Knowledge and Perceptions about Tuberculosis in Agropastoral Communities in Northern Tanzania: A Cross-Sectional Study

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Authors' contributions

This work was carried out in collaboration between all authors. Authors AMK, SGM, JM, EN and BJN designed the study and wrote the protocol. Authors AMK, BJN and YLL wrote the first draft of the manuscript and managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aim: To determine knowledge and perceptions about tuberculosis in agropastoral communities in Northern Tanzania.
Study Design: This was a cross sectional study on habits and attitudes to tuberculosis.
Methods: The study was conducted between June 2011 and May 2012.We enrolled tuberculosis patients registered at Mount Meru Hospital in Arusha municipal, Enduleni Hospital in Ngorongoro district, and Haydom Lutheran Hospital in Mbulu district. In addition we selected for comparison some of their household relatives and individuals from the neighborhood. Data was collected using a structured questionnaire. Knowledge about tuberculosis was assessed by questions concerning causes, symptoms, modes of transmission and prevention and treatment. Key variables for

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assessment of perception on tuberculosis included: individuals considered most at risk, and misconceptions.

Results: We recruited 164 respondents of whom 25% were confirmed tuberculosis patients, 41.5% relatives of the patients and 33.5% neighbors. Females constituted 48.8% of all respondents. Of all the participants, only two of the neighbors had never heard about tuberculosis in their life time. Even though 99% had heard about tuberculosis, specific knowledge on causes, prevention and treatment was poor. A total of 67.7% thought that transmission of tuberculosis occurs during sexual intercourse. Respondents thought that risk from tuberculosis was higher among adults (68.9%), alcohol users (39.6%), smoking (26.8%), consumption of raw animal products (6.1%) and childhood (23.2%).

Conclusion: Our study shows that study participants had heard about tuberculosis but specific knowledge was low. Misconceptions surrounding causes, transmission, prevention and treatment of the disease were common. Selection of appropriate channels for public health education and awareness programmes targeting knowledge about prevention and control of tuberculosis in agropastoral communities may improve this situation.

1. INTRODUCTION

Tuberculosis constitutes a significant global public health concern, especially in developing countries [1,2]. A third of the world's population is infected with *Mycobacterium tuberculosis* [3]. In addition to the public health impact, the economic effects of tuberculosis are severe [3,5].

Lack of knowledge about tuberculosis may play an important role in delayed diagnosis and treatment [6]. Many patients only seek healthcare after a long duration of disease and transmission, perhaps a consequence of lack of knowledge [7]. Further evidence from a large survey shows that a person's response to tuberculosis disease is associated with his prior knowledge of it [8], and better knowledge of tuberculosis is shown to be associated with better health-seeking behavior [9]. Delayed diagnosis and treatment leads to increased risk of transmission. The impact of treatment of tuberculosis is partly determined by the patient's health-seeking behavior, which may in turn be influenced by the patients' demographic characteristics, knowledge and socio-cultural factors [10]. Cattle can also transmit mycobacteria to man which may cause disease, like adenitis [11,12].

Agropastoral communities in Tanzania live a nomadic life with cattle being their main source of livelihood and peasants in these areas equally keep livestock alongside farming. Studies document various limiting factors to access education and health services [13,14,15]. The socio-behavior and indigenous knowledge associated with tuberculosis in most African countries have been documented previously [16,1]. Effective community-based prevention and control measures of tuberculosis in agropastoral communities require comprehensive initiatives that address the primary barriers. However, their knowledge, awareness, perceptions, attitude and practices towards prevention and control of tuberculosis among agropastoral communities in Tanzania is largely unknown. The objectives of this study were to determine the knowledge and perceptions of agropastoral communities' on tuberculosis in the Northern part of Tanzania.

2. METHODS

2.1 Study Design and Population

We conducted a cross-sectional study in Northern part of Tanzania. The study population included tuberculosis patients at Mount Meru Hospital in Arusha urban, Enduleni Hospital in Ngorongoro district and Haydom Lutheran Hospital in Mbulu district. For each patient we also enrolled at least one relative and one neighbor to allow comparison between them.

2.2 Sampling of the Study Subjects

This study was part of a larger study which enrolled 1,711 tuberculosis suspects for the purpose of improving the diagnosis of mycobacterial infections. A tuberculosis suspect was defined as an individual presenting to the health facility with any of the following symptoms or signs of tuberculosis: a productive cough for more than two weeks, shortness of breath, chest pain, blood-stained cough, weight loss, fever,

night sweats, and fatigue. Sputum samples were collected, processed and examined for smear microscopy at the local health facility to allow diagnosis of tuberculosis and treatment initiation; this information was not used in this study. The suspects were asked to collect another sample which was sent to the Central Reference Laboratory (CTRL) in Dar es Salaam for further analysis. At the CTRL, the samples were processed and examined for smear microscopy and culture. Drug susceptibility testing was also done for all positive isolates. Out of the 1,711 sputum samples from the tuberculosis suspects, 277 (16.2%) were proven to have tuberculosis either by being smear positive and or culture positive and from them we selected patients for follow up and interviews. The inclusion criteria in the current study were: 1) proven tuberculosis patients reporting to the outpatient departments of the selected health facilities for the first time; 2) residents of the districts served by the selected health facilities; 3) consenting to participate; 4) participants reachable by mobile phone and address. Only tuberculosis patients whose sputum samples were found to have smear positive and/or culture positive at the CTRL were eligible. Prior to visits, patients were reached by phone to confirm their availability and readiness to be visited and interviewed in their homes.

2.3 Data Collection

Data collection was done between June 2011 and May 2012. Following enrolment of participants, data was collected using a structured questionnaire to assess participants' knowledge about tuberculosis concerning the following aspects: 1) causes; 2) symptoms; 3) modes of transmission; and 4) prevention and treatment. Aspects of perception of tuberculosis were also included those considered most at risk and misconceptions concerning TB. Sociodemographic characteristics were collected: age, sex, marital status, rural or urban residence, occupation and level of education.

2.4 Ethical Consideration

Ethics approval was granted by the National Health Research Ethics Review Committee in Tanzania. Both regional and district adminis-trative officials gave permits to conduct the study in their areas. The study respondents consented by signing a consent form prior to participation into the study.

2.5 Data Management and Analysis

Data was double entered using Epi-data version 3.1 and transferred to Statistical Package for Social Sciences version 18 for windows (SPSS Inc, Chicago, USA) and Stata version 11 (STATA Corp Inc., TX, USA) for cross-checking, data cleaning and analysis. To assess knowledge about tuberculosis and other mycobacteria among the participants, we calculated the percentage of people who provided correct response to questions concerning the six symptoms related to tuberculosis, three ways on transmission, five items related to treatment and five core knowledge of tuberculosis. We used Pearson Chi square (χ^2) statistics to compare participants' responses by demographic characteristics and factors associated with core knowledge on tuberculosis among the respondents. We used a two-tailed probability level of $p<0.05$ as the level of statistical significance.

3. RESULTS

3.1 Demographic Characteristics of Participants

We recruited 164 respondents of whom 41 (25%) were confirmed tuberculosis patients, 68 (41.5%) relatives of the patients and 55 (33.5%) neighbors. The distribution of the socio-demographic characteristics of the study respondents is shown in Table 1.

3.2 Awareness and Knowledge about Tuberculosis

Of all the 164 study participants, only 2 (1%) neighbors had never heard about tuberculosis. Overall, health workers were a common source of information on tuberculosis (99; 60.4%) and family/friends or neighbors (27; 16.2%). Teachers (1: 0.6%) and newspapers (2: 1.2%) were not common sources of information on tuberculosis.

In Table 2 we show participants' knowledge about causes, modes of transmission, symptoms, prevention and treatment, and at risk groups from tuberculosis. There were 123 (75.0%) respondents who thought that tuberculosis was caused by microbes, 50 (30.5%) thought animals were responsible, and 111 (67.7%) suggested that transmission occurs during sexual intercourse.

Overall, 65 (39.6%) of the respondents thought that tuberculosis can be prevented and 107 (65.2%) considered it to be treatable. Of the 164 respondents, 9 (5.5%) reported to be aware of traditional medicines or procedures in their community that a person with symptoms of tuberculosis may use and get relief.

3.3 Perceptions on Selected Determinants of Tuberculosis

In Table 3 we present a list of selected perceptions on tuberculosis. Respondents considered that high risk from tuberculosis was associated with adulthood (68.9%), alcoholism (39.6%), smoking (26.8%), consumption of raw animal products such as meat, blood and milk (6.1%) and childhood (23.2%). Some misconceptions existed on mode of transmission and symptoms of tuberculosis.

4. DISCUSSION

This study shows that almost all participants had heard about tuberculosis, but specific knowledge on causes, prevention and treatment of the disease was poor, and some misconceptions existed on modes of transmission and symptoms. Adults, alcoholics, smokers and young children were thought to be at higher risk of tuberculosis.

Table 1. Socio-demographic characteristics of the study participants

Characteristics	All respondents	Patients	Relatives	Neighbors	P-value
	n (%)	n (%)	n (%)	n (%)	
Total	164 (100)	41 (100)	68 (100)	55 (100)	
Sex					
Males	84 (51.2)	24 (58.5)	28 (41.2)	32 (58.2)	0.01
Females	80 (48.8)	17 (41.5)	40 (58.8)	23 (41.8)	
Age group					
<20	12 (7.3)	4 (9.8)	5 (7.4)	3 (5.5)	0.41
20-29	35 (21.3)	6 (14.6	17 (25.0)	12 (21.8)	
30-39	44 (26.8)	10 (24.4)	19 (27.9)	15 (27.3)	
40-49	29 (17.7)	4 (9.8)	13 (19.1)	12 (21.8)	
50+	44 (26.8)	17 (41.5)	14 (20.6)	13 (23.6)	
District					
Mbulu	106 (64.6)	22 (53.7)	43 (63.2)	41 (74.5)	0.03
Ngorongoro	18 (11.0)	2 (4.9)	10 (14.7)	6 (10.9)	
Arusha	40 (24.4)	17 (41.5)	15 (22.1)	8 (14.5)	
Residence					
Urban	47 (28.7)	20 (48.8)	17 (25.0)	10 (18.2)	*P* < 0.001
Rural	117 (71.3)	21 (51.2)	51 (75.0)	45 (81.8)	
Marital status					
Married	119 (72.6)	26 (63.4)	52 (76.5)	41 (74.5)	0.31
Other[ǂ]	45 (27.4)	15 (36.6)	16 (23.5)	14 (25.5)	
Occupation					
Peasants	117 (71.3)	23 (56.1)	53 (77.9)	41 (74.5)	0.03
Employed	13 (7.0)	2 (4.9)	4 (5.9)	7 (12.7)	
Business	23 (14.0)	10 (24.4)	8 (11.8)	5 (9.1)	
None	11 (6.7)	6 (14.6)	3 (4.4)	2 (3.6)	
Level of education					
No formal education	38 (23.2)	13 (31.7)	19 (27.9)	6 (10.9)	0.02
Started primary school	99 (60.4)	19 (46.3)	44 (64.7)	36 (65.5)	
Secondary and above	27 (16.5)	9 (22.0)	5 (7.4)	13 (23.6)	

Table 2. Knowledge about tuberculosis among tuberculosis patients and their relatives and neighbors in northern Tanzania, 2012

Variable	Respondents n (%)	Patients n (%)	Relatives n (%)	Neighbors n (%)	*P*-value
Total	164 (100)	41 (100)	68 (100)	55 (100)	
Suggested causes of tuberculosis					
Microbes	123 (75.0)	37 (90.2)	46 (67.7)	40 (72.7)	0.17
Animals	50 (30.5)	21 (51.2)	22 (32.4)	7 (12.7)	*P* < 0.001
Alcohol	24 (14.6)	5 (12.2)	8 (11.8)	10 (18.2)	0.55
Smoking	15 (9.1)	6 (14.6)	5 (7.4)	4 (7.3)	0.02
Dirty air	10 (6.1)	3 (7.3)	1 (1.5)	6 (10.9)	0.09
Others	7 (4.3)	3 (7.3)	2 (2.9)	2 (3.6)	0.24
Suggested modes of transmission of tuberculosis					
During sexual intercourse	111 (67.7)	32 (78.1)	46 (67.7)	33 (60.0)	0.17
Air e.g. when a person with tuberculosis coughs/sneezes	70 (42.7)	25 (61.0)	30 (44.1)	15 (27.3)	*P* < 0.001
Sharing eating/drinking utensils	48 (29.3)	10 (24.4)	24 (35.3)	14 (25.5)	0.36
Smoking	30 (18.3)	8 (19.5)	15 (22.1)	7 (12.7)	0.40
Consumption of raw animal products (e.g. milk, meat)	11 (6.7)	5 (12.2)	3 (4.4)	3 (5.6)	0.26
Others	20 (12.2)	7 (17.1)	9 (13.2)	4 (7.3)	
Suggested symptoms of tuberculosis					
Coughing/coughing up blood	111 (67.7)	32 (78.1)	46 (67.7)	33 (60.0)	0.17
Cough lasting for 2 weeks or more	99 (60.4)	25 (61.0)	29 (42.7)	20 (36.4)	0.05
Severe headache	74 (45.1)	24 (58.5)	20 (29.4)	30 (54.6)	*P* < 0.001
Ongoing fatigue	59 (36.0)	21 (51.2)	27 (39.7)	11 (20.0)	*P* < 0.001
Fever/fever without clear cause for 7 or more days	40 (24.0)	11 (26.8)	16 (23.5)	13 (23.6)	0.92
Chest pain	25 (15.2)	9 (22.0)	12 (17.7)	4 (7.3)	0.11
Shortness of breath	25 (15.2)	9 (22.0)	12 (17.7)	4 (7.3)	0.11
Nausea	13 (7.9)	7 (17.1)	5 (7.4)	1 (1.8)	0.02
Others	14 (8.5)	4 (9.8)	5 (7.4)	5 (9.1)	0.90
Suggestions on prevention and treatment of tuberculosis					
Tuberculosis can be prevented	65 (39.6)	19 (46.3)	33 (48.5)	13 (23.6)	0.01
Tuberculosis can be cured	107 (65.2)	31 (75.6)	46 (67.7)	30 (54.6)	0.09

**Some cells had expected values < 5; the analysis did not meet criteria.

Table 3. Selected perceptions of tuberculosis among tuberculosis patients and their relatives and neighbors in northern Tanzania, 2012

Variable	All	Patients	Relatives	Neighbors	*P*-value
	n (%)	n (%)	n (%)	n (%)	
Total	**164 (100)**	**41 (100)**	**68 (100)**	**55 (100)**	
Perceived high risk groups from tuberculosis					
Adults	113 (68.9)	32 (78.1)	48 (70.6)	33 (60.0)	0.07
People who consume alcohol	65 (39.6)	18 (43.9)	30 (44.1)	17 (30.9)	0.27
Smokers	44 (26.8)	17 (41.5)	23 (33.8)	4 (7.3)	P< 0.001
Children	38 (23.2)	11 (26.8)	18 (26.5)	9 (16.4	0.34
Who consume raw animal products	10 (6.1)	6 (14.6)	4 (5.9)		**
Others	9 (5.5)	2 (4.9)	2 (2.9)	5 (9.1)	0.32
Perceptions on tuberculosis					
Apart from modern medicine there is no alternative treatment for tuberculosis	42 (25.6)	12 (29.3)	17 (25.0)	13 (23.6)	0.81
I don't think I can get tuberculosis	35 (21.3)	9 (22.0)	14 (20.6)	3 (5.5)	0.03
Tuberculosis is no longer a problem in my area	31 (18.9)	10 (24.4)	11 (16.2)	10 (18.2)	0.56
Tuberculosis can't be prevented	14 (8.5)	1 (2.4)	9 (13.2)	4 (7.3)	0.14
In my community a person with tuberculosis may try traditional medicine	9 (5.5)	2 (4.9)	3 (4.4)	4 (7.3)	0.77
A person can't pass tuberculosis on to others	8 (4.9)	1 (2.4)	5 (7.4)	2 (3.6)	0.45
Tuberculosis can't be cured	4 (2.4)		1 (1.5)	3 (5.5)	**

**Some cells had expected values < 5; the analysis did not meet criteria.

The reported high awareness of tuberculosis in our study corresponds well with findings from a study conducted in Ethiopia among cattle farmers [18]. It may be that the good awareness reported in our study community may have been acquired from long time experience in keeping cattle and continued sharing of information with peers on tuberculosis as a potential zoonotic disease. Although previous lessons show that awareness does not necessarily translate into knowledge, behavior and practice [18,20], our findings on awareness were important when considering the need to identify target areas, formulation and implementation of appropriate health interventions in agropastoral and similar communities. Previous studies done among pastoral communities reported that the communities were aware of basics about tuberculosis [21,22]. However, the respondents had limited information concerning bacteria as a causative agent of tuberculosis [21-24]. In the current study, although awareness on most of the assessed elements was good, we show that more patients than relatives and neighbours said tuberculosis was caused by animals, and that the diseases was caused by alcohol. Also, more relatives than patients and neighbours thought that tuberculosis can be prevented. These findings raise some questions on the appropriateness of the health education given when tuberculosis patients receive treatment.

Poor awareness of the causes of the disease may have a negative impact on patients' attitude towards health-seeking behavior and preventive methods as most people with such beliefs may not visit health facilities.

Previous studies elsewhere reported that mass media (television, radio and newspapers) were common sources of health information [25,26]. Although more than half of our respondents were informed about tuberculosis through health care services, we found that teachers and newspapers were not common sources of information on tuberculosis. The purpose of effective communication is to increase awareness and knowledge on health issues in the community. These findings call for appropriate means through which health information on tuberculosis can reach the community with emphasis on causes, transmission and earliest symptoms of tuber-culosis infection. Teachers unlike newspapers for example, are often available in almost all villages. Emphasis on my cobacterial diseases as part of school curriculum may be a better target to improve knowledge in the community.

Our findings on low knowledge on some aspects of tuberculosis are similar to those reported in other studies in Tanzania and elsewhere [0,27]. Studies conducted in Tanzania show that poor

knowledge on causes and transmission of tuberculosis among the Maasai people was associated with low level of schooling [28,29]. The importance of knowledge in reducing disease burden by promoting early diagnosis and adherence to treatment has been emphasized [30]. The reported low knowledge on causes and mode of transmission of tuberculosis in our study highlights current implementation gaps by health programmes in the study community. Appropriate interventions should be considered to improve knowledge about tuberculosis.

Previous studies have associated the low knowledge on tuberculosis with wrong perceptions and beliefs on the diseases [32,33]. The current study shows that a significant proportion of respondents perceived that microbes could cause tuberculosis and that transmission occurs during sexual intercourse. This may partly be explained on illness perception; e.g in South Africa a study revealed how patients constructed dichotomous identities associated with tuberculosis and HIV. The coming together of the two epidemics has rendered tuberculosis symbolic and symptomatic of HIV [33-35]. Misconceptions around most of the assessed elements were documented. These include undermining self risk from tuberculosis, transmission between individuals, possibility to prevent, prevention, treatment, and availability of alternative treatment including traditional healers or medicine. These misconceptions, together with poor knowledge, could potentially influence the transmission of tuberculosis in the study area. The insight obtained from these perceptions will help in planning an appropriate approach for a public health education package which may correct some misconceptions. This could also include strategies such as health promotion through community involvement.

This study has some limitations. As this was part of another study with another aim, the sample size was too small for analysis of sub groups, and the design was not favorable for testing associations. This has affected the precision of our estimates and may have affected some of our comparisons. There were more patients and neighbours selected in rural areas than urban, and this may have influenced the results and affected the comparisons. This has also affected the distribution of occupation among the respondents. Hence, any generalization must be done with caution.

5. CONCLUSION

Our study shows that many study participants were aware of tuberculosis but specific knowledge was generally low. Misconceptions were common. Schools and newspapers were not common sources of information about tuberculosis in the study community.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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