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## Knowledge, attitude and practices (KAP) about bovine tuberculosis (bTB) among various occupational groups in Chhattisgarh, India

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### Abstract

Tuberculosis (TB) remains the leading cause of death worldwide and affecting more than 9 million people every year. Although *Mycobacterium tuberculosis* is the most common cause of human TB, unknown proportions of TB cases are considered to be attributable to *Mycobacterium bovis* infection, which is also termed Bovine tuberculosis (bTB). In the present study, knowledge, attitude and practices (KAP) based study regarding bTB was conducted from ten districts of Chhattisgarh involving 124 respondents. In rural settings, 100% farmers, 42.9% animal handlers and 100% para-veterinarians among male respondents were aware with the fact that TB of cattle is communicable to man, while 100% farmers and 20% animal handlers among female respondents were aware. In urban settings 91.5% farmers, 41.7% animal handlers, 90.9% para-veterinarians and 100% veterinarians among male respondents were acquainted that TB of cattle is communicable to man while 28.6% farmers and 100% para-veterinarians among female respondents were aware. Also it was found that respondents of Raipur, Bilaspur, Kanker, Bastar, Ambikapur, Balrampur and Surajpur were more aware with bTB and its transmission. The Bivariate  $\chi^2$  analyses of the responses of people recorded during the study showed that there was significant difference between urban and rural people with respect to knowledge of source of information of bTB (p-value= 0.003), knowledge of bTB communicable to man (p-value= 0.008), and attitude of regular screening of dairy animals for bTB by dairy farmers (p-value =0.041). Socio-demographic parameters were analyzed by multivariate analysis of variance (MANOVA). The findings of the study suggest that there is variable response to bTB among respondents of various occupational groups. Urban people are more aware as compared to rural people; para-veterinarians and veterinarians are more aware as compared to other groups related to knowledge, attitude and practices of bTB. Hence, community awareness program about bTB transmission through different communication media and health education program integrated with the animal health care system is necessary to raise community awareness in the area.

**Keywords:** bovine tuberculosis, knowledge, attitude, practices, Chhattisgarh

### Introduction

Tuberculosis (TB) is consistently the most impactful bacterial disease to affect humanity, and is responsible for the greatest number of infection related deaths, as well as long term disability (WHO, 2020a) [9]. The World Health Organization (WHO) Global Tuberculosis Report estimates that in 2019, 10 million people developed TB disease of which approximately 1.2 million people died. Nearly 90% of all human TB cases are found in South Asia, East Asia (China), South East Asia (Philippines, Indonesia) and the most populous countries in Africa (South Africa and Nigeria, where the addition of HIV-derived immunosuppression facilitates the progression of *M. tuberculosis* infection to active TB disease (WHO, 2020b)) [10]. Although *Mycobacterium tuberculosis* is the most common cause of human TB, unknown proportions of TB cases are considered to be attributable to *Mycobacterium bovis* infection (Torres *et al.*, 2013) [8]. The infection currently poses a major concern in human populations in developing countries, as humans and animals share the same microenvironment. It has been estimated that zoonotic transmission of *M. bovis* is responsible for 10–15% of new human TB cases in developing countries (Bapat *et al.*, 2017) [3]. As with other zoonotic diseases, zoonotic TB cannot be controlled by the human health sector alone. Animal health and food safety sectors must be engaged to address the role of animals in maintaining and transmitting *M. bovis*. Preventing disease in people requires reducing the risk of exposure and transmission at the human-animal interface.

Although the principal routes of transmission are known, more information is needed about the underlying sociocultural and economic reasons for practices that facilitate transmission to people, and how to promote safer alternatives. Groups at risk of disease need to be better defined which include rural communities living in close contact with livestock and where access to safe food, healthcare, veterinary services may be poor.

In Indian settings various occupational groups like dairy farmers, livestock workers, para-veterinarians and veterinarians are involved in risk practices that facilitate zoonotic TB transmission, including consumption of unpasteurized milk, cohabitation or close contact with animals, treatment of animals coupled with increasing incidence of immunosuppressive diseases (Cadmus *et al.*, 2006) [5]. These groups of occupationally exposed individuals have been grossly neglected and their knowledge as well as preventive practices against zoonotic TB remains poorly investigated. Information on knowledge, attitude and practices of zoonotic TB prevention and influencing factors amongst occupationally exposed individuals remains a significant requirement to design all-inclusive, informed grassroots control programmes targeted towards limiting the disease and ultimately achieving the goal of 2030 End-TB strategy (Adesokan *et al.*, 2018) [1]. The present study investigated existing levels of knowledge, attitude and practice (KAP) of zoonotic TB prevention and associated determinants amongst persons who are in contact with animals.

## Materials and Methods

### Study area and sample size

This study was carried out in Chhattisgarh, a state geographically situated in central India between 17°46' N to 24°5' North Latitude and 80°15' E to 84°20' East Longitude and subdivided into 27 revenue districts with 146 blocks and 19720 villages. The respondents in the study were divided into various categories viz. gender (male and female), age (18-44yrs, 45-64 yrs and >65 yrs), residential status (urban and rural), education level, occupation (Farmer, Animal handler, Para-veterinarian, Veterinarian) and district wise. A total of 124 respondents from ten districts of Chhattisgarh were interviewed. The participation was voluntary and data collection was kept confidential to meet the ethical considerations. The questionnaire based interview was conducted in order to assess the knowledge, attitude and practice of bTB.

### Questionnaire design

A questionnaire designed for this study was partly adapted from similar such studies conducted elsewhere (Asebe *et al.*, 2018 and Chauhan *et al.*, 2019) [2, 6] and consisted of close-ended questions prepared in English and Hindi languages. The designed questionnaire to obtain information comprised of questions pertaining to the respondent's socio-demographic information (age, sex, education level, occupation, residential status, location etc.); questions related to the knowledge and perception of bTB; questions on attitude regarding bTB and practices based questions related to bTB.

### Sampling procedure

The sampling includes persons in contact with cattle viz. farmers, animal handlers, para-veterinarians and veterinarians. Face to face interview was conducted on the selected persons who were pre-informed about the purpose of the study and

written consent was taken from all respondents before filling the KAP proforma. The interview was carried out between September, 2020 to January, 2021.

### Data management and statistical analysis

Data were entered, managed and analyzed using SPSS software v.20 and Microsoft Excel 2007. Descriptive statistics were calculated for each variable of interest. General Linear Model (MANOVA) and Bivariate  $\chi^2$  test analysis were applied to compare the responses of the questions related to socio-demographic characters of respondents with respects to the respondent's knowledge, attitude and practice about bTB. A p-value <0.05 was considered statistically significant (Snedecor and Cochran, 1994) [7].

## Results and Discussion

### KAP of different occupational groups about bTB in rural areas of Chhattisgarh

The present KAP study had involved 124 respondents from ten districts of Chhattisgarh. Respondents were divided into various categories viz. gender (male and female), age (18-44yrs, 45-64 yrs and > 65 yrs), residential status (urban and rural), education level, occupation and district wise. In rural areas, male and female respondents of all occupational groups' viz. farmers, animal handlers, para-veterinarians were aware about TB. When asked if TB of cattle is communicable to man, 100% farmers, 42.9% animal handlers and 100% para-veterinarians among male respondents said yes, while 100% farmers and 20% animal handlers among female respondents said yes. When the respondents were asked about their reaction if found they had TB, 100% farmers, 50% animal handlers and 50% para-veterinarians among male respondents said they will be feared; 100% farmers and 40% animal handlers among female respondents said they will be feared. Respondents were asked about habit of drinking raw milk and all of them said they do not drink raw milk. When they were asked whether they share same house with their animals, 100% farmers, animal handlers and para-veterinarians among male respondents replied no while 20% animal handlers among female respondents said yes.

The findings of present study are in accordance with the findings of Asebe *et al.*, (2018) [2] who conducted a cross-sectional study between November, 2014 and June, 2015 at selected kebeles' of Lare Woreda, South West Ethiopia. The study indicated that the majority of the rural community members in the study area had no basic awareness of bTB. There is also a gap of knowledge about the etiology and transmission modes from animals to humans.

The health system and farm-level factors that influenced the risk of transmission of bTB in animals and zoonotic TB in humans in peri-urban smallholder dairy farms of India was also reported by Chauhan *et al.*, (2019) [6]. In this study occupational groups viz. dairy farmers, veterinarians and para-veterinarians were chosen and, knowledge and practices based questions related to bTB were asked. The findings of study revealed similar pattern as recorded during the present study.

### KAP of different occupational groups about bTB in urban areas of Chhattisgarh

The study revealed that among urban areas in male respondents, 93.2% farmers, 75% animal handler, 90.9% para-veterinarian and 100% veterinarians had heard about TB and among female respondents, 100% farmers, 100% animal

handlers and 66.4% para-veterinarian were aware. 91.5% farmers, 41.7% animal handlers, 90.9% para-veterinarians and 100% veterinarians among male respondents knew that TB of cattle is communicable to man, while 28.6% farmers and 100% para-veterinarians among female respondents were aware. When asked about transmission route of bTB from animals to human, it was found that 94.9% farmers, 66.7% animal handlers and all para-veterinarians as well as veterinarians among male respondents were aware with route of transmission while 42.9% farmers, 100% animal handlers and 100% para-veterinarians among female respondents were acquainted with this. When the respondents were asked about their reaction if found they had TB, 3.4% farmers, 41.7% animal handlers, 18.2% para-veterinarians and 25% veterinarians among male respondents said they will be feared; 42.8% farmers, 100% animal handlers and 33.3% para-veterinarians among female respondents said they will be feared. Some practices related questions were asked like habit of drinking raw milk to which most of the respondents replied no with exception of 14.3 % female farmers and 16.7% male animal handlers, who replied yes. When they were asked whether they share same house with their animals only 16.7 % male animal handlers said yes while rest of the respondents said no. The higher knowledge of urban people about TB compared to rural people may be due to higher education and general awareness regarding various diseases of cattle including bTB from various sources viz. Radio, TV, TB patient, Health institutions etc.

The present study revealed that urban people are more aware with zoonotic TB and bTB as compared to rural people. The findings are in accordance with findings of Asebe *et al.*, (2018) <sup>[2]</sup> who reported that the majority of the rural community members in the study area had no basic awareness of bTB. In this regard, the implementation of proper community-based health education is essential to raise community knowledge about TB in rural people.

The present study about awareness to zoonotic TB and bTB revealed somewhat similar pattern as reported by Bihon *et al.*, (2021) <sup>[4]</sup>. They conducted a questionnaire-based cross-sectional study to assess livestock owners KAP level towards human and bTB in Gondar, Ethiopia. The KAP measuring interview indicated that 97.4% of the participants were aware of human TB while only 24.1% know about bTB cause and its mode of transmission. Among those who have heard of bTB, only 66.7% of respondents consider bTB as a significant threat to public health. Their study showed there is a lower KAP on bTB among cattle owners in the study area.

#### **KAP of respondents about bTB from various districts of Chhattisgarh**

District wise responses of respondents revealed that seven out of ten districts are more aware with TB. Raipur, Bilaspur, Kanker, Bastar, Ambikapur, Balrampur and Surajpur districts showed higher awareness about TB. All respondents of these districts had heard about TB. When asked if TB of cattle is communicable to man, 100% respondents of these seven districts replied yes whereas only 6.7%, 86.7%, and 35% respondents of Durg, Rajnandgaon and Raigarh, districts respectively were aware as compared to rest of seven districts. The 93.3%, 66.7% and 45% respondents of Rajnandgaon, Raipur and Raigarh were found aware about transmission

route of bTB from animals to humans. On contrary, 100% respondents of rest of seven districts were well aware about it. When asked whether there should be well separated area for housing of animals, it was found that majority of the respondents of all the districts replied yes with exception of few from Durg (6.7%), Raigarh (5%) and Ambikapur (20%). The present study concluded that respondents of Raipur, Bilaspur, Kanker, Bastar, Ambikapur, Balrampur and Surajpur were more aware with questions related to bTB and its transmission.

#### **Statistical analysis of the KAP based questions regarding bTB among respondents of various districts of Chhattisgarh.**

The Bivariate  $\chi^2$  analyses of the responses of people recorded during the study showed that there was significant difference between urban and rural people with respect to knowledge of causative agent of TB (p-value = 0.001). Similarly, there was significant difference between urban and rural people with respect to knowledge of source of information of bTB (p-value= 0.003), knowledge of TB of cattle communicable to man (p-value= 0.008), and attitude of regular screening of dairy animals for TB by dairy farmers (p-value =0.041) (Table 1). Also there was significant difference (p-value= 0.018) between urban and rural people with respect to practice of bringing animals to veterinary clinic or using traditional medicines when animals were found sick.

#### **Statistical analysis of respondent's demographic and socio-demographic characteristic's with respect to KAP about bTB**

Socio-demographic parameters viz. gender, age, residential status, educational level and occupation related questions and responses were analyzed by MANOVA. There was significant difference in knowledge about bTB in between gender groups (p-value= 0.000), residential status (p-value= 0.002), educational level (p-value= 0.000), occupational groups (p-value= 0.000) and district wise groups (p-value= 0.000). Also there was significant difference in attitude among gender groups (p-value 0.000), educational level (p-value=0.009), occupational groups (p-value=0.000), and district groups (p-value=0.000) for bTB. Similarly, significant difference in practices among residential status (p-value= 0.031), educational level (p-value= 0.033), occupational groups (p-value= 0.000) and district wise groups (p-value= 0.000) was also observed (Table 2).

The findings of the study suggest that there is variable response to bTB among respondents of various occupational groups. Urban people are more aware as compared to rural people; para-veterinarians and veterinarians are more aware as compared to other groups for KAP about bTB. Hence, community awareness program about bTB and its transmission through different communication media and health education program integrated with the animal health care system is necessary to raise community awareness about bTB in the study area. Veterinarians and human health care service organizations should focus more on community workers, paying more attention to awareness creation programs through various activities aimed at addressing the knowledge about bTB.

**Table 1:** Descriptive and Bivariate  $\chi^2$  analyses of responses to questions related to the Knowledge, Attitude and Practice of Zoonotic Tuberculosis from rural and urban people of various districts of Chhattisgarh.

Variable	Rural people (%)	Urban people (%)	$\chi^2$	p-value
Have you ever heard about TB?				
Yes	27(100)	88(90.7)	2.701	0.100
No	0(0)	9(9.3)		
Causative agent of Tuberculosis?				
Yes	3(11.1)	45(46.4)	11.081	0.001
No	24(88.9)	52(53.6)		
If yes, do you know how it spreads?				
Yes	4(14.8)	24(24.7)	1.191	0.275
No	23(85.2)	73(75.3)		
Causative agent of Bovine Tuberculosis: Bacteria?				
Yes	2(7.4)	18(18.6)	1.941	0.164
No	25(92.6)	79(81.4)		
Do you know the source of information of Bovine Tuberculosis?				
Yes	9(33.3)	63(64.9)	8.670	0.003
No	18(66.7)	34(35.1)		
Is Tuberculosis of cattle communicable to man?				
Yes	15(55.5)	78(80.4)	6.960	0.008
No	12(44.5)	19(19.6)		
Do you know transmission route of Bovine Tuberculosis from animal to human?				
Yes	24(88.9)	86(88.6)	0.001	0.973
No	3(11.1)	11(11.4)		
Do you know about signs and symptoms of Tuberculosis?				
Yes	14(51.9)	60(61.9)	0.878	0.349
No	13(48.1)	37(38.1)		
Is of Bovine Tuberculosis preventable in humans?				
Yes	24(88.9)	85(87.6)	0.032	0.859
No	3(11.1)	12(12.4)		
Can bovine Tuberculosis is curable in humans?				
Yes	14(51.9)	65(67)	2.286	0.319
No	13(48.1)	32(33)		
In your opinion, how serious a disease is Tuberculosis?				
Very serious	2(7.4)	14(14.4)	0.928	0.335
Not serious	25(92.6)	83(85.6)		
How serious a problem do you think Tuberculosis is in your area?				
Very serious	5(18.5)	21(21.6)	0.125	0.724
Not serious	22(81.5)	76(78.4)		
What would be your reaction if you find out you have had Tuberculosis?				
Fear	16(59.3)	42(43.3)	2.161	0.142
Sadness	11(40.7)	55(56.7)		
In your community, how is a person with Tuberculosis usually regarded/treated?				
Rejected	27(100)	96(99)	0.281	0.596
Supported	0(0)	1(1)		
Do you think that dairy farmers should regularly screen their animals for Tuberculosis?				
Yes	25(92.6)	72(74.2)	4.183	0.041
No	2(7.4)	25(25.8)		
Do you think milk should be properly boiled before consumption?				
Yes	26(96.3)	97(100)	3.622	0.057
No	1(3.7)	0(0)		
Do you think there should be well separated area for housing of animals?				
Yes	26(96.3)	95(97.9)	0.241	0.623
No	1(3.7)	2(2.1)		
What do you do when your animals are sick?				
Bring to veterinary clinic	16(59.3)	33(34)	5.629	0.018
Use traditional medicines	11(40.7)	64(66)		
Do you wash your hands after touching animals and/or animal products?				
Yes	26(96.3)	90(92.8)	0.432	0.511
No	1(3.7)	7(7.2)		
Do you regularly clean the animal houses?				
Yes	16(59.3)	69(71.1)	1.381	0.240
No	11(40.7)	28(28.9)		
Do you consult veterinarians/ public health professionals about zoonoses?				
Yes	22(81.5)	93(95.9)	6.502	0.011
No	5(18.5)	4(4.1)		
Do you have a habit of drinking of raw milk?				

Yes	0(0)	3(3.1)	0.856	0.355
No	27(100)	94(96.9)		
Do you have a habit of raw meat consumption?				
Yes	0(0)	0(0)		
No	27(100)	97(100)		
Do you share the same house with your animals?				
Yes	1(3.7)	2(2.1)	0.241	0.623
No	26(96.3)	95(97.9)		
Do you attend any training for management of dairy animals?				
Yes	2(7.4)	16(16.5)	1.406	0.236
No	25(92.6)	81(83.5)		

**Chi-square interpretation:** p-value below 0.05 was considered to be statistically significant  
Values in parenthesis indicate percentage reflecting corresponding variables

**Table 2:** Multivariate General Linear Model results of the demographic characters of respondents with respect to Knowledge, Attitude and Practice of Zoonotic Tuberculosis

Variable	n (%)	Knowledge (p-value)	Attitude (p-value)	Practice (p-value)
<b>Gender</b>				
Male	107(86.3)	0.000	0.000	0.080
Female	17(13.7)			
<b>Age</b>				
18-44	80(64.5)	0.162	0.785	0.410
45-64	40(32.3)			
>65	4(3.2)			
<b>Residential Status</b>				
Rural	27(21.7)	0.002	0.082	0.031
Urban	97(78.3)			
<b>Educational level</b>				
Primary	40(32.3)	0.000	0.009	0.033
Higher secondary	47(37.9)			
Graduated	25(20.2)			
Post graduated	3(2.4)			
Uneducated	8(6.4)			
Uneducated with reading and writing skill	1(0.8)			
<b>Occupation</b>				
Farmer	72(58.1)	0.000	0.000	0.000
Animal handler	32(25.8)			
Para-veterinarian	16(12.9)			
Veterinarian	4(3.2)			
<b>District</b>				
Durg	15(12.1)	0.000	0.000	0.000
Rajnandgaon	30(24.2)			
Raipur	3(2.4)			
Bilaspur	11(8.9)			
Raigarh	20(16.1)			
Bastar	10(8.1)			
Kanker	9(7.2)			
Ambikapur	5(4.1)			
Balrampur	9(7.2)			
Surajpur	12(9.7)			

p-value below 0.05 was considered to be statistically significant

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### References

- Adesokan HK, Akinseye VO, Sulaimon MA. Knowledge and practices about zoonotic tuberculosis prevention and associated determinants amongst livestock workers in Nigeria; 2015. PloS one, 2018, 13(6).
- Asebe G, Gudina E. Community knowledge, attitudes and practices on bovine tuberculosis and associated risk factors in Gambella Regional State Lare Woreda, South West Ethiopia. Veterinaria, 2018, 67(1).
- Bapat PR, Dodkey RS, Shekhawat SD, Husain AA, Nayak AR, Kawle AP *et al.* Prevalence of zoonotic tuberculosis and associated risk factors in Central Indian populations. Journal of epidemiology and global health 2017;7(4):277-283.
- Bihon A, Zinabu S, Muktar Y, Assefa A. Human and bovine tuberculosis knowledge, attitude and practice (KAP) among cattle owners in Ethiopia. Heliyon 2021;7(3):e06325.
- Cadmus S, Palmer S, Okker M, Dale J, Gover K, Smith N, Gordon SV. Molecular analysis of human and bovine tubercle bacilli from a local setting in Nigeria. Journal of

- clinical microbiology 2006;44(1):29-34.
6. Chauhan AS, George MS, Lindahl J, Grace D, Kakkar M. Community, system and policy level drivers of bovine tuberculosis in smallholder periurban dairy farms in India: a qualitative enquiry. BMC public health 2019;19(1):301.
  7. Snedecor GW, Cochran WG. Statistical Methods. 6th Edn, Oxford and IBH Publishing Co. Calcutta, India, 1994.
  8. Torres-Gonzalez P, Soberanis-Ramos O, Martinez-Gamboa A, Chavez-Mazari B, Barrios-Herrera MT, Torres-Rojas M *et al.* Prevalence of latent and active tuberculosis among dairy farm workers exposed to cattle infected by *Mycobacterium bovis*. PLoS neglected tropical diseases 2013;7(4):e2177.
  9. World Health Organization. Global Tuberculosis Report 2020; WHO: Geneva, Switzerland, 2020, 2020a.
  10. World Health Organization. Tuberculosis: Key facts 2020; WHO: Geneva, Switzerland, 2020, 2020b.