

Serodetection of Hepatitis E Virus among Food Handlers in Khartoum Locality

Omer Mohammed Tamal*

Department of Microbiology, Faculty of Medical laboratory Science, West Kurdofan University, Elnuhud Sudan

*Corresponding author: omer.tamel@yahoo.com

Abstract Background: Hepatitis E virus (HEV) infections occur chiefly as a result of poor hygienic conditions. The virus is responsible for major outbreaks of acute hepatitis in developing countries. **Objective:** The aim of this study to detect HEV antibodies among food handlers working in Khartoum Locality. **Methods:** Enzyme linked immunoassay (ELISA) was done to determine the presence of anti- HEV IgG among 90 food handlers during the period from January to May 2015. **The results:** HEV IgG antibodies were detected in 10 (11.1%). There were no significant differences in HEV seropositivity between the subjects regarding gender ($P = 0.8$), age ($P = 0.47$) and nationality ($P = 0.40$) (Sudanese vs. Ethiopian), P . values ≤ 0.05 . **Conclusion:** this study concluded that HEV circulate at low but considerable levels especially among food handlers; that may be a source of infections. Adoption of molecular methods to confirm HEV positive among food handlers is highly recommended. Further nationwide study is required to validate the results of the present study.

Keywords: HEV IgG, ELISA, Hepatitis E virus, food handlers, Sudan

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1. Introduction

Hepatitis E represents a significant public health and economic burden particularly in countries where the absence of sanitation infrastructures, or their breakdown as a consequence of wars or natural disasters, brings the hygienic conditions below a safe level [1,2].

HEV is a spherical, non-enveloped, single-stranded RNA virus belonging to the Hepeviridae family and the Hepevirus genus [3]. It is mainly an enterically transmitted virus that causes waterborne epidemics in developing countries and sporadic cases in developed countries. There are four reported routes of transmission, namely waterborne, zoonotic (foodborne), bloodborne and perinatal [4].

Diagnosis of hepatitis E was made by observance of typical symptoms with elevated aminotransferases, presence of IgM anti-HEV, and rising titer of IgG anti-HEV in exclusion of other etiology of acute hepatitis. Enzyme immunoassays (EIA) for HEV antibodies are based on detection of antibodies against the highly conserved capsid protein. Although positive detection of HEV RNA in serum or stool is a confirmatory diagnostic test, there is no commercially available HEV RNA detection assay [5].

In Sudan, a large hepatitis E outbreak occurred in western Darfur; a total of 2621 cases were reported between 26 June and 31 December 2004 in Mornay Internally Displaced Persons Camp (78,800 inhabitants) [6] and also another prevalence rate (41.1%) was reported

among pregnant women in Khartoum [7]. In related studies, reported prevalence rates 42.7% and 42% in Nigeria and Zambia, respectively [8,9].

Hepatitis E Virus (HEV) infection is a newly recognized serious threat to global public health. Africa is suspected to be among the most severely affected regions in the world [10]. This cross-sectional study aimed to detect HEV antibodies among food handlers that helps to minimize spread of infection and make guideline to guide public health decision –making.

2. Materials and Methods

The current descriptive, cross-sectional study carried out between January to May, 2015. A ninety food handlers working in Khartoum locality were included in this study, Sudan were recruited in this study. This study was approved by Sudan University of Science and Technology ethical committee board and an informed consent was obtained from each food handlers before collecting the demographic and clinical data. Five-mL blood samples were obtained by venipuncture for serological analyses. Samples were centrifuged and sera were separated immediately. Sera were stored at -20°C , and tested for the presence of anti-HEV IgG antibody by enzyme-linked immunosorbent assay (ELISA) (EUROIMMUN medizinische labordiagnostika AG, Germany). The assays were performed following the instructions of the manufacturer. The presence of anti-HEV IgG antibody was considered as the evidence for prior exposure to HEV. All collected data were analyzed using SPSS version 15.

Descriptive statistics were reported as the mean \pm SD for continuous variables and as the frequency (%) for dichotomous variables. To evaluate the relationship between different factors we performed chi-square analysis. Quantitative variables were compared using independent t-test. *P. values* < 0.05 were considered statistically significant.

3. Results

The study was carried out during the period from January to May 2015 to detect Hepatitis E Virus among food handlers working in Khartoum.

A total of ninety food handlers, 87 (96.7%) males and 3 (3.3%) females were enrolled in this study (Table 1). Among these 67 (74.4%) were Sudanese and 23 (25.6%) Ethiopian. Their ages ranged from 19 to 57 years, with a mean age 29.5 years; 17 (18.9%) were less than 25 years old, 72 (80%) were 26 to 41 years old and one (1.1%) was above to 42 years old (Table 1).

The serodetection revealed that anti-HEV IgG among food handlers was 10 (11.1%) positive, 1 (1.1%) borderline while 79 (87.8%) negative. The seroprevalence was high (6.7%) among food handlers aged 26 - 41 years, followed by 10 - 25 years (4.4%), and 42 - 57 years (0). However, there was no statistically significant difference in prevalence of anti-HEV IgG by age groups ($P = 0.47$). The seroprevalence was also higher in Sudanese food handlers (10%) than Ethiopian (1.1%) (Table 2). There was no significant differences between the prevalence of anti-HEV antibodies in Sudanese and Ethiopian food handlers ($P = 0.4$). Male accounted for higher seroprevalence (10%) in contrast to female (1.1%). There was no significant differences between food handlers regarding to gender ($P = 0.8$). *P. values* \leq 0.05.

Table 1. Demographic and clinical data of all study population

Character		Frequency	Percentage (%)
Age (years)	10- 25	17	18.9
	26- 41	72	80
	42- 57	1	1.1
Gender	Male	87	96.7
	Female	3	3.3
Nationality	Sudanese	67	74.4
	Ethiopian	23	25.6

Table 2. Distribution of HEV- IgG detection among food handlers regarding to age, gender and nationality

Character		Results		
		Positive No. (%)	borderline No. (%)	Negative No. (%)
Age (years)	10- 25	4 (4.4%)	0	13 (14.5%)
	26- 41	6 (6.7%)	1 (1.1%)	65 (72.2%)
	42- 57	0	0	1 (1.1)
Gender	Male	9 (10%)	1 (1.1%)	77 (85.6%)
	Female	1 (1.1%)	0	2 (2.2%)
Nationality	Sudanese	9 (10%)	0	58 (64.4%)
	Ethiopian	1 (1.1%)	1 (1.1%)	21 (23.3%)

4. Discussion

Hepatitis E Virus (HEV) infection represents an important public health concern in many developing countries, where it is primarily transmitted through the orofecal route due to inadequate sanitary conditions and contaminated water supplies [11,12].

This study investigated HEV among food handlers working in Khartoum Locality. Ninety food handlers, (67 (74.4%) Sudanese and 23 (25.6%) Ethiopian) were included in this study. Of them 87 (96.7%) were males, and 3 (3.3%) females, with mean age of 29.5 years. The sero-positive HEV IgG antibody among food handlers was 10 (11.1%). This result was less than that reported among pregnant women in Khartoum (41.1%) and Darfur (31.1%) [1,7]. The differences between these two groups could be due to the fact that pregnant women considered to be potential risk factor for the virus [4]. (The result was also less than that reported in South Korea (33.5%), Nigeria (42.7%), Zambia (42%), France (31%), China (22.7%) and Mexico (36.6%) but higher than that reported in Iran (7.4%) [8,9,13,14,15,16,17]. These differences in prevalence rate could be due to differences in the population or the size of the sample studied. Other reasons might be lie in the differences in socioeconomic, cultural and hygienic and climatic factors across geographic. These factors need to be further evaluated.

The prevalence of HEV IgG in the different age groups of food handler revealed a high prevalence in the group 26 - 41year olds. These results were similar to those obtained by Hassan *et al* (2013) in Iran which revealed a high prevalence in aged group 31 -50 years [18]. The increase prevalence in these aged groups might be attributed to the high exposure of virus due to activate of these group.

Although no statistically significant difference was observed with regard to nationality, the current study recorded proportionately higher prevalence among Sudanese food handlers than Ethiopian. Logical reasoning could be the members of Sudanese in this study were higher than Ethiopian. The study also recorded higher seroprevalence among male than female that could be the members of the female enrolled in this study were small amount because the female rarely work as food handlers in Sudan due to customs and traditions. Therefore, a population-based study to confirm or exclude this speculation is urgently required. In addition, the sanitary conditions under which food handlers working need to be improved.

4. Conclusion

Hepatitis E infection is a result of poor hygiene and can be prevented by practising good hygiene, handling food appropriately, and drinking safe water. The study concluded that Hepatitis E Virus (HEV) circulates at low but considerable levels especially among food handlers; that may be a source of infections. The seroprevalence of HEV was higher in Sudanese food handlers than Ethiopian and among food handlers aged 26 - 41 years. Finally, addressing the public health problems associated with the enteric transmission of viral hepatitis in

developing countries will require implementing stronger measures to prevent fecal contamination of food and water.

5. Recommendations

1. Further studies with large sample size are needed to evaluate the risk factors associated with HEV among food handlers.

2. Reinforce the importance of food safety and provide training for food handlers to reduce the risk of HEV and other enteric infections.

3. Raise the awareness of general public about the risks of HEV and other enteric infections through various channels and advise the importance of good personal and food hygiene.

4. Food handlers should be considered for prophylaxis (HEV vaccine).

5. Finally, further nationwide study is required to validate the results of the present study.

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