

Occurrence of Zoonotic Hepatitis E Virus Among Suspected Butchers in Kano Abattoir, Nigeria

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Abstract

Hepatitis E virus (HEV) is a non-enveloped RNA virus with a single-stranded, positive-sense genome, currently classified in the family Hepeviridae, and within in, proposedly in the genus Orthohepevirus. HEV infections are common in both humans and animals. In humans, HEV genotypes 1 and 2 (HEV-1 and HEV-2) are endemic to Asia, Africa, and Central America, where they cause large, usually waterborne, hepatitis epidemics, whereas zoonotic genotypes 3 and 4 (HEV-3 and HEV-4) cause sporadic cases worldwide. HEV-3 and HEV-4 also infect animals, and especially HEV-3 is common in swine globally. The porcine infection is usually asymptomatic. In humans, HEV-3 and HEV-4 infections are often asymptomatic or only cause mild symptoms of hepatitis, but they can also cause chronic hepatitis that can lead to liver fibrosis and cirrhosis and even death in immunocompromised patients. This is the cross sectional study of 73 butchers. Sterile 2ml syringe was used to withdraw 2mls of blood sample from each of the participants, and the blood was transferred into a plain containers. The sample was spun and the serum was separated and stored at - 20^oc.ELISA techniques were used to analyze the samples. Out of 73 recruited subjects, 36 were positive to Hepatitis E Virus IgG antibody. The association between the risk factors and the seropositivity was analyzed using Chi-square. There is a statistical significant association between the age ranges of 11-27. While there was no significant association between other

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ages ranges, no significant association between the genders, ethnic group and the state of origin. This study revealed that there is a prevalence of Hepatitis E Virus among butchers and it is associated with the age range of the participant.

Keywords: Hepevirus, Vaccines, Hepatitis E Virus.

Introduction

Hepatitis E virus (HEV) is the causative agent of hepatitis E virus infection in humans and it is an important public health disease in many parts of the World (Meng *et al.*, 2013). Hepatitis E virus is one of the most important cause of acute clinical hepatitis among adults throughout Central and Southeast Asia and the second most important cause throughout the Middle East and North Africa after hepatitis B (Purcell. 2008). Models derived from epidemiologic and clinical studies project a conservative estimate of the annual impact of hepatitis E virus infection to be ~3.4 million symptomatic cases, 70,000 deaths, and 3,000 stillbirths (Rein *et al.*, 2012). The etiologic agent of hepatitis E virus infection is hepatitis E virus (Emerson *et al.*, 2003) classified as a member of the genus Hepevirus, family Hepeviridae (Meng *et al.*, 2012). The virus is a non-enveloped, single-stranded positive-sense RNA virus that contains three open reading frames (ORF); ORF1 encodes for non-structural proteins, ORF2 encodes for the capsid protein, and ORF3 encodes for a multi-functional small protein (Meng *et al.*, 2012).

HEV is transmitted primarily by the fecal-oral route through contaminated drinking water. However, recent studies have demonstrated that various animal species have serum antibodies to HEV, suggesting that hepatitis E is a zoonotic disease (Meng. 2000). In Japan, 4 hepatitis E cases have been linked directly to eating raw deer meat (Tei *et al.*, 2003), and several cases of acute hepatitis E have been epidemiologically linked to eating undercooked pork liver or wild boar meat (Yazaki *et al.*, 2003). These cases provide evidence of zoonotic food-borne HEV transmission. Therefore this research is aim at identifying the incidence of HEV among butchers in Kano abattoir and the butchers ought to be introduced in the study.

Materials and Method

Study Design and Population

This is a cross sectional study among people working in the abattoir. A total of 73 participants were recruited in the study randomly.

Sample Collection

The serum sample was used for the analysis.

Two milliliter (2ml) of venous blood sample was collected aseptically from each of the participant and dispensed into a plain container. The sample was spun at 3000rpm for 5minutes. The serum was transferred into pre-labeled 2ml plain containers and stored at -20°C.

Sample Analysis

The ELISA kits (Melsin Co Ltd, China) were used to detect the IgG of the virus using indirect ELISA principle following the manufacturer's instruction strictly.

Ethics and Consent

Ethical clearance to conduct the research was obtained from the ethical committee of ministry of health Kano, Kano State Nigeria. All participants signed a written informed consent to participate in the study.

Statistical Analysis

Data obtained were edited and summarized using Microsoft Excel. Association between proportions tested using Chi square at 95% confidence interval. p-value of < 0.05 was considered statistically significant.

Result

A total of 73 participant recruited in this research 72 (98.6%) were males and 1 (1.4%) was a female. The age of the participants ranges from 11-59 years.

The socio-demographic data of the participants was obtained, where 41(56.2%) are within the range of 11-27yrs, 22 (30.1%) are within the range of 28-43 and 10 (13.7%) are within the range of 44-59 years (**Table 1**) out of which 1 (1.4%) of the participant is a Christian while 72 (98.6%) are Muslims. Among which, 72 (98.6%) are Hausa and 1 (1.4%) is Jaba by tribe.(**Table 1**). The participants include butchers from five states, Kano 64 (87.7%), Sokoto 6 (8.2%), Kaduna 1 (1.4%), Yobe 1 (1.4%) and Jos 1 (1.4%) (**Table 1**)

Table 1 Socio-Demographic Characteristic of the Participants

Variable	Frequency (%)
Gender	
Male	72 (98.6)
Female	1 (1.4)
Age category	
11-27	41 (56.2)
28-43	22 (30.1)
44-59	10 (13.7)
Ethnic group	
Hausa	72 (98.6)
Fulani	0 (0.0)
Jaba	1(1.4)
State of origin	
Kano	64 (87.7)
Kaduna	1 (1.4)
Sokoto	6 (8.2)
Jos	1 (1.4)
Yobe	1 (1.4)

The prevalence of Hepatitis E Virus was obtained in which 36 (49.3%) out of 73 recruited subjects are seropositive and 37 (50.7%) are sero-negative to hepatitis E antibody as shown in

Table 2 Prevalence of Hepatitis E Virus

Variable	Frequency	Percentage
Negative	37	50.7
Positive	36	49.3
Total	73	100

Different species of animals handled by the participants, were identified, where 29 (39.7%) handles camel, 59 (80.8%) handles cow, 1 (1.4%) handles pig, 28 (38.4%) handles poultry, and 49 (67.1%) handles sheep (**Table 3**)

The investigation shows that 9 (12.3%) uses protective device while handling the animals

The table three depict the association between the risk factors and sero-positivity or sero-negativity and there was no significant association between the two, because all the p-values was greater than 0.005 (**Table 3**)

Table 3 Risk Factors Associated with Sero-positivity

Variables	Positive	Negative	X ²	P-Value
CAMEL				
Yes	15	14	0.112	0.738
No	21	23		
SHEEP				
Yes	24	25	0.07	0.935
No	12	12		
COW				
Yes	29	30	0.03	0.955
No	7	7		
PIG				
Yes	1	0	0.986	0.321
No	36	36		
POULTRY				
Yes	13	15	0.151	0.697
No	23	22		
PROTECTION				
Yes	5	4	0.160	0.689
No	31	33		
TOTAL	36	37		

P=< 0.05, X²= Chi square

The Association between socio-demographic variables and the sero-positivity or sero-negativity was obtained in which 37 males are seropositive to hepatitis E, (**Table 4**)

And 35 males are negative while 1 female is seropositive and none is negative to HEV (**Table 4**).

The findings also shows that age range of 11-27 have 16 participant that are seropositive, age range of 28-43 have 11 participants that are seropositive and age range of 44-59 have 9

participants that are seropositive (Table 4). The age range of 11-27 is statistically significant because the *P*-value is 0.014 which is < 0.05 (Table 4).

Table 4 Association Between Socio-Demographic Variables and Sero-Positivity or Sero-Negativity

Variables	Positive	Negative	X ²	P-value
Gender				
Male	37	35	1.042	0.307
Female	0	1		
Age(Years)				
11-27	25	16	8.462	0.014*
28-43	11	11		
44-59	1	9		

P= < 0.05 , X²= Chi square

Discussion

Hepatitis E virus (HEV) is a major cause of acute hepatitis in many developing countries. HEV is an essential enterically transmitted human and animal pathogen with a worldwide distribution. It causes sporadic cases as well as large epidemics of acute hepatitis (Khuroo, 1991). The occurrence and magnitude of outbreaks are strongly associated with the hygienic conditions and the occupational exposure.

In our study, the HEV antibody prevalence was found to be 49.3% in butchers of Kano abattoir which is consistent to the result of the research conducted by Kuan *et al.* (2013) in Burkina Faso among blood donors found 47.8%. The result obtained is lower than the result obtained from the research conducted by Kuan *et al.* (2015) among Ouagadougou butchers which was estimated to be 76%. It is also lower than the result (67.7%) obtained from the cohort study in Egyptian villages by Stoszek *et al.* (2006). It is also lower than the result obtained from China by Feng *et al.* (2018). The anti-HEV antibody sero-prevalence was found to be higher in age group ranging from 11-27yrs found 44.4% the difference was statistically significant (*P*-value =0.014), than 30.6% of age group 28-43yrs and 25% in age group 44-59yrs. However in another study in Nigeria a high sero-prevalence was observed among those below 10 and above 60 years and the lowest sero-prevalence among those between 20 and 40 years (Junaid *et al.*, 2014).

In this study, the increased sero-prevalence among the middle aged may be explained by the fact that most of them are energetic males who are involved in slaughtering animals in the abattoir which increases their degree of exposure.

Males had a high seroprevalence compared to females. This may be because males are more involved in activities of slaughtering and supplying animals thus more exposed to animals and animal carcasses compared to females.

Conclusion

The result of this investigation identifies the presence of HEV infection in Kano abattoir and suggests that it should be considered a public health problem. Hence the vaccine should be provided to prevent the spread of the virus.

References

- Feng Y, Feng Y-M, Wang S, Xu F, Zhang X, Zhang C (2018). High seroprevalence of hepatitis E virus in the ethnic minority populations in Yunnan, China. *PLoS ONE* 13(5): e0197577.
- Junaid SA, Agina SE, Abubakar KA (2014). Epidemiology and associated risk factors of hepatitis e virus infection in plateau state, Nigeria. *Virology: research and treatment* ;5:15.
- Khuroo M.S. Hepatitis E: The enterically transmitted non-a, non-b hepatitis. *Indian Journal Gastroenterol.* 1991;10:96-100
- Kuan Abdoulaye Traoré, Jean Bienvenue Ouoba, Nicolas Huot, Sophie Rogée, Marine Dumarest, Alfred S. Traoré, Nicole Pavio, Nicolas Barro, and Pierre Roques (2015). Hepatitis E Virus Exposure is Increased in Pork Butchers from Burkina Faso *American Society of Tropical Medicine*;93 (6) pp. 1356-1359.
- Meng X-J (2000). Zoonotic and xenozoonotic risks of the hepatitis E virus. *Infectious Disease Review.*;2:35- 41.
- Meng XJ, Anderson D, Arankalle VA, Emerson SU, Harrison TJ, Jameel S, Okamoto H (2012). Hepeviridae. King AM, Adams MJ, Carstens EB, Lefkowitz EJ, editions. *Virus taxonomy: Ninth Report of the International Committee on Taxonomy of Viruses.* London, UK: *Academic Press*, 1021-1028.
- Meng, X.J (2013). Zoonotic and foodborne transmission of hepatitis E virus. *Seminar on Liver Diseases.*, 33, 41-49.
- Purcell, RH., Emerson SU (2008). Hepatitis E: an emerging awareness of an old disease. *Journal of Hepatology.* 48: 494-503.
- Rein, DB., Stevens, GA., Theaker, J., Wittenborn, JS., Wiersma ST (2012). The global burden of hepatitis E virus genotypes 1 and 2 in 2005. *Hepatology.* 55: 988-997.
- Stoszek S K, Engle R E, Abdel-Hamid M, Mikhail N, Abdel-Aziz F, Medhat A (2006). Hepatitis E antibody seroconversion without disease in highly endemic rural Egyptian communities. *Transaction of the Royal Society of Tropical Medicine and Hygiene.*; 100(2):89-94.
- Tei, S., Kitajima, N., Takahashi, K., Mishiro, S (2003). Zoonotic transmission of hepatitis E virus from deer to human beings. *Lancet Journal.* 362: 371-3.
- Yazaki, Y., Mizuo, H., Takahashi, M., Nishizawa, T., Sasaki, N., Gotanda, Y (2003). Sporadic acute or fulminant hepatitis E in Hokkaido, Japan, may be food-borne, as suggested by the presence of hepatitis E virus in pig liver as food. *Journal of General Virology.*