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Seroprevalence of Human Toxoxcariasis in Relation to Socio-economic Status: A Case Study of Six Hospitals, Adamawa State, Nigeria

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Abstract:
Study on the Seroprevalence of Human Toxocara canis (T.canis) Antibody Titre using ELISA Technique was conducted in Six Government Hospitals (General Hospitals) of Adamawa State Nigeria, between the months of January to June 2018. Five Hundred and Sixty-four (564) whole blood samples were collected using non-randomised sampling technique for convenience. Five millilitres (5ml) of serum after separation of the whole blood was used for analysis. Statistical analyses were carried out using Statistix 9. Results obtained from the study indicates that under care (Children under one year) had higher prevalence of 69.69%, while farmers had lower prevalence of 60.31%

Keywords*: Antibody, Seroprevalence, Socio-economic status, Correlation, Adamawa, Pork, Toxocara canis and Seropositivity*

1. Introduction

Toxocariasis is a neglected infection that has a worldwide distribution. *T. canis* is the most relevant agent due to its frequent occurrence in humans. Over the years, this disease has drawn much attention because of its surprisingly high prevalence (Anna *et al*., 2018). Parasite eggs are commonly found in soil and canine fur, dirty hands, consumption of vegetables contaminated with embryonated eggs or consumption of embryonated egg in paratenic hosts such as chicken, beef from cattle, pork and other small animals. Previous studies have reported varying seroprevalence rates in different locations which agree with the findings in this study. The overall seroprevalence rate in this study was 63.63% though higher agrees with similar work earlier conducted by Alonso *et al.* (2000), who reported a positivity of 37.9% in Argentina; Epinoza *et al.* (2008) in Peru and Brazil (32.4%) positivity. Similarly, Ajayi *et al.* (2014) reported 29.8% positivity in Jos, Nigeria. Other findings showed 1.6% in Japan, 2.4% in Denmark, 6.3% in Australia, 7% in Sweden, 14% in USA and 19.6% in Malaysia (Guangxu *et al.,* 2018).

2. Materials and Methods

2.1. Study Area

Adamawa State is located at the North Eastern part of Nigeria. It lies between latitude 7^0 and 11^0 N of the equator and between longitude 11^0 and 14^0 E of the Greenwich meridian. It shares boundary with Taraba State in the South and West, Gombe State in the Northwest and Borno to the North. Adamawa State has an international boundary with the Cameroon Republic along the Eastern border. The State covers a land area of about 38,741km with a population of about 2,102,053 people according to the 1991 census. Adamawa State is divided into 21 Local Government Areas Fig 3.1 (Adebayo and Tukur 1999).

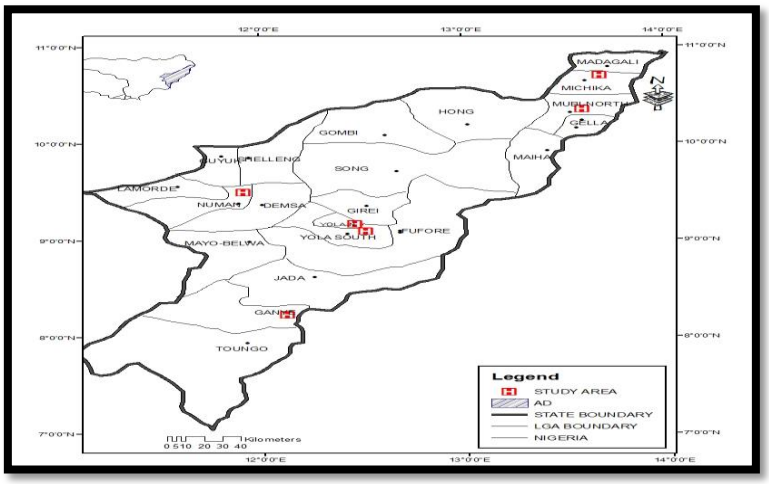

Figure 1: Map of Adamawa State Showing Study Areas

Study Design and Sample Collections

One hundred (100) whole blood samples each were collected from the Six Hospitals in the Study Areas using nonrandomised sampling technique for convenience, whole blood was collected through the venous puncture with the aid of sterile syringe and approximately 5ml of whole blood was obtained and emptied into plain gel vac-container tubes pre-labelled with information on Age, Sex, Location, Socioeconomic Status, Tribe, Religion and whether the Patient's own dog(s) or not. The blood samples were than centrifuged to separate serum from the red cells, the serums were then used for analysis.

2.2. Laboratory Analysis

Enzyme Link Immunoabsorbent Assay (ELISA) *Toxocara canis* Antigen Kit product No.8206-35 supplied by Diagnosis Automation/Cortez Diagnostics Inc. Woodland Hills California USA were used for analysis which was carried out in the Haematology Laboratory of the Federal Medical Centre Yola, Adamawa State, Nigeria.

2.3. Statistical Analysis

Statistix 9.1 (2012) Statistical package for scientist and engineers, USA, was used for statistical analysis.

3. Results/ Discussion

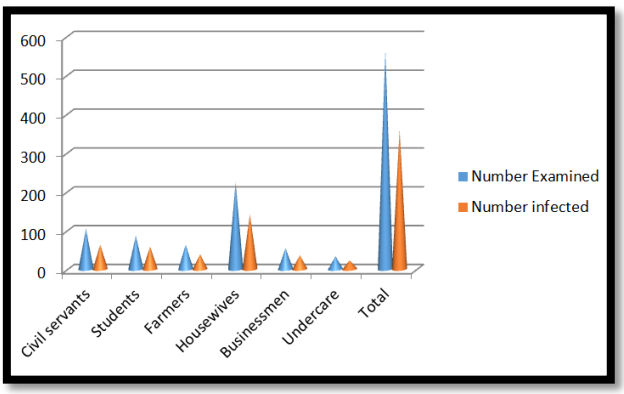

Figure 2: Seroprevalence of Anti-Toxocara Antibody Titre with Socio-Economic Status

Finding in this study based on socioeconomic status indicates that under care (Children under one year) had higher prevalence of 69.69%, while farmers had lower prevalence of 60.31%; similar result was recorded by Mazur-Melewska *et al*., 2012 where it was reported that Children within this age range spend a considerable amount of time playing in soil that could be contaminated with *Toxocara canis* eggs, and exposed to infection. Children within this age range are known to have the habit of playing with dogs so much so that sometimes they share their meal stalk less of their habit of eating sand (geophagia) which could have increased their risk of infection. Children socio-economic level is a factor that influences *Toxocara* seroprevalence as reported by (Nash, 2000; Magnaval, 2001). While some studies report that *Toxocara* Seroprevalence increases with low socio-economic status (Magnaval, *et al*., 1994; Alonso *et al*., 2000; Kanafi *et al*., 2006; Dar *et al*., 2008), there are others which claim that it does not change (Buijs *et al*., 1994; Sadjjadi *et al*., 2000), this contradiction can be explained with the presence of different socio-economic factors influencing the seroprevalence of Toxocariasis like dog and cat ownership, presence of untreated host, pet population, personal and social hygiene, education, faecal contamination of drinking water, contaminated soil in play grounds and in homes. These factors are

commonly obtained in socioeconomically disadvantage communities thereby increasing the risk of infection with *Toxocara canis.*

In the current study, Odds ratio result indicated that there was an increase in the chances of infection with decrease in level of educational as recorded, students had 49% chances when compared with business men, housewives and farmers with 50%, 58%, and 65% chances respectively, this finding agrees with an earlier result reported by Lynch *et al*., 1988; Genchi *et al.,* 1990 and Havasiova *et al.,* 1993.

Findings in this study that shows that socio-economic status of individuals is statistically non-significant (P=0.196) to *Toxocara canis* infection agrees with an earlier report by Filho *et al.* (2002), in Brazil; which showed a non-significant effect of socio-economic parameters on human infection rates with Toxocariasis. Similar findings have also been reported by Tina *et al.,* (2016); where it was reported that educational level, dwelling place be it rural or urban and the personal hygiene status of individuals coupled with the factors such as environmental contamination and presence of untreated dogs and cats, which are mostly seen in low socio-economic areas than high socio-economic areas and the combination of favourable climate and poor sanitation results in a high transmission pressure. On the other hand, it should not be underestimated that one feature which constitutes an important risk factor for a region or country may not be the most important risk factor for another region. It is likely that Toxocariasis will be one of the diseases about which we will be writing and talking in the future as long as human live with dogs and cats

Though findings in this study have indicated that farmers had lower prevalence rate, Odds Ratio result indicated that farmer had higher chances of infection, this could be attributed to their roles in farming activities as such activities exposes them to soils probably contaminated with *Toxocara* species definitive host. This agrees with findings of Pius *et al.* 2012, in their work on the prevalence and risk factors for zoonotic helmith infection among humans and animals in Jos, Nigeria 2005-2009; where it was reported that contact with soil due to farming activities exposes individuals to the risk to infection with *Toxocara canis* eggs.

4. Conclusion

In conclusion the study showed that there is a very high Seroprevalence of *Toxocara canis* Antibody Titre amongst the studied population, with Children at a high risk of getting infected

5. Recommendations

It is therefore recommended that Anti-Toxocara Antibody Screening be included in the routine Medical Diagnosis. It is also recommended that further studies on Molecular Diagnosis be carried out to ascertain the Gene Markers responsible for the Pathology caused to the host by *T. canis.*

6. Acknowledgements

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