Kanchanpur district for diagnosis and treatment of TB. The Government of Nepal approved to make it 150 bedded hospitals in 2020. The core variables used for the study were MTB and RR-MTB. The covariates included in this study were: age, gender, ethnic group, and geographic location.

Presumptive pulmonary tuberculosis patients who visited Mahakali Provincial Hospital in the year 2023 for the diagnosis and treatment of the disease, who met the inclusion criteria were enrolled in the study. To be eligible, all age groups with signs and symptoms suggestive of TB underwent the GeneXpert/RIF assay test. Patients with insufficient demographic and clinical information were excluded from the study. A total of 2587 records of study participants met the included criteria.

A structured questionnaire and checklist were used for the data collection. Patient's demographic including age, sex, ethnicity, geographic diversity and results of rifampicin resistance using the GeneXpert/RIF assay was assessed retrospectively from laboratory records.

A single sputum sample per patient was used for the diagnosis of TB using the GeneXpert MTB/RIF assay. Samples were collected and processed by the GeneXpert MTB/RIF assay using the standard protocol. Briefly, after the sputum was collected, it was mixed in the supplied cartridge with sample reagent buffer in a 1:2 (sample: sample reagent buffer) volume ratio. Then, the cartridge was tightly closed, vortexed for 15 seconds and allowed to stand at room temperature for 10 minutes. It was vortexed again after 10 minutes and allowed to stand for 5 min. Using the Pasteur pipette provided with

the kit, [2 ml (just above the 2 ml mark on the pipette) of the processed sample was put into the cartridge. Finally, the cartridge with the specimen was loaded into the Xpert machine and the results were collected from the Xpert computer after 2 hours (Cepheid, 2012).

After data completeness was checked, the data were entered into Microsoft Excel sheet 2021 and analyzed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp. Armonk, NY, USA). Frequency, mean, range, and standard deviation were computed. Using an Enter modelling method, potential candidates associated with the outcome variables (MTB and RR-MTB) in bivariate analysis at a significance level of 0.05 were identified and exported to multi-variable logistic regression analysis. Confidence intervals (CI) of 95% were reported for each odds ratio (OR). All reported p-values were two-tailed, and the statistical association was set as significant at a p-value of 0.05.

A letter of cooperation was written to study hospital authority and permission to collect the data was obtained. To ensure the confidentiality of the participants' information, data were anonymously used, and any other confidential information was highly secured. Since we used secondary data, informed consent was not sought from the study participants.

Results and Discussion

Results

Out of 2587 presumptive TB cases, 1575 (60.9%) were male while 1012 (39.1%) were female. The overall prevalence of MTB detected using GeneXpert MTB/RIF assay was 11.8 % (304/2587). TB detection rates were higher in males (66.1%) compared to females (33.9%). The RR-TB prevalence was 9 (3%) in all TB-diagnosed patients. Of 9 RR-TB patients, male 7 (77.8%) was higher than female 2(22.2%). The positivity rate for RR-TB was also higher in males (2.3%) than in females (0.7%). Despite these differences, the gender of the patients is significant (p=0.046) in MTB and insignificant with RR-TB (p =0.457).

In this study, the mean ages of the patients were 46.1 ± 19.49, 95% CI (45.36, 46-86) years. The highest number of presumptive TB patients was found in 554 (24.3%) belonged the age group 46-60 years age group followed by 533 (23.3%) in the age group 31-45 years, 496 (21.7%) in 16-30 years, 435(19.1%), 145 (6.4%) in >76 years, and lowest in 120 (5.3%) in 0-15 years age group. The MTB, 100 (32.8%) was detected highest in the 46-60 years age group followed by 70 (23%) in the age group16-30 years. The lowest 3 (1%) in the age group <15 years. The age group analysis showed significant variations of MTB cases (p =0.002) RR-TB positivity was highest at 3(33.3%) in the 16-30 years age group followed by 2(22.2%) in both 56- 60 years and 61- 75 years age

groups. The lowest RR-TB in 1(11.1%) was detected in each age group 31-45 years and > 76 years. However, no significant association was found between age group and RR-TB positive cases (p= 0.089).

The distribution of presumptive TB cases varied across ethnic groups, though the variation was not statistically significant (p-value = 0.30). The Kshetri ethnic group had the highest proportion of 1226 (47%) presumptive TB cases followed by Dalit 590 (22.8%), Bhrahmin 426(16.5%), Janajati 342 (13.2%), Madheshi 12 (0.49%) and lowest case 1 belonged to Muslim. The MTB, 146 (48.2%) was highest detected in Kshetri followed by 75 (24.6%) in Dalit, 46 (15.1%) in Bhrahmin, and 37 (12.1%) in Janajati. Similarly, the RR-TB was found highest at 7 (77.8%) in Kshetri and 1 (11.1%) in both ethnic groups of Dalit and Brahmin whereas no RR-TB was found among Janajati, Madheshi and Muslim communities in this study. These findings indicated no significant association between ethnicity and both types of TB (P=>0.05).

Kanchanpur district is divided into 7 municipalities and 2 rural municipalities. Out of these municipalities, the presumptive cases were predominantly from Bhimdatta Municipality 1316 (50.9%) followed by Bedkot Municipality (11.2%) and Mahakali Municipality (11.0%). The lowest cases 46 (1.8%) were from Punarwas Municipality. Patients from out of Kanchanpur district were categorized in others which were 224 (8.7%) study population of the present study. The detailed findings are given in Table 1. The TB detection rate was highest in Bhimdatta Municipality (53.1%), and RR-TB positivity was also highest in Bhimdatta (1.3%). Other municipalities showed lower rates of TB detection and RR-TB positivity, with no significant association found between residential locality and both MTB and RR-TB positivity (p-value = >0.05).

Table 1

Frequency of RR-TB among Pulmonary TB patients in Mahakali Provincial hospital Kanchanpur district Nepal in 2023

Characteristics	**Presumptive TB**		**TB detected**			**RR-TB positive**		
	Number	%	Number	%	Positivity %	Number	%	Positivity %
Gender			P value = 0.046			P value = 0.457		
Female	1012	39.1	103	33.9	3.9	2	22.2	0.7
Male	1575	60.9	201	66.1	7.9	7	77.8	2.3
Total	2587	100	304	100	11.8	9	100	3
Age group(-years)			P value = 0.002			P value = 089		
0-15	120	5.3	3	1.0	0.1	0	0.0	0.00
16-30	496	21.7	70	23.0	2.7	3	33.3	0.90
31-45	533	23.3	59	19.3	2.3	1	11.1	0.35

46-60	554	24.3	100	32.8	3.9	2	22.2	0.70
61-75	435	19.1	55	18.0	2.1	2	22.2	0.70
>76	145	6.4	18	5.9	0.7	1	11.1	0.35
Ethnic group				P value= 0.305			P value=0.309	
Dalit	590	22.8	75	24.6	2.9	1	11.1	0.35
Janajati	342	13.2	37	12.1	1.4	0	0.0	0.0
Madheshi	12	0.49	0	0.0	0.0	0	0.0	0.0
Muslim	1	0.01	0	0.0	0.0	0	0.0	0.0
Kshetri	1216	47.0	146	48.2	5.6	7	77.8	2.30
Bhrahmin	426	16.5	46	15.1	1.8	1	11.1	0.35
Residential locality				P value= 0.305			P value=0. 152	
Bhimdatta M	1316	50.9	162	53.1	6.3	4	44.4	1.3
Bedkot Municipality	291	11.2	40	13.1	1.5	2	22.2	0.65
Belauri Municipality	76	2.9	2	0.7	0.1	0	0.0	0.0
Dodharachadani M	284	11.0	61	20.0	2.4	0	0.0	0.0
Suklaphanat M	141	5.4	13	4.3	0.5	1	11.1	0.32
KrishnpurMunicipality	160	6.2	12	3.9	0.5	1	11.1	0.32
Punrwas Municipality	46	1.8	0	0.0	0.0	0	0.0	0.0
Beldandi RM	49	1.9	4	1.3	0.2	1	11.1	0.32
Others	224	8.7	10	3.3	0.4	0	0.0	0.0

In this study, the female crude odds ratio (COR) for females was 0.775, meaning that females have 22.5% lower odds of having drug-susceptible tuberculosis (DSTB) compared to males, after adjusting for other factors, the adjusted odds ratio (AOR) is 0.729, indicating that females still had lower odds (27.1%) of having DS-TB compared to males, and these both effects were statistically significant (p = <0.05). Similarly, the crude odds ratio (COR) for males was 1.291, meaning that males had 29.1% higher odds of having DS-TB compared to females, the adjusted odds ratio (AOR) was 1.353, indicating that males still had higher odds (35.3%) of having DS-TB compared to females, and these effects were it is statically significant (p = <0.05).

Among the all-age group, the age group 0-15 years had significantly lower odds of having DS-TB compared to the reference age group (31-45). Specifically, they are approximately 80.9% less likely to have DS-TB (adjusted for other factors), and this finding is statistically significant.

Over 9 municipalities of Kanchanpur district, the Bedkot Municipality residential location had a COR of 2.119, suggesting 111.9% higher odds of DS-TB compared to the reference group. The AOR increased to 2.447, indicating a 144.7% higher odds of DS-TB for Bedkot Municipality residents. Both effects remain statistically significant with a 95% CI that does not include 1 and p-values less than 0.05. The Belauri Municipality residential location had a COR of 2.242, which suggested 124.2% higher odds of DS-TB compared to the reference group. The AOR increased to 2.748, indicating 174.8% higher odds of DS-TB for Belauri Municipality residents. Both effects remain statistically significant with a 95% CI that does not include 1 and a p-value less than 0.05. The Suklapahanta Municipality residential location had a COR of 4.158, suggesting 315.8% higher odds of DS-TB compared to the reference group. The AOR increases to 4.673, indicating 367.3% higher odds of DS-TB for Suklapahanta Municipality residents. This effect remains highly statistically significant with a 95% CI that does not include 1 and a p-value (0.000) very much less than 0.05.

Table 2

Multivariate logistic regression analysis for the sociodemographic factors associated with DS-TB in Mahakali Provincial Hospital, Kanchanpur District Nepal (N=2587)

Variables	COR	95% CI (LL, UL)	P value	AOR	95% CI (LL, UL)	P value
			Gender			
Female	0.775	0.602, 0.996	0.047	0.729	0.570, 0.958	0.023
Male	1.291	1.004, 1.661	0.047	1.353	1.043, 1.754	0.023
			Age group (years)			
0-15	0.201	0.058, 0.700.	0.012	0.191	0.55, 0.670	0.010
16-30	1.004	0.585, 1.722	0.989	1.029	0.594, 1.1781	0.919
31- 45	1	0.558, 1.786	0.996	1.025	0.567.1.853	0.936
46- 60	1.454	0.852, 2.481	0.169	1.657	0.960, 2.861	0.070
61- 75	1.019	0.579, 1.791	0.949	1.051	0.592, 1.864	0.866
			Ethnic group			
Dalit	1.233	0.833, 1.826	0.296	1.176	0.782, 1.767	0.436
Janajati	1.027	0.648, 1.027	0.909	1.215	0.749, 1.970	0.430
Kshetri/ Bhrahmin	1.164	0.817, 1.658	0.399	1.122	0.782, 1.610	0.531
			Residential location			
Bhimdatta M.	0.249	0.031, 1.989	0.190	0.252	0.032, 2.014	0.194
Bedkot M.	2.119	1.094, 4.103	0.026	2.447	1.256, 4.766	0.009

Belauri M.	2.242	1.177, 4.985	0.016	2.748	1.329, 5.683	0.006
Dohara-chadani M.	0.411	0.088, 1.923	0.259	0.462	0.098, 2.170	0.328
Suklapah-anta M.	4.158	2.065, 8.371	0.000	4.673	2.309, 9.458	0.000
Krishnapur M.	1.544	0.655, 3.668	0.321	1.722	0.728, 4.072	0.216
Punarwas M	1.232	0.517, 2.930	0.637	1.506	0.626, 3.624	0.361
Beldanadi RM	1.351	0.404, 4.514	0.625	1.598	0.475, 5.370	0.449

The gender (male, female), age groups, ethnic groups (Dalit, Brahmin/Kshetri), and residence (urban, rural) do not show statistically significant associations with rifampicin-resistant tuberculosis (RR-TB) in this study. These findings suggest that none of these sociodemographic factors have a significant impact on the odds of RR-TB in the population studied at Mahakali Provincial Hospital, Kanchanpur district, Nepal (table 3).

Table 3

Multivariate logistic regression analysis for the sociodemographic factors associated with RR-TB in Mahakali Provincial hospital, Kanchanpur district Nepal (N=2587)

Variables	COR	95% CI (LL, UL)	P value	AOR	95% CI (LL, UL)	P value
			Gender			
Female	0.552	0.113, 2.704	0.463	0.515	0.094, 2.836	0.446
Male/	1.813	0.370, 8.887	0.463	1.940	0.353, 10.676	0.446
			Age group (years)			
≤ 35	1.225	0.328, 4.572	0.763	1.243	0.318, 4.856	0.754
≥ 36	0.816	0.219, 3.047	0.763	0.804	0.206, 3.143	0.754
			Ethnic group			
Dalit	0.722	0.045,11.568	0.722	1.083	0.066, 17.897	0.925
Brahmin/ Kshetri	2.461	0.302,20.509	0.400	2.707	0.326, 22.462	0.271
			Residence			
Urban	0.509	0.105, 2.454	0.400	0.520	0.107, 2.533	0.418
Rural	1.966	0.408, 9.483	0.400	1.924	0.395, 9.374	

Discussion

This study determined the frequency of TBRR-TB and their associated factors in Mahakali Provincial Hospital using GeneXpertMTB/RIF assay data collected from

January 2023 to December 2023. Of the participants 2587, 60.9% were male while 39.1% were female. This was agreed with the findings of Fadeyi et al. (2017) 60.8% were males and 39.2% were females, Diriba et al. (2022) and Abay et al. (2020) 59.7 % were males, 40.3 % were female and 58.1% were male and 41.9% female respectively. The positivity of TB among presumptive TB patients in this study was 11.8%. MTB was found more in males 66.1% and in females 33.9%. The positivity of the MTB rate among the males and females was 7.9% and 3.9%. This finding is statistically significant (p= 0.046) indicating that males have more risk of TB infection than females. Our result was compared with previous similar studies conducted by Diriba et al (2021), the overall prevalence of Mycobacterium tuberculosis (MTB) in Ethiopia was 11.8%, in Amhara 11% by Wasihun et al., 2021, in Addis Ababa 10% by Nugussie et al., 2016, Nigeria 10.3% (Azuonwu et al., 2017). This finding was comparable with studies done in Debre Berhan, Ethiopia 13% (Asfaw et al., 2018), Felege Hiwot and Debre Tabor Hospitals 14.6% (Derbis et al.,2016), Addis Ababa 15.11% [Arega et., 2019], in Northwest, Ethiopia 5.73% (Liyew et al., 2020). This difference might be due to differences in the method of diagnosis, duration of study periodic community characteristics and geographical location, skill of the laboratory personnel to detect TB, study design and other factors that may affect case occurrences in different study areas.

The rate of rifampicin resistance was 3 % in this study among confirmed TB cases. The prevalence of RIF resistance was higher in males than females although the difference was not statistically significant. This finding is consistent with the studies done in Nigeria 2.9% (Azuonwu et al., 2017), and in Ethiopia 3.4% (Hordofa et al., 2015). RR-TB in this study is lower than the studies conducted in Eastern Ethiopia 4.1% (Wasihun et al., 2021), in Nigeria Fadeyi et al. 2017 found 4.2%, in Ethiopia 5.2% (Asfaw et al., 2018), Nepal 10.2% (Sah et al., 2020) but the finding was higher in studies by Liyew et al., 2020 was 0.2%, in India 0.66% by Hesseling et al., 2012, in Cameroon 1.3% by (Noeske et al., 2018). The discrepancy might be due to variations like study populations, study setting, study design, socio-cultural, TB control and prevention practices.

In the current study, age was significantly associated with MTB (p= 0,002). The age of our study participants was 0–100 years with a mean age of 46.1 ± 19.49, 95% CI (45.36, 46-86). Of these, participants whose age was <15 years or >76 years were less infected by MTB while it was high in adults aged 46-60, 31-45 years. The MTB prevalence was also high observed in the young age group 16-30 and old age 61-75 years. The Rifampicin resistance cases were high in young patients age group 16-30 years and consistent to above this age but it was not found in children below 15 years. This study was supported by findings of other studies that reported higher prevalence in age groups: 16–30 years (Hordofa et al. 2015), 25–34 years (Adane et al. 2015), 16 to 34 years (Abayneh et al. 2022). Although, rifampicin resistance TB was not significant in

this study tuberculosis is in the young age group indicating a recent transmission of the disease in the community.

The data indicates that the Kshetri ethnic group has the highest number of presumptive TB cases with a TB positivity rate of 5.6%. This group also exhibited the highest RR-TB positivity rate at 2.30%, accounting for 77.8% of the RR-TB positive cases. However, the high positivity rates in the Kshetri group are noteworthy and require further investigation. The Dalit ethnic group also shows a considerable number of presumptive TB cases (590) and TB detections (75), with a positivity rate of 2.9%. Other ethnic groups, such as the Brahmin, Janajati, Madheshi, and Muslim communities, exhibited lower TB and RR-TB rates. These groups reported negligible TB cases, with no detected TB or RR-TB cases. These findings may reflect either lower TB prevalence or possible underreporting and limited access to diagnostic services within these communities. Further research is needed to ascertain the reasons behind these low figures and to ensure equitable TB care and screening across all ethnic groups. The disparity in TB and RR-TB rates between the ethnic groups suggests potential socio-economic and healthcare access factors influencing these outcomes.

The current study reveals notable differences in TB detection and rifampicin-resistant TB (RR-TB) positivity across various residential localities. Bhimdatta Municipality has the highest number of presumptive TB cases (50.9%), TB-detected cases (53.1%), and RR-TB positive cases (44.4%), indicating a significant burden of TB and drug-resistant TB in this area. Bedkot and Dodharachadani municipalities also exhibit considerable TB detection rates, with 13.1% and 20.0%, respectively. However, Dodharachadani has no RR-TB cases detected. In contrast, Belauri, Punarwas, and other localities report very low TB detection and no RR-TB cases. The p-value for TB detection (0.305) suggests no significant difference among localities, while the p-value for RR-TB positivity (0.152) indicates a trend towards significance, hinting at potential differences in RR-TB rates. This suggests that targeted interventions are particularly needed in high-burden areas like Bhimdatta to effectively address TB and its drug-resistant forms.

The multivariate logistic regression analysis identifies gender as a significant sociodemographic factor associated with drug-susceptible tuberculosis (DS-TB) at Mahakali Provincial Hospital in Kanchanpur District, Nepal. The analysis, based on 2587 cases, reveals that females have a lower likelihood of DS-TB compared to males. The crude odds ratio (COR) for females is 0.775 (95% CI: 0.602, 0.996; p=0.047), and the adjusted odds ratio (AOR) is 0.729 (95% CI: 0.570, 0.958; p=0.023), indicating a statistically significant protective effect. Conversely, males have a higher likelihood of DS-TB with a COR of 1.291 (95% CI: 1.004, 1.661; p=0.047) and an AOR of 1.353 (95% CI: 1.043, 1.754; p=0.023). These findings underscore the importance of gender-specific interventions in TB control programs. The gender disparity in DS-TB prevalence may be

influenced by various biological, social, and healthcare access factors.

The findings of the present study reveal notable variations in DS-TB prevalence across different age groups. Specifically, individuals aged 0-15 years exhibited significantly lower odds of DS-TB, with both crude (COR: 0.201, 95% CI: 0.058-0.700, P = 0.012) and adjusted odds ratios (AOR: 0.191, 95% CI: 0.550-0.670, P = 0.010), compared to other age groups. Conversely, no statistically significant associations were found for the older age groups (16-30 years, 31-45 years, 46-60 years, and 61-75 years), as indicated by their COR and AOR values alongside their respective confidence intervals and P-values. These findings suggest that younger age may be a protective factor against DS-TB within the study population, underscoring the importance of age-specific considerations in tuberculosis prevention and management strategies.

Investigated the association between ethnic groups and drug-sensitive tuberculosis (DS-TB) among 2587 patients. The results indicate that ethnicity, represented by Dalit, Janajati , and Kshetri/Brahmin groups, showed no significant association with DS-TB. The odds ratios of all ethnic groups were close to 1 and not statistically significant, indicating that ethnicity alone may not be a significant predictor of DS-TB in this population. These findings suggest that other factors, such as age or socioeconomic status, may play a more influential role in the prevalence of DS-TB within the study context.

Among 2587 patients. Significant associations were observed in certain municipalities: Bedkot Municipality, Belauri Municipality and Suklapahanta Municipality ($P < 0.001$) showed significantly higher odds of DS-TB compared to Bhimdatta Municipality. However, other residential areas did not exhibit statistically significant associations with DS-TB. These findings underscore the localized nature of tuberculosis risk within the district, suggesting the need for targeted public health interventions in identified high-risk areas to mitigate the prevalence of DS-TB.

Table 3 presents the results of a multivariate logistic regression analysis examining sociodemographic factors associated with rifampicin-resistant tuberculosis (RR-TB) at Mahakali Provincial Hospital in Kanchanpur district, Nepal, involving 2587 patients. The analysis focused on gender, age group, ethnic group, and residence type. The findings indicate no statistically significant associations between these factors and RR-TB. Both crude and adjusted odds ratios (OR) for gender, age group, ethnic group, and residence type show wide confidence intervals crossing 1, suggesting a lack of conclusive evidence for these factors influencing the risk of RR-TB in this population. These results imply that other unmeasured variables or larger sample sizes might be necessary further to elucidate the determinants of RR-TB in this region.

Conclusion

In this study at Mahakali Provincial Hospital, Kanchanpur district, Nepal,

the frequency and associated factors of tuberculosis (TB) and rifampicin-resistant tuberculosis (RR-TB) were investigated using GeneXpert data from January to December 2023. The study revealed an overall TB positivity rate of 11.8%, with a higher prevalence among males (66.1%) than females (33.9%). The prevalence of RR-TB was 3%, with slightly higher rates observed among males, although not statistically significant. Age was found to significantly correlate with MTB infection, with higher prevalence seen in adult age groups. Ethnicity did not significantly correlate with TB or RR-TB, indicating other factors may be more influential. Variations in TB and RR-TB rates across different residential areas highlight localized risk factors, necessitating targeted interventions. Overall, these findings underscore the complex interplay of demographic factors in TB epidemiology and the need for tailored public health strategies to combat the disease effectively.

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Nil.

Conflicts of Interest

There are no conflicts of interest.

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