A Retrospective Study On Bovine And Human Tuberculosis Cases In Maiduguri, Borno State.

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Abstract: Data on bovine and human tuberculosis in Maiduguri for five years (2005-2009) were collated and analyzed. The results did show that more cases of bovine tuberculosis occurred in 2005 ($P<0.001$) compared with 2007, 2008 and 2009. There was no significant difference in the number of cases ($P>0.05$) between 2005 and 2006. The number of cases of bovine tuberculosis was significantly different ($P<0.001$) when 2006 was compared with 2008 and 2009. For human tuberculosis, the number of cases for the five years (2005-2009) did not differ significantly ($P>0.05$). On the bases of sex for humans, in year 2008, there was significant number of cases in males compared to females and the difference was significant ($P<0.05$). Data on age of persons showed significant difference ($P<0.05$) between the age brackets 15-30 and 31-45 years. Our data revealed that pulmonary tuberculosis occurred significantly higher ($P<0.001$) when compared with cases of extra pulmonary tuberculosis. In conclusion, our data has shown that both human and bovine tuberculosis still pose a threat to the health management in Maiduguri. We therefore recommend that appropriate preventive and control measures be instituted as an intervention programme.

[Ayi Vandi Kwaghe, James Agbo Ameh, Abdul-Ganiyu Ambali, Joy Thliza Gararawa, Goni Bukar and Usman Jauro. **A Retrospective Study On Bovine And Human Tuberculosis Cases In Maiduguri, Borno State.** Researcher. 2011;3(4):39-43]. (ISSN: 1553-9865). http://www.sciencepub.net.

Key words: retrospective, bovine and human tuberculosis, Maiduguri

1. Introduction

TB kills someone approximately every 20 seconds — nearly 4,700 people every day, or 1.7 million in 2009 alone, according to the latest estimates from the World Health Organization (WHO). TB is second only to HIV as the leading infectious killer of adults worldwide. It is among the three greatest causes of death of women aged 15-44 and is the leading infectious cause of death among people with HIV/AIDS (Global Alliance For TB Drug Development, 2011). One – third of the world's current population has been infected with *Mycobacterium tuberculosis*. New infections occur at a rate of one per second (WHO, 2006). The proportion of people in general who become sick with tuberculosis each year is stable or falling world -wide but due to population growth the absolute number of new cases is still rising (scientific facts, 2008).

In 2004, mortality and morbidity statistics included 14.6 million chronic active cases, 8.9 million new cases and 1.6 million deaths, mostly in developing countries (WHO, 2006). In addition, an increasing number of people are contracting tuberculosis because their immune systems are compromised by immune-suppressive drugs, substance abuse or acquired immune deficiency syndrome (AIDS). The distribution of tuberculosis is not uniform across the globe, about 80% of the population in many African countries tested positive to tuberculin test, while only 5-10% of the US population tested positive (Kumar *et al*., 2007).

Mycobacterium bovis is the causal agent of bovine Tuberculosis (TB). It infects approximately 50 million animals all over the world causing economic losses of approximately 3 billion dollars per year (Steele, 1995). The disease is zoonotic, human populations may be infected by direct contact with diseased animals and by the consumption of non-pasteurized milk and its derivatives.

Nigeria has a population of over 130 million people and ranks 4th among the world's 22 countries with a high TB burden (WHO, 2006). Among African countries, Nigeria has the highest estimated number of new TB cases with nearly 368,000 new cases annually (WHO, 2005). In countries where bovine TB is uncontrolled, most human cases occur in young persons and result from drinking or handling contaminated milk (Cosivi *et al*, 1998). Little is known of the relative frequency with which *M. bovis* causes nonpulmonary TB in developing nations because of the

limited laboratory facilities for the culture and typing of tubercle bacilli (Cosivi *et al*, 1998). In Nigeria, the only method used in the diagnosis of suspected TB is the direct smear microscopy which does not permit the differentiation of *M. tuberculosis* complex although an essential requirement of any national TB program, this could partly explain the relatively low notification rate of disease caused by *M. bovis*. This study is therefore undertaken to highlight the importance of tuberculosis in man and cattle.

2. Materials And Methods

2.1 Sampling method: convenience sampling was used based on the availability of data to carry out this study.

2.2 Data collection: A retrospective study of abattoir and health facility records on tuberculosis in humans and cattle was conducted. The study period for both bovine and human cases was from 2005-2009. The only abattoir in Maiduguri, Maiduguri abattoir, was selected for cases of bovine tuberculosis. From abattoir records, data on TB cases per month were extracted. For the human cases, the following health facility sites were selected for convenience; General Hospital Molai Maiduguri, University of Maiduguri Teaching Hospital, Nigerian Airforce Clinic Maiduguri, COCCIN Clinic Molai Maiduguri, Police Hospital Maiduguri and Police College Clinic Maiduguri. From the health facility records, data on age, sex and type of infection (pulmonary and extrapulmonary) were collected.

2.3 Data analysis: Data was analyzed using GraphPad InStat 3. One way analysis of variance (ANOVA),Turkey-Kramer Multiple Comparism Test, and Unpaired t test were equally used to compare data and probability (P) for test of significance.

3. Results

Table 1 shows the distribution of cases of bovine tuberculosis for the study period. The results revealed significant higher number of cases in 2005 ($P<0.001$) compared to the rest of the years. There was no significant difference in the cases obtained between 2005 and 2006, p value > 0.05 and similarly no significant difference in the number of cases obtained between 2006 and 2007, $P>0.05$. Between 2006 and 2008, there was significant difference with P value <0.001. The same P Value was obtained ($P<0.001$) when the number of cases in 2006 is compared with 2009. Comparing the number of cases for 2007 and 2008, showed no significant difference ($P>0.05$). The data did not establish any significant difference in the number of cases for 2007 and 2009 as well as 2008 and 2009 (Table 1).

Table 1:Cases of bovine tuberculosis in Maiduguri abattoir for 2005-2009

YEAR	CASES OF BOVINE TB	MEAN ± S.E.M
2005	376	$^{a}31.33 \pm 2.63$
2006	298	$^{a}24.83 \pm 2.76$
2007	198	$^{a,b}16.50 \pm 1.94$
2008	124	$^{a,b,c}10.33 \pm 1.29$
2009	113	$^{a,b,c}9.42 \pm 1.40$

a, b, c, d- values along the same column differently superscripted , differ significantly when $p < 0.05$.

From Table 2, when the total number of human cases from 2005 to 2009 were compared, the P value obtained was 0.36 and considered not significant ($P >0.05$).

Table 2: Distribution of human cases of tuberculosis in Maiduguri 2005-2009.

YEAR YEAR	NUMBER OF CASES OF HUMAN TUBERCULOSIS	MEAN ± S.E.M
2005	605	50.42 ± 7.42
2006	522	43.50 ± 8.42
2007	706	58.83 ± 14.21
2008	745	62.08 ± 4.50
2009	805	67.08 ± 7.21

The number of cases between male and female TB patients over the period indicates that there was no significant difference between the number of cases in males and females during the period of study ($P>0.05$). There was significant difference in the number of cases between males and females in 2008 in favour of males ($P<0.05$) as shown on (Table 3).

Table 3: Sex distribution of tuberculosis in humans from 2005-2009 in Maiduguri.

YEAR	2005	2006	2007	2008	2009
	MEAN ± S.E.M	MEAN ± S.E.M	MEAN ± S.E.M	MEAN ± S.E.M	MEAN ± S.E.M
MALES	27.83 ± 4.32	25.70 ± 4.92	33.33 ± 7.87	[a]35.75 ± 2.87	39.17 ± 3.90
FEMALES	21.75 ± 3.70	18.00 ± 4.00	25.50 ± 6.49	[b]26.33 ± 2.89	27.92 ± 3.79

a, b values along the same column differently superscripted differ significantly (P< 0.05).

The results did show that there was significant difference in the number of cases between the age brackets 0-14 and 15-30 years (P<0.001) as well as 0-14 and 31-45 years (P<0.05) as shown on (Table 4).

Table 4: Distribution of cases of human tuberculosis in Maiduguri by age bracket (2005-2009).

	YEARS				
	2005	2006	2007	2008	2009
AGES	MEAN ± S.E.M	MEAN ± S.E.M	MEAN ± S.E.M	MEAN ± S.E.M	MEAN ± S.E.M
0-14	[a]8.00 ± 1.32	7.83 ± 2.32	9.92 ± 3.44	[a]5.00 ± 1.09	7.25 ± 1.24
15-30	[b]18.08 ± 3.08	[a]14.50 ± 2.52	[a]20.83± 4.80	[a,b]24.08 ± 1.88	25.00 ± 3.60
31-45	[a,b]16.67 ± 2.61	[a]13.17 ± 2.64	[a]18.25 ± 4.25	[a,b]22.50 ± 1.96	23.50 ± 2.81
46-60	[c,d]6.17 ± 0.71	6.33 ± 1.45	8.00 ± 2.22	[a,c,d]8.08 ±0.54	9.58 ± 0.82

a, b, c, d, values along the same column differently superscripted differ significantly (P< 0.05).

Table 5 contained data on pulmonary and extra pulmonary human tuberculosis. The number of cases of pulmonary tuberculosis occurred significantly higher than the extra pulmonary tuberculosis during the period (P<0.001).

Table 5:Distribution of human cases of tuberculosis on the basis of pulmonary and extra pulmonary tuberculosis in Maiduguri (2005-2009).

TUBERCULOSIS (HUMAN)	YEARS				
	2005	2006	2007	2008	2009
PULMONARY TB	[a]46.50 ± 7.13	[a]40.00 ± 7.75	[a]55.50 ± 13.21	[a]54.67 ± 3.81	[a]60.33± 6.44
EXTRAPULOMNARY TB	[b]3.92 ± 1.58	[b]3.50 ± 1.12	[b]3.33 ± 1.22	[b]7.42 ± 1.15	[b]6.75 ± 1.03

a, b, values along the same column differently superscripted differ significantly (P< 0.05).

4. Discussion

The decrease in the number of bovine TB cases could not have occurred by chance taking into consideration the P value. This may suggests that healthier animals are being brought to the abattoir for slaughter. Animals were formerly brought mainly from Damboa and other parts of Borno state with higher incidence rate. Presently currently the sources of animals being slaughtered at the Maiduguri abattoir are mainly from Tchad and Cameroon which explains the decrease in the number of TB cases over the years as seen in the present study.

The distribution of human cases over the period shows that the increase in the number of TB cases do not differ significantly although there was increase in the number of people being infected annually. This agrees with the findings of scientific facts (2008), which stated that the total population of people who become sick with tuberculosis each year is stable or falling world-wide but due to population growth the absolute number of new cases is still rising .This finding also indicates that the current TB programmes on ground has made impact by treating infected patients thereby reducing the amount of people spreading the disease.

Our data showed significant difference in the number of cases in favour of males in 2008. For the rest of the years, there was no significant difference and this indicates that both males and females are equally proned to TB. Other unknown factors might have contributed to males having much higher rate of cases compared to females in 2008. It has been reported that males appeared most affected due to socio-cultural background, Imam *et al.,* (2008) ; Taura *et al.,* (2008).

The effect of age on this study indicates that

the age brackets 15-30 and 31-45 were most affected with TB and is in agreement with Imam *et al.*, (2008), who reported that the demographic characteristic analysis showed 15-29 age group having the highest percentage distribution of tuberculosis. Also, there was a high rate of smear positive cases in the 15 to 44-year-old group in previous studies as reported by Muvunyi *et al.*, 2010 and Holmes *et al.*,1998.

This might be as a result of the fact that individuals of this age in their life tend to be more active and are more likely to interact with other people than the elderly and the very young. This is probably due to socio-cultural activities and supported by being the work force in the population. This indicates that males and females of reproductive age are more prone to this disease than the young or old. Children are being administered TB vaccine (BCG) at birth and this vaccine is said to have above 80% protection against TB in children (Bannon and Finn, 1999). This may in part explain for the low rate of TB cases in children.

When those with pulmonary and extra pulmonary TB were compared, the difference was very significant, Pulmonary tuberculosis was highly predominant. This is in line with (WHO, 2007) report which stated that when the disease becomes active, 75% of the cases may be pulmonary TB and that the other 25% active cases when the infection moves from the lungs, causing other types of TB, collectively denoted as extra pulmonary TB.

5. Conclusion

There was a significant yearly decrease of TB cases in cattle from 2005-2009. TB cases gradually increased in humans from 2006-2009. Our study has shown that TB cases occurred more commonly in males, adolescents and young adults. Most cases of tuberculosis in humans are pulmonary. The presence of bovine tuberculosis in the abattoir indicates possible cases of *Mycobacterium bovis* infecting humans, as the present diagnostic tool will not differentiate *M. bovis* from *M. tuberculosis.*

6. Recommendations

The TB control program should focus on prevention and control efforts, to reduce further the number of new cases.

Diagnostic technique in humans should involve determination of species of *Mycobacterium* which affects humans in order to evaluate the impact of bovine tuberculosis in this part of the country, and we recommend the use of deletion analysis.

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3/12/2011