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Prevalence of Tuberculosis in Males and Females in Arba Minch Town of South Ethiopia

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Prevalence of tuberculosis disease in males and females was studied in Arba Minch town of South Ethiopia from the records of Arba Minch hospital for four years from 2006 to 2009. The patients were classified as TB suspected and TB positive cases which were divided into ten yearly different age groups. In infant group up to 10 years, the TB suspected cases were 9 to 10% and positive TB patients were 2 to 6% in both males and females. The percentages of TB positive and suspected patients were high in both males and females in age group of 11-20 years ranging from 20 to 27% which increased to the maximum of 33 to 37% in age group of 21-30 years and decreased thereafter, ranging between 10 to 20% in age group of 31-40 years. In subsequent age groups of 41-50 and 51-60 years the number and percentages of patients decelerated from 7% in age group of 41-50 years followed by elderly age groups of 61-70, 71-80 and 81-90 years. The total number of suspected and the positive patients during four years were: 1141 and 299 in males, and 740 and 175 in females. The percentages of positive TB patients out of the suspected ones over the years were: 26.20 in males and 23.64 in females. Of the total positive patients over four years, however, 67.29% were males and 32.71% females. Thus the number and percentages of the TB patients were higher in males than the females. The results indicated that the TB disease was more prevalent in males than the females in and around Arba Minch town of south Ethiopia. The reasons for males being more affected with TB than females were not known. The greater mobility of males could possibly lead to getting higher infection by coming into contact with the TB patients and or the males were more prone to infection of this disease. However, it needs to be investigated for finding the reasons for more prevalence of TB in males than females.

Key words: TB disease, human males and females, Arba minch town, Ethiopia

INTRODUCTION

Tuberculosis is a life threatening disease. It ranks second in causing adult mortality among infectious diseases. It accounts for about 2 million deaths, 50 to 100 million infections and 8 to 9 million new cases every year worldwide (Frieden *et al.*, 2003). According to World Health Organization (WHO) one third of human population is infected with tuberculosis and some one dies every 15 seconds globally (WHO, 2009). It is caused by the bacterium, *Mycobacterium tuberculosis* described first by Robert Koch (Batzing, 2002) but other species of *Mycobacterium* such as *M. bovis*, *M. africanum*, *M. canetti*, *M. microti*, *M. capsae* and *M. pinnipedii* can also cause tuberculosis which are collectively called as *Mycobacterium tuberculosis* complex (Soo *et al.*, 2007).

Tuberculosis (TB) affects many parts of body but 80% of patients suffer from pulmonary TB or the lung TB. It spreads through inhalation of air containing tubercle bacilli by the person coming in contact with an infected person. The patients with pulmonary TB shed large number of tubercle bacilli by coughing or sneezing in to the air around it. It is a menace to human health in Africa as it is often associated with HIV/AIDS (Tortora *et al.*, 2007; Jerene *et al.*, 2007). Several strains of *Mycobacterium tuberculosis* have been found in equatorial Africa. The occurrence of multiple drug resistance in the strains poses a problem in the control of TB in several countries of Africa, Asia and Europe. Africa alone accounted for one third of all notified and relapse cases and the similar proportion of new smear positive cases in 2007. Among the 22 high TB affected countries in the world nine are in Africa and Ethiopia ranks seventh among these countries (Corbett *et al.*, 2006). In Ethiopia, Southern Nations Nationalities Peoples Region (SNNPR) had high incidence of TB with an estimated 23928 new sputum smear positive cases in 2007-08 (FDRE, MOH 2007-08). The occurrence of TB in human beings needs to be observed at different places to devise control measures and to advise people to avoid its infection. The present investigation reports the prevalence of TB in males and females in Arba Minch town of southern Ethiopia.

MATERIALS AND METHODS

The materials for the investigation represented the population of TB patients recorded at Govt. Arba Minch hospital (AMH). Arba Minch town has 75000 human populations as per record of Central Statistical Authority of Ethiopia (<http://www.csa.gov.et>). It is located at 6.5 N0 and 37.32°E at altitude 1200-1400 m above mean sea level with temperature range between 200 and 300 °C, and average rainfall of 623.5 mm. It is a town in Southern

Nations Nationalities Peoples Region, 505 km away in south of Addis Ababa. The patient population comprised of people of all ages registered as suspected TB patients and positive TB patients after sputum test. Three samples of sputum from each suspected patient were collected, one at the time of submission of test request form, second in the early morning of the next day, and the third after two days. The samples were examined in AMH for the presence of *Mycobacterium tuberculosis* briefly as follows: The yellowish opaque purulent part of sputum was taken out by flame sterilized metal loop and spread on the sterile slide, passed over the flame of Bunsen burner three times and dried for 30 min. The smear was stained with Ziehl-Nelson stain and heated gently on the flame of cotton wool dipped in methylated spirit. On cooling, the slide was rinsed in water until excess stain was removed. The slide was decolorized in 3% HCl and washed gently in water. Thereafter, the smear was treated with enough of 0.3% methylene blue for two minutes. Excess methylene blue was removed and the slide washed with water. The smear was examined under the microscope by placing a drop of immersion oil to make contact between the slide and the objective lens. *Mycobacterium* took magenta colour as against light background. Identification was done by examining in several microscopic fields.

The data on TB patients were collected from AMH for four years from 2006 to 2009 and arranged for both males and females in 10 yearly consecutive different age groups, separately. Percentage of positive TB patients in males and females out of the suspected ones as well as out of total positive patients were calculated. The results were summarized in Table 1 to 4 for occurrence of TB in males and females.

RESULTS AND DISCUSSION

The data on TB patients recorded as the suspected and positive TB cases in Arba Minch hospital for four years from 2006 to 2009 were divided into ten yearly different age groups, viz., up to 10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71-80 and 81-90 years for both males and females. The results on number and percentages of TB positive and suspected patients in different age groups are summarized in Table 1 and 2 for years, 2006 and 2007, and 2008 and 2009, respectively. It may be noted from Tables 1 and 2 that the children age group of up to 10 years had about 2% TB positive cases in males and 4 to 7% in females during four years. The percentages of positive TB patients in 11-20 years age group were considerably high which varied from 20 to 31% in males and 19 to 36% in females during four years with average 27 and 26% over the years, respectively (Table 3). The highest percentage of TB positive patients were

Table 1: Number of TB positive and suspected patients with percents in parenthesis in different age groups for males and females in Arba Minch during 2006 and 2007

| Age group year | 2006 | | | | 2007 | | | |
|----------------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| | Males | | Females | | Males | | Females | |
| | Positive | Suspected | Positive | Suspected | Positive | Suspected | Positive | Suspected |
| upto 10 | 1(1.56) | 30(10.91) | 1(4.00) | 23(11.92) | 1(1.19) | 38(12.62) | 3(5.66) | 29(14.72) |
| 11-20 | 13(20.31) | 60(21.82) | 9(36.00) | 49(25.39) | 26(30.95) | 64(21.26) | 16(30.19) | 40(20.30) |
| 21-30 | 21(32.81) | 90(32.73) | 5(20.00) | 60(31.09) | 30(35.71) | 88(29.24) | 23(43.30) | 65(32.99) |
| 31-40 | 9(14.06) | 50(18.18) | 2(8.00) | 30(15.54) | 19(22.62) | 61(20.27) | 3(5.66) | 20(10.15) |
| 41-50 | 10(15.63) | 18(6.55) | 2(8.00) | 10(5.18) | 5(5.96) | 32(10.63) | 5(9.43) | 18(9.14) |
| 51-60 | 2(3.13) | 8(2.91) | 3(12.00) | 8(4.15) | 1(1.19) | 8(2.66) | 1(1.89) | 3(1.52) |
| 61-70 | 6(9.38) | 10(3.64) | 2(8.00) | 11(5.70) | 1(1.19) | 4(1.33) | 1(1.89) | 20(10.15) |
| 71-80 | 1(1.56) | 6(2.18) | 1(4.00) | 2(1.04) | 1(1.19) | 6(1.99) | 1(1.89) | 2(1.02) |
| 81-90 | 1(1.56) | 3(1.09) | | | | | | |
| Total | 64(100) | 275(100) | 25(100) | 193(100) | 84(100) | 301(100) | 53(100) | 197(100) |

Table 2: Number of TB positive and suspected patients with percents in parenthesis in different age group for males and females in Arba Minch during 2008 and 2009

| Age group year | 2006 | | | | 2007 | | | |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Males | | Females | | Males | | Females | |
| | Positive | Suspected | Positive | Suspected | Positive | Suspected | Positive | Suspected |
| upto 10 | 3(3.45) | 16(5.32) | 4(7.41) | 10(4.50) | 1(1.56) | 16(6.06) | 2(4.65) | 10(7.81) |
| 11-20 | 27(31.03) | 67(22.26) | 13(24.07) | 34(15.32) | 15(23.44) | 62(23.48) | 8(18.60) | 19(12.80) |
| 21-30 | 34(39.08) | 99(32.89) | 21(38.89) | 72(32.43) | 26(40.63) | 99(37.50) | 14(32.56) | 45(35.16) |
| 31-40 | 13(14.95) | 72(23.92) | 4(7.41) | 27(12.16) | 13(20.31) | 50(18.94) | 9(20.93) | 26(20.31) |
| 41-50 | 3(3.45) | 27(8.97) | 3(5.56) | 13(5.86) | 4(6.25) | 18(6.82) | 3(6.98) | 13(10.16) |
| 51-60 | 4(4.60) | 12(3.99) | 1(1.85) | 6(2.70) | 4(6.25) | 16(6.06) | 1(2.33) | 3(2.3) |
| 61-70 | 1(1.15) | 3(1.00) | 3(5.56) | 20(9.01) | 1(1.56) | 3(1.14) | 1(2.33) | 4(3.13) |
| 71-80 | 2(2.30) | 5(1.66) | 5(9.26) | 40(18.02) | | | 5(11.63) | 8(6.25) |
| 81-90 | | | | | | | | |
| Total | 87(100) | 301(100) | 54(100) | 222(100) | 64(100) | 264(100) | 43(100) | 128(100) |

Table 3: Number and percentage of TB positive and suspected patients out of their totals over four years(2006-2009) in different age groups for males and females in Arba Minch

| Age group years | Male positive patients | Percent male positive | Female positive patients | Percent female positive | Male suspected patients | Percent male suspected | Female suspected patients | Percent female suspected |
|-----------------|------------------------|-----------------------|--------------------------|-------------------------|-------------------------|------------------------|---------------------------|--------------------------|
| upto 10 | 6 | 2.01 | 10 | 5.71 | 100 | 9.41 | 72 | 9.73 |
| 11-20 | 81 | 27.09 | 46 | 26.29 | 253 | 22.17 | 142 | 19.19 |
| 21-30 | 111 | 37.12 | 63 | 36.00 | 376 | 32.95 | 242 | 32.70 |
| 31-40 | 54 | 18.06 | 18 | 18.29 | 233 | 20.43 | 103 | 13.92 |
| 41-50 | 22 | 7.36 | 13 | 7.43 | 95 | 8.33 | 54 | 7.30 |
| 51-60 | 11 | 3.68 | 6 | 3.43 | 44 | 3.86 | 20 | 2.70 |
| 61-70 | 9 | 3.01 | 7 | 4.00 | 20 | 1.75 | 55 | 7.43 |
| 71-80 | 4 | 1.34 | 12 | 6.86 | 17 | 1.49 | 52 | 7.03 |
| 81-90 | 1 | 0.33 | | | | | | |
| Total | 299 | 100 | 175 | 100 | 1141 | 100 | 740 | 100 |

recorded in 21-30 years age group which ranged from 31 to 41% in males and 20 to 43% in females during four years with average 37 and 36% over years in males and females, respectively.

The percentage of TB positive patients in 31-40 years age group varied from 14 to 22% in males and 6 to 21% in females during four years with average 18 and 10%, respectively. Evidently, the males in this age group had higher prevalence of TB than the females. In 41-50 years age group the positive patients were 4 to 15% in males and 6 to 9% in females. In subsequent elderly age groups, the percentages of TB positive patients decelerated, for instance, in 51-60 years age group it varied from 1 to 6% in males and 2 to 12% in females with average over 3%. In 61-70 years age group it varied from 1 to 9% in males and

2 to 8% in females with averages 3 and 4%, respectively. In 71-80 year age group positive patients ranged from 1 to 2% in males and 2 to 11% in females with average of 1 and 7% over four years in males and females, respectively. The percentage positive patients in 81-90 years age group was 1.56% during 2006 only as the patients in other three years, 2007, 2008 and 2009 were not recorded in this age group.

The suspected patients in children age group up to 10 years varied from 5 to 14% with average over 9% over four years both in males and females as evident from Table 1, 2, and 3. Similarly, the percentage of suspected cases was higher in 11-20 years age group which varied from 21 to 23% in males and 13 to 25% in females with average 22 and 19% over four years in males and females,

Table 4: Number and percentage of TB positive patients out of the suspected ones and the percentage of TB Positive patients out of total positive patients in males and females in Arba Minch during 2006 to 2009

| Years | Males | | | Females | | | Total positive patients | Percent positive patients | |
|-------|----------|-----------|------------------|----------|-----------|------------------|-------------------------|---------------------------|---------|
| | Positive | Suspected | Percent positive | Positive | Suspected | Percent positive | | Males | Females |
| 2006 | 64 | 275 | 23.27 | 25 | 193 | 12.95 | 89 | 71.91 | 28.09 |
| 2007 | 84 | 301 | 27.90 | 53 | 197 | 26.90 | 137 | 61.31 | 38.69 |
| 2008 | 87 | 301 | 28.90 | 54 | 222 | 24.33 | 141 | 61.70 | 38.30 |
| 2009 | 64 | 264 | 24.24 | 43 | 128 | 33.59 | 107 | 59.81 | 40.19 |
| Total | 299 | 1141 | 26.20 | 175 | 740 | 23.64 | 474 | 67.29 | 32.71 |

respectively. As for the positive patients, the suspected cases were highest in 21-30 years age group, whose percentage ranged from 29 to 35 in males and 31 to 35% in females with average 33% both in males and females. The percentage of suspected patients in 31-40 years varied from 18 to 24% in males and 10 to 20% in females with averages 20 and 14% in males and females, respectively. Obviously, the suspected patients were higher in males than the females in this age group similar to that of the positive TB patients. The suspected cases in 41-50 years age ranged from 7 to 11% in males and 5 to 10% in females with average over 8 and 7% in males and females. In age group 51-60 years the suspected patients were over 3 and 2% in males and females during four years. The average percentages of suspected cases in 61-70 and 71-80 years age group were 1.75 and 1.49 in males and 7% in females which showed that females had more suspected cases in these age groups.

The results on the number of suspected and the positive TB patients, and the percentage of positive TB patients out of the suspected ones, total positive patients, and the percentages of males and females out of total positive patients for four years from 2006 to 2009 are summarized in Table 4. The number of TB suspected patients varied from 264 to 301 in males totaling to 1141 over four years from 2006 to 2009, whereas the same varied from 128 to 222 in females totaling to 740 during these years. The number of TB positive patients in males ranged from 64 to 87 with a total of 299 in males and the same varied from 25 to 54 with a total of 175 during 2006 to 2009. It was evident from the number of TB suspected and the positive patients that the males were more affected with TB than the females. The percentage of TB positive patients out of the suspected ones over four years was 26.20 in males and 23.64% in females indicating thereby high occurrence of TB in males than females. Further, the percentages of positive TB patients out of the total positive cases ranged from 60 to 72% in males with average of 67.29%, whereas the same varied from 28 to 40% with average of 32.71% in females during four years. Thus TB patients were generally higher in males than the females during four years as evident from Table 4. From the foregoing results it was obvious that the prevalence

of TB was considerably higher in males than the females in Arba Minch town. In an earlier study at Arba Minch hospital on the TB patients from January to August, 2005, Jerene *et al.* (2007) reported that 52% of the total 190 patients were males, with age ranging from 15 to 68 years with median age 30 years. The present study with data of Arba Minch hospital for four years from 2006 to 2009 showed that the positive TB patients out of the total positive patients 67.29% were males and 32.71% were females. Obviously, the prevalence or occurrence of TB disease in males was higher than that in the females. The reasons for the prevalence higher TB in males than the females were not known. Tuberculosis is an infectious chronic disease. Any factors that contribute in spreading the infection more in males than that in females need to be investigated. The greater mobility of males than females to visit and to come into contact with TB patients could contribute in catching higher infection among the males than the females.

Most affected TB patients particularly the pulmonary TB patients shed considerably higher number of tubercle bacilli in the air around by coughing or sneezing. Any person inhaling the air containing tubercle bacilli can get infection in the lungs to cause pulmonary tuberculosis (Seth, 2010). Tuberculosis is not reported to be a hereditary disease. But the prevalence of higher TB among males than females needs to be investigated. The male and female members of the affected families need to be studied for finding some clues for higher TB among males than the females. As the prevalence of TB is found to be more in males than in females, the males have to take due care to avoid infection of the tuberculosis causing bacteria which may occur due to any factors in the routine of their life.

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