



Retrospective Study on Prevalence of Human Taeniasis in Mekelle, Tigray, Ethiopia

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ABSTRACT

A cross-sectional study was conducted at Mekelle from November 2013 to March 2014 on the basis of questionnaire survey with the main objective of determining the prevalence of taeniasis in human. It also estimates the cost of taeniasis treatment in Mekelle town. A retrospective data on human taeniasis was collected from health centers and inventory of Pharmacy shops in Mekelle town. Out of the total 75 respondents, 46 (61.3%) had contracted *Taenia (T) saginata* infection and there was significant difference ($p < 0.05$) with religious groups and different levels of raw meat consumers ($P = 0.000$). An-overall prevalence of human taeniasis was 0.56% (193/34, 310). An inventory of pharmacy shops revealed a total of 22,412 adult taeniocidal drug doses worth 95,700 Eth. Birr (4958.5 USD) were sold during the year 2012-2013. Based on the response of pharmacists at 48 different pharmacy shops, 40 (83.33%) were from rural areas as compared to urban dwellers (16.7%). Niclosamide and Praziquantel are the only drugs used for treatment of human taeniasis in the study area and Niclosamide was preferred over Praziquantel. Taeniasis is resulted by consumption of raw beef. Therefore, due attention is needed to spread mass awareness in public and there is strict need for routine meat inspection.

Keywords: Health centers; Pharmacy shop; Prevalence; Taeniasis; Mekelle, Ethiopia.

1.INTRODUCTION

Taenia saginata, commonly known as the beef tapeworm is a zoonotic tapeworm found in intestine causing taeniasis in humans. Cattle are the intermediate hosts where larval development occurs, while humans are definitive hosts harboring the adult worm. Humans are generally infected as a result of eating raw beef having cysts of *Taenia*. Taeniasis is found globally that consume raw beef (Murrell, 2005). It is relatively common in Africa, some parts of Eastern Europe, Southeast Asia, and Latin America (Eckert, 2005). In Eastern African countries 70% of the population is reported to have been infected with a tapeworm (Tolossa et al., 2015).

Taeniasis is very common in Ethiopia (Mohammed and Waqtola, 2006) and the cost of taeniocidal drugs for treatment results into annual loss of revenue (Ahmed, 1990; Dawit, 2004; Abunna, 2006). Prevalence of human taeniasis in Ethiopia varied from 31% to 70% as has been reported by different researchers (Megersa et al., 2010; Bedu et al., 2011; Endris and Negussie, *Momona Ethiopian Journal of Science (MEJS)*, V10(2):290-297, 2018 ©CNCS, Mekelle University, ISSN:2220-184X
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2011; Taresa et al., 2011; Abunna, 2013; Gebremichael and Mohammed, 2013). The present study was undertaken to determine the prevalence of human taeniasis in Mekelle town of Tigray region.

2.MATERIALS AND METHODS

2.1.Study Area

The present study was conducted at Mekelle, the capital city of Tigray Regional State which is located 783kms North of Addis Ababa. Its astronomical location is 13°32' North latitude and 39°28' East longitude. The total area of the city is estimated to be 53 km² and it is located between altitudes of 2000-2200 m above sea level. The rainy season in the Mekelle region is from June to September, while the dry season is from October to May. The average annual rainfall is approximately 579mm.

2.2. Study Design and Data Collection

The study was a cross sectional type in which retrospective data collection from health centers, questionnaire survey and drug shops.

2.3. Questionnaire Survey on Taeniasis

Identification of 75 volunteer respondents for questionnaire survey was based on random selection of volunteers from Mekelle town. Taeniasis such as by raw meat consumption, age, sex, marital status, religion, occupation, educational levels, and knowledge about how cattle get infected were assessed. Occupationally high risk groups were meat, meat products and animals, such as, abattoir workers, butcher men, meat inspectors and farmers; whereas, the low risk groups were arbitrarily selected as those not connected.

2.4.RetrospectiveData Survey of HumanTaeniasis

Data on human taeniasis for 2012 and 2013 were collected from the parasitological laboratory recording books at 7 health centers located in Mekelle town. Taenia positive patients out of the total patients examined for their stool were included in the data of this study. Also the number of males and females and age (<18, 18-30, 31-40 and >40) of positive patients were recorded.

2.5. Inventory and Questionnaire Survey at Pharmacy Shops

Inventories at 26 randomly selected pharmacy shops located in Mekelle town were screened for the amount and cost of drugs sold yearly for the treatment of human taeniasis. The age (young or

adult), sex, residential status (rural or urban) of buyers having/not having doctor's prescription were recorded. The most common drug sold during the year was also noted.

2.6. Data Management and Analysis

The collected data from health centers, questionnaire and drug sale inventory were stored into Microsoft excel. Chi-square statistical test was employed to analyze the association of taeniasis occurrence with the potential risk factors using Stata11.1 software. Both data collected by questionnaire from residents of the town and survey were analyzed using chi-square statistical test to assess the association between the disease occurrences with the risk factors.

Table 1. Potential risk factors for Taeniasis prevalence among the interviewed respondents.

| Risk factors | No. interviewed | No. of infected | X² | p-value |
|-------------------------------|------------------------|------------------------|----------------------|----------------|
| Age | | | 1.9380 | 0.379 |
| 20-30 | 28 | 15(53.57%) | | |
| 31-40 | 28 | 17(60.71%) | | |
| >40 | 19 | 14(73.68%) | | |
| Sex | | | 1.1735 | 0.279 |
| Male | 52 | 34(65.38%) | | |
| Female | 23 | 12(52.17%) | | |
| Occupation | | | 1.1968 | 0.274 |
| Low risk | 38 | 21(55.26%) | | |
| High risk | 37 | 25(67.57%) | | |
| Religion | | | 13.2472 | 0.000 |
| Christian | 58 | 42(72.4%) | | |
| Muslim | 17 | 4(23.53%) | | |
| Marital status | | | 0.5060 | 0.477 |
| Single | 27 | 18(66.67%) | | |
| Married | 48 | 28(58.33%) | | |
| Educational status | | | 0.0765 | 0.782 |
| Illiterate | 27 | 16(59.26%) | | |
| Literate | 48 | 30(62.5%) | | |
| Raw meat consumption | | | 16.1141 | 0.000 |
| Infrequent | 43 | 18(41.86%) | | |
| Frequent | 32 | 28(87.5%) | | |
| Knowledge of human infection | | | 1.0331 | 0.309 |
| Yes | 72 | 45 (62.5%) | | |
| No | 03 | 1 (33.33%) | | |
| Knowledge of animal infection | | | 2.7006 | 0.100 |
| Yes | 18 | 14 (77.8%) | | |
| No | 57 | 32 (56.1%) | | |

3.RESULTS

3.1. Questionnaire Survey

Questionnaire survey data collected was translated into categorical variables which were assessed for association with human taeniasis (Table 1). Of the total 75 respondents, 46 (61.3%) of them said they were infected with human taeniasis (*T. saginata*) at least once in their life time. There was statistically significant difference in the prevalence of taeniasis between different religion groups ($p < 0.05$; $p = 0.000$) and different level of raw meat consumers ($p < 0.05$; $p = 0.000$). There was no statistically significant difference ($p > 0.05$) observed in the prevalence of taeniasis between age groups, sex, marital status, educational status, and occupation. 96% (72/75) of them know the cause of taeniasis i.e. raw or under cooked meat and 24% of them replied that cattle were infected with *C. bovis*.

3.2. Retrospective Study of Taeniasis

It was conducted from seven different health centers located in Mekelle town to find out the prevalence of taeniasis. The result indicated that the overall prevalence was 0.56% (193/34,310). In males whose age was greater than 40 had higher prevalence (2.1%) as compared with females (0.63%) of the same age group. The overall prevalence of taeniasis in male's age group was 0.64% and that of females was 0.51% (Table 2).

Table 2. Retrospective data and prevalence of human taeniasis in Mekelle town.

| <i>Sex</i> | <i>Age</i> | <i>No. of diagnosed</i> | <i>No. of infected</i> |
|------------|------------|-------------------------|------------------------|
| Male | <18 | 6238 | 6 (0.096%) |
| | 18-30 | 4174 | 30 (0.72%) |
| | 31-40 | 1434 | 20 (1.4%) |
| | >40 | 1386 | 29 (2.1%) |
| | Total | 13,232 | 85 (0.64%) |
| Female | <18 | 7952 | 7 (0.089%) |
| | 18-30 | 8889 | 67 (0.75%) |
| | 31-40 | 2480 | 23 (0.9%) |
| | >40 | 1757 | 11 (0.63%) |
| | Total | 21,078 | 108 (0.51%) |
| Overall | 34,310 | 193 (0.56%) | |

3.3. Inventory of Pharmacy Shops

It was revealed that a total of 22,412 adult doses of taenicial drugs costing 95,700 ETB (4943.2 USD) per annum was used in the treatment of human Taeniasis in the town. Niclosamide 80.3% was sold followed by Praziquantel 19.7% (Table 3).

Antitaeniasis drugs were most commonly used by dwellers of rural areas 40 (83.3%) as compared with urban dwellers, 8 (16.7%). Forty seven of 48 respondents (97.9%) (pharmacists), reported that Niclosamide and Prazequantel were the drugs used for treatment of human taeniasis in the study area and Niclosamide is preferred to Prazequantel. The clients do not use prescription to buy anti-taeniasis drugs and a higher percentage of people in adult age groups and males were the frequent users of taeniocides (Table 4).

Table 3. Taeniocidal drugs sold at 26 different pharmaceutical shops in Mekelle for 2012/13.

| <i>Name of drug</i> | <i>Total dose</i> | <i>Total cost (ETB)</i> |
|---------------------|-------------------|-------------------------|
| Niclosamide | 17, 990 | 61, 784 |
| Prazequantel | 4422 | 33, 916 |
| Total | 22,412 | 95,700 |

Note: ETB= Ethiopian birr; 1USD=19.33 ETB.

Table 4. Frequency of human taeniasis according to data based on different characteristics at pharmaceutical shops.

| <i>Characteristics</i> | <i>Frequency</i> | <i>Percentage(%)</i> |
|---|------------------|----------------------|
| Resident of clients (from where they come from) | | |
| Urban | 8 | 16.7% |
| Rural | 40 | 83.33% |
| Effective drug according to clients opinion | | |
| Niclosamide | 15 | 31.25% |
| Prazequantel | 33 | 68.75% |
| Commonly in use antitaeniasis drug | | |
| Niclosamide | 47 | 97.92% |
| Prazequantel | 1 | 2.08% |
| Age group which commonly uses the drugs | | |
| Adult | 38 | 79.17% |
| Old | 10 | 20.83% |
| Sex of the clients | | |
| Male | 41 | 85.42% |
| Female | 7 | 14.58% |
| Prescription use | | |
| Yes | 2 | 4.17% |
| No | 46 | 95.83% |

4. DISCUSSION

Human taeniasis was found to be a widespread health problem in the study area with prevalence of 61.3% which agrees with the findings of others (Taylor et al., 2007; Regassa et al., 2008; Taresa et al., 2011; Tesfaye et al., 2012). Significant association was observed between taeniasis prevalence and raw meat. The proportion of taeniosis infection is higher in people believing christians (72.4%) than muslims (23.53%). Markos Tibo (2001); and Abunna et al., (2008) have also recorded similar observations in different parts of Ethiopia suggesting that the tradition of raw beef consumption is more important in the christian community.

Statistically there was no significant difference between prevalence of taeniasis among two sexes and different educational levels. Similar finding has been reported from Jimma town by Megerssa et al. (2010). This could be due to the long time cultural habit of eating raw meat particularly that of “kurt” and “kitifo” in many social groups.

As compared to prevalence of taeniasis based on questionnaire survey, prevalence of the disease as per inventories in health centers was low. One of the major reasons of this difference was buying of taenicidal drugs without a prescription issued by health centers. Also many patients who visited health centers may have used traditional medicines.

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