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Seroprevalence of Echinococcusgranulosus parasite in sheep slaughtered at Katsina central abattoir Katsina state Nigeria

Bello, M. B., Magaji, A. S., Sabo,B. and Garba, N.
College of Agriculture, Hassan Usman Katsina Polytechnic, P.M.B. 2052 Katsina, Katsina State Nigeria

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ABSTRACT: This research 'Seroprevalence of Echinococcusgranulosus parasite in sheep slaughtered at Katsina central abattoir Katsina state Nigeria' determined the serum prevalence of hydatid cyst disease in sheep in Katsina state. The overall result indicated that 13.6% of sheep slaughtered during the study period were positive for Echinicoccusgranulosus antibodies. The study also shows that prevalence of E. granulosus increases as the animal aged with older animals between the age of 2-3 years having the highest prevalence of 5.6%. With regards to sex, female animals were found to have high (8.0%) prevalence than male (5.6%). However, Yankasa breed had the highest prevalence of E. granulosus antibodies (11.2%) than Ouda (2.4%) and Balami (0%). On the post-mortem inspection conducted during the study period in the abattoir 28(17.39%) CE lesions were found with Omentum having the highest prevalence (6.83%) among the visceral organs. Retrospective study at Katsina zonal veterinary clinic revealed no record of Echinococcusgranulosus disease reported. It can be concluded that Hydatid cyst disease is present in Katsina state. Therefore, detailed investigation into the basic local epidemiological factors governing the spread of hydatidosis in the area is recommended.

KEY WORDS: Katsina, Echinococcusgranulosus, Nigeria, prevalence, Abattoir

I. INTRODUCTION

Parasitic diseases are transmitted from animal to another, and some are transmitted from animal to human or even from human to another. This is another problem in itself, and with the low level of health education in the society and the low of conscious to veterinary services, so these parasitic diseases spread and causing health problems in the world. The most important of these diseases is cystic echinococcosis CE (Hydatidosis) disease, which caused by the larva or adult of Echinococcusspp, belonging to the family Taeniidae [6]. Hydatidosis is a term used to describe infection of animals and human with metacestode stage of Echinococcus species [4,12]. Dogs and other canids are definitive hosts for the parasite while livestock are intermediate hosts. Man is aberrant intermediate host. The outcome of infection in livestock and man is hydatid cyst development in lung, liver or other organs. Hydatid cyst causes severe disease and death in humans and results in economic loss for treatment costs, lost wages and livestock annual production loss [2]. Hydatid worms (Echinococcus granulosus) belong to the genus Echinococcus of the order Cyclophyllidea in the phylum Platyhelminthes. The adult worms are small and flat-shaped, parasitizing in the small intestines of carnivorous animals canine [16], while the larvae live in the liver, lung, and other organs of humans, cattle, sheep, pigs, and other animals [5,9], causing cystic hydatid disease, also known as cystic echinococcosis (CE). It is a serious zoonotic disease hazardous to humans [1,3] and livestocks[14,17]In living animal there is no reliable methods for the diagnosis of the infection except using ultra sonography alone or in conjunction with serum antibody detection for cyst identification [8].Based on Food and Agricultural Organization (FAO) reports, herbivorous animals are commonly infected in developed and developing countries..

The fertility of hydatid cysts occurring in various intermediate host species is one of the most important factors in the epidemiology of the disease [7]. The fertility of hydatid cysts varies depending on intermediate host species and geographical areas [13]

Typical live cycle for Echinococcus need two intermediate hosts; adult worm found in the intestine of the carnivores (dogs and foxes) as definitive hosts, while herbivorous (cattle, sheep, and camels) as an intermediate host, where the

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Metacestode stage (hydatid cyst) develops in their tissues. Humans are infected with Hydatidosis after ingestion the eggs and consider as an accidental intermediate host [11]). In living animal there is no reliable methods for the diagnosis of the infection except using ultrasonography alone or in conjunction with serum antibody detection for cyst identification [8]. The aim of this study is to determine the seroprevalence of Echinococcusgranulosus in sheep slaughtered at Katsina Central abattoir, Katsina state.

II. MATERIALS AND METHODS

Study Area

The research was conducted at the Katsina central abattoir Katsina state, Nigeria. Katsina state is located in the northwestern part of Nigeria between latitude $11^0 00^{'}$N and $13^0 20'$N and longitude $7^0 00'$E and $8^0 55'$E. Katsina state shares border with Zamfara state to the west, Kaduna state to the south, Kano and Jigawa states to the east and Niger Republic to the north. It has a land size of about 24,971.215km^2 with a population of 5,801,584 as at 2006 national census.

Katsina state fall under the tropical wet and dry climate type (Tropical Continental Climate). The average annual rainfall varies from 550 mm in the northern part to about 1000mm in the southern part of the state between May and September with high intensity between the month of July and August. The annual mean temperature is about 27^0C. the highest air temperature normally occurs in April/May and the lowest in December through February.

Study design

A cross sectional survey for the antibodies against Echinococcusgranulosus in sheep (as one of the intermediate hosts of the parasite) was conducted.

Sampling procedure

An average of 25-30 sheep (both male and female) were slaughtered on daily basis at sheep slaughter section of Katsina central abattoir. A random sampling technique was adopted often which in every 4 sheep slaughtered par day, 1 is selected randomly and its blood sample was collected and preserved.

SAMPLE COLLECTION

MATERIALS USED DURING SAMPLE COLLECTION AND PROCESSING

1. Test tubes.
2. Test tube racks.
3. Hand gloves.
4. Laboratory coat.
5. Plain blood sample bottles (Non-EDTA).
6. Cotton wool.
7. Centrifuge.
8. Marker for labeling.
9. Cello tape.
10. Refrigerator.
11. Transport (ice) pack.

Blood samples were collected from sheep at slaughter at Katsina Central abattoir for a period of 4 weeks (March – April, 2017), an average of 4-5 blood samples per day. Sheep slaughtered at the abattoir mostly come from the Local Government Areas as well as from the neighbouring Niger Republic. About 5 to 10mls of blood samples were collected in test tubes, the test tubes were labelled using cello tape and indelible marker. The blood samples were transported to the Department of Animal Health and Production Technology Laboratory at College of Agriculture, Hassan Usman Katsina Polytechnic, Katsina, in ice pack for analysis. The samples were allowed to stand for few minutes to allow the separation of the serum from the blood cells. The samples were then centrifuged at 3000rpm for 10 minutes and the sera poured into labeled plain sample bottles before being refrigerated.

The serology (ELISA test) was carried out using the protocol provided by the manufacturer (R-biopharm, Germany) and the assay was done in the Immunology unit of Parasitology Department, National Veterinary Research Institute (NVRI), Vom. Plateau State, Nigeria.

The ages of the animals were determined using dentition (plate 1); and sex and breed of the animals were noted. Post mortem examination of the viscera, especially the lungs and liver tissues was conducted for the presence of the cystic lesion. Samples suspected as hydatid cyst lesions were collected for microscopic identification. Identification of the viable metacestodes was carried out under light microscope by adding 0.1% aqueous eosin solution to equal volume of hydatid cyst fluid on a microscope slide on the principle that viable protoscoleces completely or partially exclude the dye, while the dead ones take it up [15,10]. Cyst materials were labeled against the collected blood sample of the animals as well as the organ on which it was found. Only metacestodes with viable protoscoleces were recorded.

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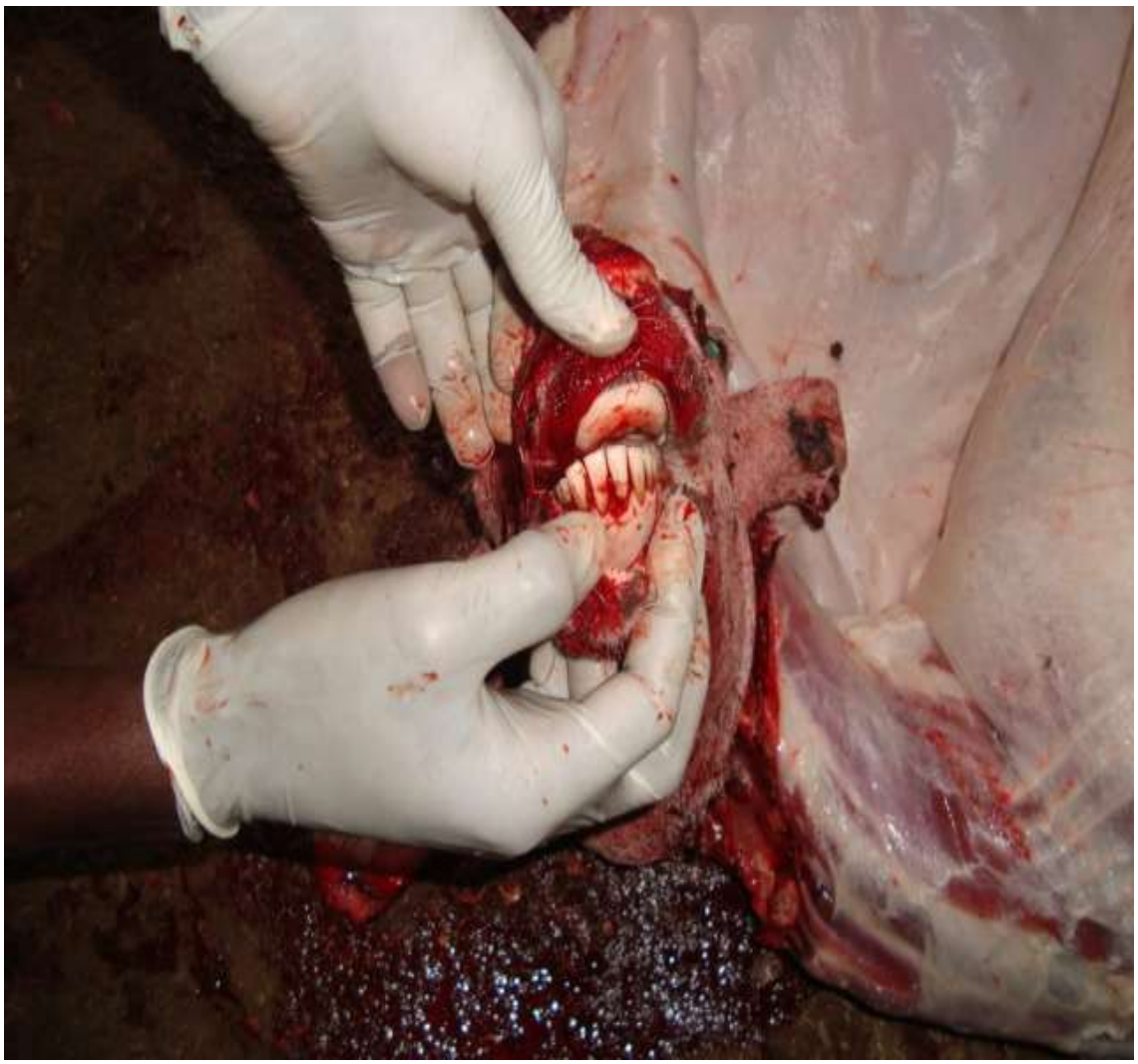

Plate1; Ageing of the sheep after slaughter.

III. RESULTS

The overall prevalence of E. granulosus at the Katsina Central abattoir is presented in table 3.1. A total of 125 samples were screened. 17 samples were positive for E. granulosus IgG antibodies giving a prevalence rate of 13.6%.

Table 3.1: Shows the overall prevalence rate of E. granulosus IgG antibodies in sheep slaughtered at the Katsina Central abattoir, Katsina state.

Total No. screened	No. of positive	Prevalence (%)
125	17	13.6

AGE PREVALENCE OF E. granulosus IgG ANTIBODIES IN SHEEP

Table 3.2 shows the age prevalence of E. granulosus IgG antibodies. The E.granulosus infection rate was very low in young animals (<1year old) 0 (0.00%). However, the rate increases as sheep aged, indicating that older sheep have higher chance to contact the pathogen between 2 to 3 years 7(5.60%).

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Table 3.2: The age prevalence of E. granulosus IgG antibodies in sheep slaughtered at the Katsina Central abattoir, Katsina state.

Age group (years)	No. examined	No. Positive	Prevalence (%)
< 1	21	0	0.00
≥1 - <2	39	2	1.60
≥2 - <3	18	7	5.60
≥3 - <4	35	3	2.40
≥4 - ≥5	12	5	4.00
Total	**125**	**17**	**13.60**

SEX PREVALENCE OF E. granulosus IgG ANTIBODIES IN SHEEP

Table 3.3 shows the sex prevalence of E. granulosus IgG antibodies. There was high IgG antibodies of E. granulosus detected in female (8.0%) than in male (5.6%).

Table 3.3: The sex prevalence of E. granulosus IgG antibodies in sheep at slaughter in Katsina Central abattoir, Katsina state.

Sex	No. screened	No. Positive	Prevalence(%) (%)
Male	82	7	5.60
Female	43	10	8.00
Total	**125**	**17**	**13.60**

BREED PREVALENCE OF E. granulosus IgG ANTIBODIES IN SHEEP

Table 3.4 shows the breed prevalence of E. granulosus IgG antibodies. There was high IgG antibodies of E. granulosusdetected in Yankasa breed (11.2%) than the other breeds Ouda (2.4%) and Balami (0%).

Table 3.4: The breed prevalence of E. granulosus IgG antibodies in sheep at slaughter in Katsina Central abattoir, Katsina state.

Breed	No. screened	No. Positive	Prevalence (%)
Ouda	21	3	2.40
Balami	17	0	0.00
Yankasa cross	87	14	11.20
Total	**125**	**17**	**13.60**

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ABATTOIR PROSPECTIVE SURVEY

One hundred and sixty-one (161) sheep were examined at post-mortem inspection during the period of the study for CE lesions and other parasitic lesions. Twenty 28 CE lesions were found. Incidence of cystic lesions was found to be 17.39 % (28/161) in sheep in this study. The organ location of the cysts includes: Mesentery, 3.10% (n=5); lungs, 1.86% (n=3); Omentum, 6.83% (n=11) and the liver, 5.59% (n=9).

The origin of thecystic lesions in the examined animals is presented in table 4.5. The Omentum was the most predominant site while the least lesions were observed in the lungs.

Table 4.5: Shows the organ distribution of cystic lesions in sheep slaughtered at Katsina central abattoir, Katsina state.

Organ	No. Infected	% Infected
Mesentery	5	17.86
Lungs	3	10.71
Liver	9	32.14
Omentum	11	39.29
Total No.	**28**	**100%**

POST-MORTEM RECORDS OF SHEEP IN KATSINA ZONAL VETERINARY CLINIC, KOFAR KWAYA, KATSINA.

On visit to the Katsina Zonal Veterinary Clinic, Tafawa Balewa way, Katsina state, none of the post mortem records were available for the study.

IV. DISCUSSIONS

This study was conducted to investigate the incidence of hydatid cyst disease in sheep slaughtered at Katsina Central abattoir, Katsina state, Nigeria using ELISA serological technique. The overall prevalence was found to be (13.60%) of Echinococcus granulosus antibodies. This value is almost similar to the prevalence in Ethiopia, which recorded 13.5% [16] in sheep. However, the result was slightly lower than the earlier reports about the parasite antibodies work [6] which shows a relatively higher prevalence rate of 36.2% (50/136).

The survey indicates that there is a close relationship between the infection rate and the age of the animal. The E.granulosus infection rate was very low in young animals (<1year old) 0 (0.00%). However, the rate increases as sheep aged, indicating that older sheep have higher chance to contact the pathogen between 2 to 3 years 7(5.60%).

There was high IgG antibodies of E. granulosus detected in female (8.0%) than in male (5.6%). The high prevalence found in female than male may be due to variation in immunity of the animal.

There was high IgG antibodies of E. granulosus detected in Yankasa breed (11.2%) than the Ouda (2.4%) and Balami (0%). This may be as a result ofgrazing behavior of the animal and exposer to the disease as Yankasa sheep are the predominant breed in the state and are mostly kept under semi-intensive system of management.

The survey also found that the Omentum and liver were more susceptible to the parasite with prevalence rate of 39.29% and 32.14% respectively. This may be because these organs have special blood circulation characteristics. In the liver, blood is abundantly supplied from both portal veins and hepatic arteries; 25% of the blood flow into the liver comes from the hepatic arteries, and used as the major supply of oxygen required for the liver. The remaining 75% is from the portal veins (jointly from the veins of the stomach, intestine, spleen, and pancreas), transporting various nutrients and hazardous substances from digestive tracts to the liver to process for recycling into the body's circulation systems. The Omentum has

intensive capillary networks, and they are the frequent designation of the 6-hooked larvae cycled in which the blood from the intestine to continue to develop.

During the survey, we also found that the high infection rate can be partially attributed to the lack of understanding of the herdsmen to the life cycle of the worms. Most of herdsmen do not know that dogs are the major sources of the infective stage (=eggs) of the parasite. It is therefore highly recommended that scientific educations and effective measures be undertaken in the regions to improve the awareness of disease prevention and to prevent the spread of the pathoge.

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