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Assessment of knowledge, attitude and practices towards human and bovine Tuberclosis among high school students in Gondar town, Ethiopia

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Abstract

Tuberculosis is recognized as one of the most important threat to human and animal health causing mortality, morbidity and economic losses. A cross sectional survey was conducted between November 2018 and April 2019 to assess the knowledge, attitude and practices towards bovine and human tuberculosis among 400 high school students in Gondar town, Ethiopia. A structured questionnaire was designed, pretested and self-administered to ninth and tenth grade students in a national language. Human TB was recognized by 396(99%) of students, while only 71(17.8%) had heard of animal TB though statistically not significant ($p>0.05$).Majorities of respondent indicated that they have acquired the awareness about TB was from multiple source that accounts about 192(48.5%), radio/TV 99(25%), TB patient 76(19.2%) and school 29(7.3%).Knowledge on the infectious cause of human and animal TB was known by 32.3% and 39.4%, respectively. However, misperceptions such as cold weather, locally termed as *"Berd"* were also implicated as cause to human TB.The communities practice that use of milk as raw that studied as the sources of infection to TB. In conclusion, as the bovine tuberculosis is less aware as well as misperception about cause, ways of transmission and prevention towards human tuberculosis among high school students. Thus, it is highly imperative to impart public health education to build up public awareness about the causes, sources of infection and its control in the study area.

Keywords: Attitude, High school students, Knowledge, Practice, Zoonotic tuberculosis

1. Introduction

Tuberculosis is recognized as one of the most important threat to human and animal health causing mortality, morbidity and economic losses (Smith, 2006).Tuberculosis (TB) is one of the major public health threats globally and cause infection among billions of peoples each year and ranks as second leading cause of death from an infectious disease worldwide after HIV/AIDS (WHO, 2014). It is a reemerging disease and a significant health problem in human and animal caused by a group of bacteria called *Mycobacterium* tuberculosis complex (MTBC) (Pal *et al*., 2014).It signifies different species including *Mycobacterium tuberculosis* nd *Mycobacterium bovis* (Thoen *et al*., 2009). *M. tuberculosis (MTB)* primarily causes TB in humans whereas *M. bovis* predominantly affects cattle causing bovine tuberculosis (Pal *et al*., 2014).

Bovine tuberculosis (BTB) is a chronic bacterial disease of cattle characterized by the formation of granulomas in tissues and organs, more significantly in the lungs, lymph nodes, intestine, kidney, liver and spleen(Shitaye *et al*., 2007). BTB is caused by slowly growing non-photochromogenic bacilli members of the *MTBC* known as *M. bovis*. It is the principal agent

of zoonotic tuberculosis and the most universal pathogen among *mycobacteria* affects many vertebrate animals of all age groups including humans although, cattle, goats and pigs are found to be most susceptible, while sheep and horses are showing a high natural resistance (Radostits *et al*., 2000; Thoen *et al*., 2006).

Zoonotic TB is a form of TB in people caused by *M. bovis* that can spread from infected animals to humans, typically by the inhalation of aerosols, close contact and ingestion of raw animal products (Ashford *et al*., 2001; Cosivi *et al*., 1998; Pal, 2007; Pal *et al*., 2014).Also, it represents a financial burden due to the loss of productivity of livestock through the reduction of milk production and carcass condemnation (Girmay *et al*., 2012). Drinking raw milk is a primary route of *M. bovis* infection of humans; hence, the occurrence of human tuberculosis is most commonly in the extra pulmonary form, particularly resulting in the cervical lymphadenitis (Ayele *et al*., 2004).

Naturally, the occurrence of zoonotic TB is greatly dependent on the presence of TB in animals. Global estimated prevalence of zoonotic TB is 3.1% of total human TB cases that accounts for 2.1% of the pulmonary TB cases and 9.4% of the extra-pulmonary TB cases (Cosivi*et al*.,1998).The incidence of zoonotic TB drastically reduced in developed countries due to implementation of efficient eradication program involving test and slaughter policy and milk pasteurization. However, in developing countries Human tuberculosis of animal origin poses a major public health concern due to the high burden of HIV/AIDS, emergence of drug resistant strains of Mycobacterium species, poor living condition apart from lack of intervention system (Eric *et al*., 2006; WHO, 2002; Ofukwu, 2008).

In Ethiopia, BTB has been considered as the most important disease of intensification with detrimental effect on animal production. The economic impacts and zoonotic significance of the disease have been reported in peri-urban areas of the country(Ayele*et al*., 2004; Regassa*et al*., 2005; Ameni*et al*., 2011). Thus, BTB still remains a great concern in our country, with considerable prevalence in cattle populations. Its zoonotic implication has also significantly indicated an increasing trend to be of public health hazards to human being (Shitaye*et al*., 2007; Ameni*et al*., 2011).

The main factors associated with TB acquiring and development of disease and its epidemiological burden includes poverty, infection with HIV, poor nutritional status, smoking, poor access to health facilities, lack of financial source, lack of awareness and knowledge about the cause, mode of transmission, and symptoms TB, demographic characteristics, lack health education, socioeconomicstatusand traditional beliefs. These are thought to have an essential impact on the health seeking behavior of patients, delay in diagnosis, treatment compliance and treatment success rate (Lawn *et al*., 2006;Hassmiller, 2006;Kumar *et al*., 2007).

Assessment of knowledge, attitude, and practice (KAP) of community toward TB, is very essential to collect information for planning public health programs, problem cognition and planning intervention based on the gaps. Even if this type of research is very essential to give high beneficiary to the community a few studies were done among students. Therefore, the specific objective of this study was:-

To assess knowledge, attitude and practices towards human and bovine tuberculosis among high school students in study area

2. Literature Review

2.1 Etiology

Mycobacterium tuberculosis complex (MTC) consists of *Mycobacterium africanum, Mycobacterium bovis, Mycobacterium Canetti, Mycobacterium microti, myc robacterium BCG, mycrobacteum caprae*and *Mycobac terium tuberculosis (*Quinn *et al.*, 2002). Genus mycobacterium is characterized phenotypically as non-motile, noncapsular, non-spore forming, obligate aerobic, thin rod usually straight or slightly curved having 1 - 10 µm length and 0.2 - 0.6 µmwidth, facultativeintracellular microbe and has a slow generation time about 15 - 20 hours. Its cell wall is rich in lipids (mycolicacid) that provide it the thick waxy coat which is responsible for acid fastness and hydrophobicity. This waxycoat (mycolic acid) is also greatly contributing for the bacterium resistance to many disinfectants, common laboratory stains, antibiotics and physical injuries. It probably also contributes to the slow growth rate of somespecies by restricting the uptake of nutrients (Birhanu*et al*, 2015).

Mycobacterium bovis is the main etiological agent of bovine tuberculosis. It is found that *M. bovis* best survive in frozen tissue and there is adverse effects of tissue preservative i.e. sodium tetraborate on viability (Verma*et al*, 2014). In the environment *M. bovis* can survive for various months especially in cold as well as dark and conditions which is moist. The survival period varies from 18 - 332 days at 12˚C - 24˚C (54˚F - 75˚F) which is dependent of sunlight exposure. From soil or grazing pasture there is infrequent isolation of this organism. It has been found that culture of the organism can be done for approximately two years in samples that are stored artificially. The viability of the organism has been found more recently to be between 4 - 8 weeks in 80% shade whereas it can get destroyed in either summer or winter on New Zealand pastures (Verma*et al*, 2014; Birhanu*et al*, 2015). Incubation period of *M. bovis*is 3 weeks (Verma*et al*., 2014).

2.2 Epidemiology

The disease affects cattle throughout the globe, but some countries have been able to reduce or limit the incidence of the disease through process of 'test and cull' of the cattle stock. Most of Europe and several Caribbean countries are virtually free of *M. bovis*. Bovine tuberculosis is endemic to many developing countries particularly African countries (Abubakar*et al.*, 2011). *M.bovis*combines one of the widest host ranges of all pathogens with a complex epidemiological pattern, which involves interaction of infection among human beings, domestic animals and wild animals (Gemechu*et al.*, 2013). However, only little is done particularly in developing countries on the epidemiology of this organism and the epidemiological requirements for its control (Ali, 2006)

2.3 Source of infection and mode of transmission

Cattle serve as the principal reservoir of *M. bovis*. Humans can be infected with *M. bovis*where cattle are reared for milk production (Girmay*et al.*, 2012).Tuberculosis is speared from one person to the other through air droplets that is produced during the person affected by pulmonary and laryngeals tuberculosis by coughing, sneeze talk and song. It is determined by three factors those are numbers of organisms expel into air, concentration of organism in the air and length of the time expose to organisms (Millet *et al*., 2013).

The bovine tuberculosis transmitted from animals to human by use of raw animal products and un cooked meat that can affect gastro intestine and speared to other organs also in contaminated animal to others by air or contaminated feed and when materials that the animals used was contaminated (WHO, 2013).Transmission of *M.bovis* from cattle to humans is possible and likely results from the cattle's living or slaughtering conditions. When cattle are bought form the market, they are kept near homes while they are fattened before sale. Once sold, cattle are often slaughtered and the butchers do not protect themselves against mycobacterium or other infectious agents. Butchers use their bare hands on the carcasses, which may be diseased and serve as a host for *M.bovis* (Cadmus *et al.*, 2005).

The chance of contact with a person who has an infectious form of TB, the intimacy and length of that contact, the degree of infectiousness of the case, and the divided environment in which the contact happens are all important determinants of the probability of transmission (Nicas*et al*.,2005).

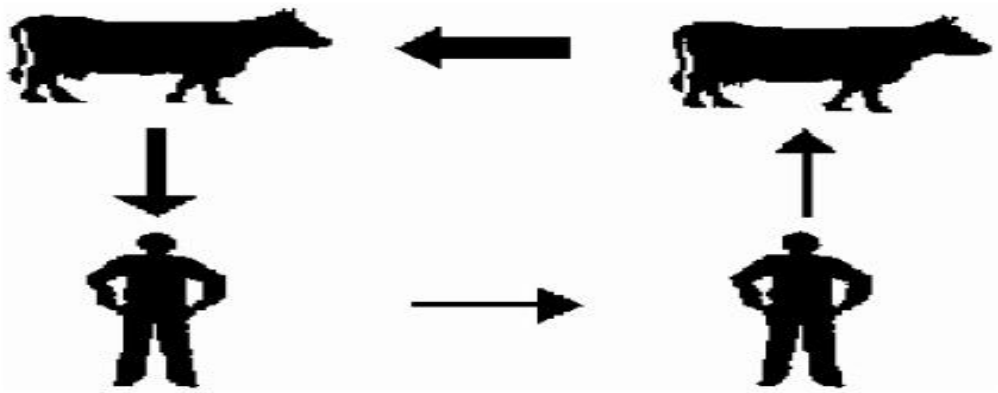

Figure.1: Cycle of *M. bovis* transmission between cattle and human .The thickness of arrows suggests high transmission route (Grange and Collins, 1987).

2.4. Risk Factors of Human and Bovine Tuberculosis

Tuberculosis has been considered as a disease of poverty so, lack of basic health Services, malnutrition, social disruption, low awareness to diseases and cause of all contribute to the dissemination of TB and its impact in the community (WHO, 2005). The observed increase in TB incidence in sub-Saharan Africa may have resulted from several of these risk factors (Millet *et al*., 2013).

Risk factors contributing to difficulties in controlling bovine tuberculosis in cattle across continents can have their origin at farm-level, e.g. cattle breed, age, behavior and nutrition of animals. However, host independent factors are considered more important in most case include, amongst others, production types, management practices, environmental variables, anthropogenic variables and seasonality. Cattle movement, existence of a wildlife reservoir and possibly strain related differences are of additional significance. Tuberculosis in wildlife can also pose difficulties for bovine tuberculosis eradication (Verma*et al*., 2014).

Sub Saharan Africa, which is home to more than half of the world's cattle population, has been the hardest hit for various reasons. Firstly, in most African countries cattle are used to show economic status in the society and secondly they serve as the main source of income for many farmers. Moreover, countries in Africa are yet to fully implement the TS policy; this is mainly because of the lack of financial commitment on the part of governments to compensate farmers with infected animals (Otte and Chilonda, 2002).So far, different studies have indicated a critical knowledge gaps and the associated risky practice towards BTB in Ethiopia .In fact, educational effort among young in Ethiopia were reserved to addressing human to human transmissions (Ameni*et al*., 2007).

2.5 Pathogenesis

Once bacteria entered through aerosolized droplets or ingestion it is established in a herd of cattle. The incubation period can range from months to years with the severity depending on the immune system of each individual animal. The bacteria usually enter the respiratory system of a cow and settle in the lungs. Macrophages in lungs are then responsible for phagocytizing the organism. The organism replicates intracellularly after it has been taken up by the macrophages. A granuloma or tubercle forms as the body tries to wall off the infected macrophages with fibrous tissue. The granuloma is usually 1 - 3 cm in diameter, yellow or gray, round and firm. On cut section, the core of the granuloma consists of dry yellow, caseous, or necrotic cellular debris. The infection can spread hematogenously to lymph nodes and other areas of the body and cause smaller, 2 - 3 mm in diameter, tubercles. The formation of these smaller tubercles is known as "miliarytuberculosis". The histological lesions consist of necrotic cells in the center of the tubercle surrounded by epitheloid cells and multinucleated giant cells all encapsulated by collagenous connective tissue. The necrotic core of cells can often become calcified as the tubercle matures (OIE, 2009).

2.6Clinical Signs

The classic clinical features of pulmonary tuberculosis include chronic cough, sputum production, appetite loss, weight loss, fever, night sweats and hemoptysis (Lawn, 2011). Extra pulmonary tuberculosis occurs in 10 to 42% of patients, depending on race or ethnic background, age, presence or absence of underlying disease, genotype of the *M. tuberculosis* strain and immune status (Caws,2008). The clinical signs reflect the extent and location of lesions. However, the generalized clinical signs include Progressive emaciation, lethargy, weakness, anorexia and fluctuating fever. Localized disease can affect the lymph nodes, skin, bones and joints, genitourinary system, meanings or respiratory system (Ameni*et al*., 2011).

Animals infected with *M.bovis* have low-grade fever, chronic intermittent hacking cough and associated pneumonia, breathing difficulties, weakness and loss of appetite, emaciation and swelling of superficial body lymph nodes (adenitis) (Herenda*et al*.,2000). In contrast, the most common symptoms of TB in humans are cough (green, yellow and sometimes bloody sputum in the mornings), night sweats, low energy and fatigue, decreased appetite, shortness of breath and chest pain (Mfinanga*et al*.,2003).

2.7 Diagnoses

The standard method for detection of TB is the tuberculin test, where a small amount of antigen is injected into the skin, and the immune reaction is measured. Single intra dermal tuberculin skin test (SITT) is the test that bovine tuberculin

injection can be at the site of hairless area of caudal fold to observe the skin reaction against*M.bovis*. Comparative intradermal tuberculin test (CIDT) is the test that many studies usually used to observe the skin reaction against *M. bovis* and *M. avium*. Definitive diagnosis is made by culturing the bacteria in the laboratory, a process that takes at least eight weeks (OIE, 2015).

2.8 Treatment

In human tuberculosis, drugs like isoniazid, combinations of streptomycin and para-aminosalicylic and other acids are commonly used. The treatment of animals with tuberculosis is not a favored option in eradicationconscious countries and is not economical. Long term therapy requirement of the disease can create the chances of development of multidrug resistant (MDR), extremely drug resistant (XDR) and even totally drug resistant (TDR) bacterial strains if treatment regime is not properly followed. So that vaccination of calves with BCG and testing and culling is important for prevention and eradication of tuberculosis (Verma*et al*., 2014).

Bacillus Calmette and Guérin (BCG) vaccine is the only TB vaccine licensed for use in humans and has advantages for use in cattle since the vaccine is safe, inexpensive, is commercially produced for human application. BCG vaccine has variable levels of protection efficacy in humans against pulmonary TB in children and adults, ranging from 0% - 80% (Parlane and Paddle, 2015).

However, in animals vaccination with BCG sensitizes animals to the tuberculin skin test, and vaccinated animals will therefore, at least for a significant period postvaccination, become test positive in the classical skin test. For this reason, test and slaughter-based control strategies based on tuberculin skin testing were favored above BCG vaccination in many countries including Ethiopia (Ameni *et al*., 2014).

2.9 Impacts of Human and Bovine Tuberculosis

The disease has also significant global economic impacts within the context of animal health particularly in most developing countries, as it directly affects animal productivity and also influences international trade of animal products (OIE, 2010). It remains an epicenter for potential zoonotic diseases such as (BTB) putting public healthy and livestock sector in jeopardy (Grace *et al*., 2012). Ethiopia is one of the high burdened countries in the world with human TB that estimate 10-15% TB prevalence is due to *M.bovis* (Pal *et al*., 2014; WHO, 2014).With every growing population of the country, there is high effort by the livestock sector to cope with proteins demands and hence, high productive animals are reared under intensive farming system in urban and peri urban parts of the county it creates favorable environment for it *(*Elias *et al*., 2008).*M.bovis* in cattle is pervasive through different agro ecological zones of Ethiopia where the BTB prevalence in cattle ranged from 16.2%-65.8% in different farming system (Shitaye*et al*., 2007).

2.9.1. Economic Impact of Tuberculosis

Financial losses are encountered through the costs for the control of the disease (testing and compensation expenses, losses from animal movement and sale restrictions) as well as decreased milk and meat production. In contrast, bovine tuberculosis is endemic in numerous developing countries and can have devastating impacts on the livelihood of millions of the world's most vulnerable communities as the disease compromises their sustainable food supply, income, socialstatus and potentially their health in the mainly rural livestock producing areas (WHO, 2009).

Ethiopia few abattoir meat inspection surveillances have shown the condemnation rate of the total or partial carcass and organs. It causes ill-health among millions of people each year and ranks as the second leading cause of death from an infectious disease globally next to the human immunodeficiency virus (HIV).According to World Health Organization (WHO) in 2013, there were an estimated 9.0 million incident cases of TB (ranging from 8.6 million–9.4 million) and 11.0 million prevalent cases (range, 10 million–13 million) of global populations. Most of the figured number of cases in 2013 occurred in Asia (56%) and the African Region (29%). Tuberculosis is also one of the major diseases that cause tremendous economic crisis in low income countries (Zinsstag*et al*., 2006). It represents financial burden due to lose of productivity to the livestock sector that can be accounted though reduction of milk production, carcass condemnation and death of animals due to it (Girmay*et al*., 2012)

2.9.2. Public Health Importance

Tuberculosis continues to be a major public health problem throughout the world, including Ethiopia.The observed increase in human TB incidence in sub-Saharan African countries including Ethiopia may have resulted from several of these risk factors most of societies were highly affected by such difficult factors that lead them to such kinds of problem (Millet *et al*., 2013).*M. bovis*is not the major cause of human tuberculosis, but humans remain susceptible to BTB. Humans can be infected primarily by ingesting the agent by drinking raw milk containing the infective bacilli, secondly, by inhaling infective droplets when there is close contact between the owner and his/her cattle, especially at night since in some cases they share shelters with their animals. In some countries, it is estimated that up to10% of human tuberculosis are due to BTB (Gebremedhin*et al*., 2014; OIE, 2015).

Bovine Tuberculosis has been controlled in the developed countries due to the successful implementation of the test and slaughter (TS) policy of all infected cattle and pasteurization of milks it block transmission path from *M.bovis* from animals to human with low cost.It is a well-known fact that knowledge can influence people's practices regarding prevention(Firdessa*et al.*, 2013).

3. Materials and Methods

3.1 Description of the Study Area

The study was conducted between November 2018 to April 2019 in Gondar town, Amhara regional state.Gondar is located in North Western part of Ethiopia at about 748km North West of Addis Ababa and 180 km from North East of Bahir Dar. The city has a latitude and longitude of 12°30′N 37°20′E, respectively. And the altitude ranges from 1800-2200 m.a.s.l. The area is located under Woinadega, agro-climatic zone and receives a bimodal rainfall; the average annual rainfall is about 1161mm,which long rainy season that extends from June to September and a short rainy season from March to Maywith 19.1 ^{o}C annual temperature (EMS, 2012).Gondar is the third city of Ethiopia, situated just north of Lake Tana and the capital city of the country for about two hundred years. Today, the glories of ancient Gondar are very hard to find. Its present center largely Italia built and is dusty and run down.The estimated human population is 207,044 of which 98,120 are males and 108,924 females (CSA, 2007).

3.2 Study Population and Sampling Methods

The study population consisted of 400 high school students that were found in Gondar town was included in the study. Totally there were 11 public and 6 private schools were found in town from the lists ofGondar town education bureau and then five schools were selected through simple random sampling methods. Two classes from each school representing the grades of interest namely grade 9 and 10 were picked by simple random sampling of class. As per suggestion by school heads and teachers, convenience sampling was conducted in those classes that were not engaged in teaching practice during the visit. After wards, all students in a class were handed to fill in questionnaire. The data collection tool was a standardized questionnaire which consists of questions on socio demographic characteristics of the study students and their knowledge, attitudes and practices towards both human and bovine TB. The questionnaire was first designed in English based on WHO guidelines and information from different literatures developed for similar purpose (Deribew*et al*., 2010). Then the questionnaire was translated to Amharic (the national language of the study area). The questionnaire consisted of basic questions to assess knowledge on transmission and cause of human and animal TB, source of information for acquired knowledge, attitude and habits in usage of animal product. Targeted groups were believed to represent the high school and associated curricula. Only public schools were involved while private schools were excluded, as there was stringent process and long appointments for besides problem of un willingness of students and their schools heads for pre-tested questions beforeget started data collections.

3.3 Study Design and Sampling Size

The cross-sectional study design was used to collect data from November, 2018 until April, 2019 at high school students that were found in Gondar town. There was no previous information on the level of high school student's awareness about bovine and human tuberculosis in the present areas. However, 13.9% of high school students in Addis Ababa had awareness about bovine tuberculosis (Pal *et al*., 2014) and using the formula of:

$$n = \frac{1.96^2 RD(1 - RD)}{d^2}$$

Where, n=required sample size, RD= Response Distribution, d=desired absolute precision (Le, 2003).Therefore, the calculated sample size was184 samples and for the higher accuracy, the total number of sampling was increased to 400.

3.4 Data Management and Analysis

The collected data was entered and managed on a Microsoft excel spreadsheet manually and checked again for completeness and consistency. Questionnaires were coded and analyzed using SPSS 20 Version (Statistical Package for Social Science 20 Version). The result was described using frequency counts and percentages. The statistical significance of proportional differenceswastested using chi-square tests.For all analyses, a *P*-value of less than 0.05 was taken as significant.

4. Result

4.1. Demographic Characteristics of Respondents

A total of 400 students completed the questionnaire, 95% of the target sample size with 5% non-response rate. The age of participants ranged from 14 to 30 year with a mean of 17.1. Of which, 142(35.5%) and 258(64.5%) were male and female, respectively whereas 212(53%) and 188(47%) participants represented ninth and tenth grades as presented in Table 1.

Table 1: Characteristics of study participants in high schools at Gondar town, Ethiopia

Character	Number	Percentage
Gender		
Male	142	35.5
Female	258	64.5
Grade		
9^{th}	212	53
10^{th}	188	47
Age		
≤16	133	33.3
>16	267	66.8

4.2. Knowledge on Human and Bovine Tuberculosis

Human TB was recognized by 396(99%) of students, while only 71(17.8%) had heard of animal TB though statistically not significant(X^2 = 0.872, P=0.35). Information on human and animal TB was obtained mainly from multiple sources which accounts for 192(48.5%) and 41(59.2%),respectively. TB patients and school were also reported as information source (Table 2).Knowledge on the infectious cause of human and animal TB was known by 32.3% and 39.4%, respectively. However, misperceptions such as cold weather, locally termed as *"Berd"* were implicated as cause to human TB.

As shown in Table 2, knowledge towards human TB and BTB was better in tenth grade than ninth grade. Moreover, Females had relatively better awareness on HTB (99%) while male had (24%) towards BTB. The knowledge variation across gender and grade was not statistically significant (P>0.05) as depicted in table 2.

Table 2:Knowledge and attitude towards human and bovine TB across gender and school grades from public high school students, Gondar town

	Characteristics					
	Grade			Gender		
	9th N (%)	10th N (%)	p-value	Male	Female	p-value
Heard of human TB	208(98)	188(100)	P>0.05	140(96)	256(99)	P>0.05
Heard of bovine TB	39(18)	32(17)	P>0.05	34(24)	37(14)	P<0.05
Consider BTB as zoonosis	58(27)	45(24)	P>0.05	44(31)	59(29)	P>0.05
TB is a disease that affects only people	64(30)	48(26)	P>0.05	38(27)	74(29)	P<0.05

The zoonotic implication of BTB was better known by ninth grades (27%) and male students (31%) as shown intable 2. However, no significance association was found as indicated above in table 2. Informants believed susceptibility of ox/cow 44(62%) and other domestic animals such as cat/dog 13(18.3%) and other animals 14 (19.7%) to BTB.

Concerning the modes of TB transmission, inhalation was the commonly reported route of transmission in human (85.5%) as well as in bovine (87.3%) as depicted in Table 3.

Table 3:Knowledge towards TB and source of information for human and animal tuberculosis among 9th and 10th grade students in public high school in Gondar town, Ethiopia

Variable	**Category**	**Types of TB**			
		Human TB		**Animal TB**	
		N =396	**%**	**N=71**	**%**
Heard of the disease		396	99	71	17.8
Source of information	Radio/TV	99	25	14	19.7
	TB patient	76	19.2	10	14.1
	School	29	7.3	5	7
	Multiple source	192	48.5	42	59.2
Mode of transmission	Contact	16	4	5	7
	Inhalation	338	85.4	62	87.3
	Consuming raw animal products	6	1.5	1	1.4
	Don’t know	36	9.1	3	4.2

Cause of disease	Cold weather "berd"	43	10.9	5	7
	Bacteria	128	32.3	28	39.4
	Cold weather "berd" and bacteria	125	31.6	30	42.3
	Don't know the cause	100	25.3	8	11.3
Symptom of human TB	Coughing more than 2 week				
	Blood tinged sputum	183	45.8	-	-
	Chest pain				
	Weight loss	26	6.6	-	-
	Covering mouth and nose when coughing/sneezing	14	3.5	-	-
		4	1	-	-
Prevention method	Use cooked/boiled animal product	116	29	-	-
	Early treatment				
	Avoid sharing of utensils	6	1.5	-	-
		56	14	-	-
	Separating sleeping room	28	7	-	-
		28	7	-	-

4.3 Attitude and practice towards tuberculosis

Across study populations, 390(97.5%) knew a person who have/had TB case and a significant proportion of students 146(36.5%) indicated that most people would reject a TB patient whereas most of the student 181(46.4%) replied they feel compassion desire to help TB patient and not sure 69(17.4%). Majority of the informant's share their illness and 95% of them advice TB patients to go health center or hospital.Among student's family practice, 210(52.5%) used pasteurized milk products, while the rest consumed raw/unpasteurized milk (17%), yoghurt(8.3%) and othersuse all type of milk products(30.8%). while, only 86(21.5%) and 50(12.5%) considered raw milk/unpasteurized milk and yogurt as vehicles to *M. bovis*infection, respectively. Of the respondents who had awareness towards human and bovine TB, (52.8%) and (50.7%) claimed to use pasteurized milk and milk products, respectively. Their awareness was not statistically associated with milk consumption habit (P>0.05).

5. Discussion

The study had provided information regarding the knowledge, attitude and practices of high school students towards human and bovine tuberculosis in Gondar town of Ethiopia. Human TB was highly recognized by (99%) of students, while only (17.8%) had heard of bovine tuberculosis (p>0.05).Similarly to this report, very impressive awareness on human TB among high school students was recorded in study done in Addis Ababa city of Ethiopia (Pal *et al*., 2014), Mysore city of India (Renuka and Muralidhar, 2012) and in Vellore of India (Gopichandran*et al*., 2010).The low recognition about bovine TB noted in the present study slightly agrees 29.7 % reported by Romha*et al*., (2014) on TB occurrence in animals across study population in southern part of Ethiopia. Likewise, Munyeme*et al.* (2010) reported as high as 60.4% of respondents not to have heard of bovine tuberculosis from Zambia. The awareness variation seen in this study between the two types of TB could be a reflection of remarkable educational efforts towards the human TB through various mass media.

This study indicated the usefulness of electronic media in health education. Majority of the students reported that they have acquired the awareness from multiple sources such as radio/TV, TB patient and school about human TB (48.5%) and bovine tuberculosis (59.2%).

Similarly, other investigators showed that health education means such as television (64.6%) can play a pivotal role in disseminating educational messages (Hoa*et al*., 2009). Nonetheless, Yadav*et al.,* (2006) described that neighbors, friends and family members as major source of information in India. Thus, different intervention means and efforts are suggested to consider the peculiar nature of each setting and target group (Hoa*et al.,* 2009). On contrary, there is lack of attention towards bovine tuberculosis as part of educational endeavors. Although 11.3% did not know the actual cause of BTB, no false perception was found. As to human TB, majority (25.3%) of the respondent remained having no knowledge on the cause of TB. Moreover, misperception as cold weather *"berd"* was implicated as cause of human TB. Similarly, Gebremariam *et al.* (2011),Bati *et al.* (2013) and Pal *et al. (2014)* had reported similar misperceptions among the different parts of the country.

M. bovis has been detected in milk and yogurt and hence, these products are regarded as of infection (Franco *et al*., 2013; Mariam, 2014).However, in this study, significant proportion (4.3%) across study population used to consuming raw milk. TB cases are reported in different parts of the world due to habit of consuming raw milk (Cosivi*et al.,* 1998; Kazwala *et al*., 1998; Kahla *et al.,* 2011; Njarui *et al*., 2011;Pal *et al*., 2014).

Different studies have reported the culture of raw milk consumption in Ethiopia and potential transmission to humans (Ameni and Erkihun, 2007; Bati *et al*., 2013; Romha *et al*., 2014). Dankner and Davis (2000) reported *M. bovis* as a significant (34%) cause of TB among children raised in setting where raw milk is used. Herein, majority of students have indicated inhalation (87.3%) and ingestion (1.4%) as means of transmission of BTB giving more priority to the earlier route of transmission. In fact, inhalation is a great concern to individuals having close contact with cattle (Acha and Szyfres, 2001). Nonetheless, BTB is transmitted primarily through ingestion of contaminated milk and milk products (Cosivi *et al*., 1998). In the present study, (85.4%) of a ll participants implicated inhalation as primary means of human TB transmission. Student's belief on BTB transmission through inhalation could be attributed to their knowledge on human TB transmission having an indirect effect on bovine TB awareness provided that students had low awareness in BTB transmission though ingestion.

The four most commonly recognized symptoms of TB mentioned by respondents were coughing for 2 weeks and above (45.8%), weight loss (1%), chest pain (3.5%), and blood tinged sputum (6.5%) which was in agreement with previous studies in a rural community in Southwest Ethiopia (Abebe *et al*., 2010), in Northeast Ethiopia (Legesse *et al*., 2010), Iran (Yousif *et al*., 2009) and in Philippines (Christina *et al*., 2009). The reported basic students' knowledge about the symptoms and transmission methods of TB has an important implication for the TB control program in the current study area in particular and also in the country in general in that it could reduce diagnosis and treatment delay, as well as the spread of the disease.

Of the respondents, 116 (29%) respondents considered covering their mouth and nose as the most commonly used method for preventing the spread and transmission of TB. Moreover, 7% respondents mentioned that transmission and spread of TB could be prevented by avoiding sharing of utensils, use cooked/boiled animal products (1.5%), early treatment (14%) and separating sleeping rooms (7%). Thus, an important aspect noted in this study was that most of the participants were aware of the prevention methods of TB which is more or less similar to a report in other parts of the Ethiopia (Deribew *et al*., 2010; Melaku *et al*., 2013) and in Pakistan (Mushtaq *et al*., 2011).

Across study population, 390(97.5%) know a person who have/had TB case and a significant proportion of the study subjects 181(46.4%) had particular feeling compassion and desire to help people with TB disease, means that there is slight discrimination against TB patients in the current study area. Moreover, TB patients are mostly supported and helped by the community in the study area. This study observed that there were numerous misconceived ideas about the causes of TB, transmission, and prevention. Studies conducted in Pakistan, Croatia, and Ethiopia depicted similar report (Khan *et al*., 2006) those misconceived ideas might have a potential to create ground for stigmatization of TB patients and decrease the TB case detection rate.

Conclusion and Recommendations

Generally, majority of high school students in Gondar town recognized human tuberculosis as compared to bovine tuberculosis. However, they had little information about the cause of TB, as a significant number of the participants do not know or perceived that cold weather or "berd" as the cause of the disease. Moreover, large numbers of students were unaware about the cause of TB and the key routes of its transmission from infected organisms to others. Based on above conclusions the following recommendations are forwarded:-

It would be better to establish an appropriate control measure such as establishing proper information, education, and a communication pathway that indicate the level of severity of the disease.

Creating proper awareness about its cause, transmission, prevention, and availability of public service should be in place.

Human TB awareness creation strategy should be operated along with bovine TB under a One Health concept.

The government should give attention to bovine tuberculosis as equal with human TB by formulating strategies as well as policy to break the path ways of it.

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