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Sero-Prevalence of Human Taeniasis Antibody Using Enzyme-Linked Immunosorbent Assay Among Herdsmen in Benue Vally Farm, Fofure Local Government Area, Adamawa State, Nigeria

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Abstract: The economic and public health consequences of T. saginata in our society cannot be overstated. Therefore, this study was conceived to determine the sero-prevalence of T. saginata antibody among Herdsmen in Benue Vally farm, Fofure Local Government area, Adamawa State, Nigeria. The study was carried out using a purposive sampling technique, a total of ninety four (94) samples were used. T. saginata antibody ELISA Test Kit was used for analysis. In this study, males had a higher prevalence of 13.3% while females had 8.8%. Among the age groups, aged 21-30 had a higher prevalence of 10.34%, while 41-year-olds had zero prevalence. The prevalence of 11.7% was found among those who eat beef. Those who ate only properly cooked beef had the least prevalence of 11.1%, others had prevalence of 15.4%. Consume raw beef had prevalence of 20%, while do not consume raw beef had prevalence of 10.6%. Those who dewormed regularly had a prevalence of 8.5% while those who do not deworm regularly had a higher prevalence of 21.7%. Those who always wash their hands had 11.1% prevalence, while those who do not had 10.0% prevalence. Conclusively, the prevalence in the study area is relatively low and eating undercooked beef, open defecation, poor sanitation, and poor personal hygiene are all contributing factors to the disease's future prevalence in the study area. Thus it's recommended that government and NGOs should make proper campaign awareness program and health education to curtail transmission of T. saginata taeniasis among the Herdsmen in Benue Vally farm, Fofure Local Government area, Adamawa State, Nigeria.

Keywords*: Sero-Prevalence, Taeniasis, Transmission, Antibody.*

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I. INTRODUCTION

Taenia saginata is an intestinal zoonotic cestode (tapeworm), which is most commonly found in humans (Food & Agricultural Organization/United/World Health Organization [FAO/WHO] 2014). Taeniasis and cysticercosis are meat borne parasitic infection with public health and economic importance globally (Jansen, Dorny, Trevisan, Dermauw, Laranjo-González & Allepuz, 2018). These tapeworm infections have significant human and veterinary disease implications as well as economic effects (Okello & Thomas, 2017). Taeniasis has a worldwide distribution for *Taenia solium* and *Taenia saginata*, except *Taenia asiatica* which appears to be restricted to Asian countries. The highest prevalence is found in areas with poor access to adequate clean water and sanitation and areas that ingest raw or under-cooked meat (Dermauw, Dorny, Braae, Devlleesschauwer, Robertson, Saratsis… *et al.*, 2018). The same authors reported that *T.saginata* has its highest prevalence in Southern and Eastern Africa. *T. solium* has been effectively controlled in most of Europe, North America, and Australlia while the highest prevalence is found in Africa, Asia, Latin America East Europe, China, Pakistan, and India

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(Tanowitz, Weiss & Wittner, 2001; Okello & Thomas, 2017; Garcia, 2018).

The primary risk factor that sustains the transmission of the disease being unsanitary disposal of human faeces, and eating raw or insufficiently cooked beef or pork (Biu & Hena, 2008). The tapeworm *T. saginata* is one of the three *Taenia* species that infect humans as their definitive host, with bovines serving as the intermediate host. Contaminated pastures, water and feed are sources of infection for cattle. Following ingestion, the early larval stages (oncospheres) hatch and the hexacanth larvae migrate, utilising the lymphatic and blood system, to the muscle tissue. Here the larvae mature into the metacestode stage, called cysticerci (Symeonidou, Arsenopoulos, Tzilves, Soba, Gabriël, Papadopoulos… *et al.*, 2018).

The inspection procedure for *C. bovis* depends on physical examination of the slaughtered animal to detect macrocysts in the predilection sites. It has been shown that the currently established inspection methods are not suitable for sensitive detection of cysticercus metacestodes, which in many cases were found in tissues other than predilection sites (Wanzala, Onyango, Abuje, Kangeth, Ochanda & Harrison, 2012). It was difficult to diagnose in live animals, but if the animal was heavily infested, cysts may be felt on the tongue and face. The majority of cases were identified during visual inspection at slaughter, with samples sent to a laboratory for confirmation. If infection was confirmed, the meat would be destroyed or frozen to inactivate the cysts and prevent transmission to people (Wanzala, Onyango-Abuse, Kangethe & Zessin, 2017).

The Enzyme- Linked Immunosorbent Assay (ELISA) was considered one of the useful methods for sero diagnosis of bovine cysticercosiss to indicate the infection in outbreaks or high infected areas (Harrison, Garate & Bryce, 2005).

II. METHODOLOGY

➢ *Study Area*

The study was conducted in Benue Vally farm, Fofure Local Government Area of Adamawa State, Nigeria.

➢ *Study Population*

A total of Ninety-four samples were collected from Herdsmen in Benue Vally farm, Fofure. Two (2) serum samples out of the Ninety-four (94) samples collected were used for positive and negative control. The actual samples used for this study were three hundred and seventy-two (92).

➢ *Serology*

Blood samples (2 ml each) were obtained from 96 Herdsmen in Benue Vally farm, Fofure and the sera harvested according to standard methods. Sera samples were frozen at -20^{o}C until required. All sera were analysed and screened for IgG antibodies to *T. saginata* using the enzyme-linked immunosorbent assay according to the manufacturer's recommendations.

➢ *Statistical Analysis*

Data was computed using descriptive statistic of percentage and SPSS (statistical) software. A Chi-squared test was used to compare the differences in Sero-prevalence of *T. saginata* antibody among human at a 5% level of significance.

III. RESULTS

Table 1: Sero-Prevalence of *T. saginata* Antibody in Relation to Sex and Age Group

Variable	No. Examined	No. Positive (%)
Sex		
Male	60	8(13.3)
Female	34	3(8.8)
Age		
11-20	15	3(20.0)
21-30	38	6(10.34)
31-40	23	2(16.12)
41&above	18	0(0.0)
Total	**94**	**11(11.7)**

Sex: χ^2=1.095, df = 1, p=0.295, p>0.05
Age: χ^2=3.455, df = 3, p=0.327, p>0.05

Table 2: Sero-Prevalence of *T. saginata* Antibody in Relation to Behavioral Determinants of the Study Samples

		No. of Respondents	ELISA Result
			No. Positive (%)
Eat beef	Yes	94	11(11.7)
	No	0	0(0)
Properly cooked beef	Yes	81	9(11.1)
	No	13	2(15.4)

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Eat raw beef	Yes	20	4(20.0)
	No	74	7(9.5)
Deworm regularly	Yes	71	6(8.5)
	No	23	5(21.7)
Wash hands	Yes	84	10(11.9)
	No	10	1(10.0)
Toilet	Water system	43	4(9.3)
	Latrine	51	7(13.73)
Water source	Borehole	82	9(11.0)
	Well	12	2(16.7)

IV. DISCUSSION

The possibility of Serological identification of *T. saginata* infected humans among Herdsmen in Benue Vally farm, Fofure LGA was investigated in this study using ELISA assays that detect the presence of antibodies based on antigens-antibodies reaction.

The prevalence of *T. saginata* infection differed somewhat by age group, according to the findings. In this study, the age group 21-30 years had a higher prevalence than the other age groups. The age range of 21-30 is made up of capable young people who have a difficult time making ends meet. However, this study's high incidence in the age group 21-30 years is lower than previous studies in primary school children (Auta, Kogi, & Kokori Audu, 2013), in rural school children and adult, (Auta, Reuben, Abdulhadi, and Mohammed, 2014).

Earlier research by Hendrickx *et al.* (2019) and Moazeni *et al.* (2018) indicated no significant differences in *T. saginata* infection by population age. In a study conducted in Sudan and other northern Geneva zones, the parasite was shown to be equally prevalent in people of all ages (Eke *et al.*, 2014). As a result, age had no effect on the prevalence of *T. saginata* infection, indicating equivalent susceptibility to infection. This agreed with the current sudy.

Lack of latrine availability or usage (Eshitera, Githigia & Kitala, 2012; Weka *et al.*, 2013), as well as free-ranging husbandry techniques, have been linked to an increased incidence of Taeniasis in humans, underscoring the importance of environmental pollution. Although a single tapeworm can release up to 300,000 eggs per day, temperature and humidity have an impact on egg survival, with tropical areas being more conducive to transmission (Scholte *et al.*, 2013). The climate of the greater Yola area exhibits a typical tropical climate (Zemba, 2010). Surface moisture and humidity are thought to be the main constraining factors for *Taenia* spp. eggs in the environment: the eggs are vulnerable to desiccation and survival is greatly reduced under dry conditions, regardless of temperature (Pullan *et al.*, 2011). Mechanical spatial spread of eggs can also occur via movement in streams, rivers or flood waters and via the activity of dung beetles.

V. CONCLUSION

The prevalence of *T. saginata* Taeniasis among modern abattoir workers in Yola south Local Government Area of Adamawa state is 11.7%, according to this study.

Although the prevalence is relatively low, this study provides baseline data on the disease's prevalence in the study area. *T. saginata* causes great economic losses especially to the developing countries with public health problems, discomfort, and malnutrition in humans and children. With the increased number of human-to-cattle and person-to-person transmissions of Taeniasis, eating undercooked beef, open defecation, poor sanitation, and poor personal hygiene are all contributing factors to the disease's future prevalence in the study area.

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