Hepatitis E virus (HEV) is ssRNA positive-strand virus, the member of the Hepevirus genus, Hepeviridae family and consists of 4 major genotypes (1, 2, 3 and 4). Genotypes 1 and 2 of HEV have been found only in humans and they are responsible for epidemics in endemic region (HEV 1 in North America and Asia, HEV 2 in West Africa and Mexico). The transmission is primarily via the faecal-oral route through drinking water or food contaminated with human excreta. In developed countries those two genotypes cause travel associated infections, in Europe cases caused by HEV 1 are predominant. Genotypes 3 and 4 of HEV have been found in humans and animals (pigs, wild boars, shellfish and other), they are responsible for worldwide autochthonous infections. Zoonotic transmission to humans is the most important for HEV genotypes 3 and 4. Consumption of raw or undercooked wild-boar meat, offal or beef is significantly associated with autochthonous HEV infection. HEV infections caused by blood transfusions, mother-to-child, person-to-person, and sexual intercourses were also documented but uncommonly noted. In Europe, there is mostly genotype 3 in humans, but a few cases of HEV 4 were described (Wichmann et al., 2008; Lee et al., 2015; Pérez-Gracia et al., 2015). HEV-infected persons exhibit a wide clinical spectrum, ranging from asymptomatic infection through acute icteric hepatitis to fulminant hepatitis. Acute hepatitis E usually manifests with icterus, malaise, anorexia, fever, hepatomegaly, and occasionally pruritus. Certain population sub-groups are at a higher risk of severe disease following HEV infection. These include pregnant women, persons with pre-existing liver disease and persons with immunosuppression (WHO, 2014).

Contact exposure to infected animals leads to an elevated risk of HEV transmission in humans. Studies have shown that occupational groups e.g. swine breeders (Forgách et al., 2007), slaughterers (Krummbholz et al., 2012), veterinarians who come into close contact with pigs (Bouwknecht et al., 2008) run the risk of being infected with HEV. Swine workers in Spain were found to be 5.4 times more likely to be positive for anti-HEV IgG than those not exposed to swine (Galiana et al., 2008). Contact with swine is the most widely recognized route for occupational exposure to HEV; however, the multitude of novel strains of HEV in wildlife and other domestic animal species suggest additional mechanisms of transmission (Yugo and Meng, 2013). The aim of the study was the analysis of the occurrence of specific antibodies against HEV among hunters and foresters who are at risk to be exposed.

Study group consisted of 210 hunters aged of 23–80 (54, SD 11.61): 208 men (99.05%) and 2 women (0.95%).
and 60 male foresters, at the age of 22–64 (45.63, SD 11.81). The selection of the groups was purposeful because hunters and foresters have a diverse activity by being in forest environment. Blood samples were collected in Lubelskie voivodship from 2014 to 2015. The groups of hunters and foresters were divided into three age groups: ≤ 35 years old, 36–55 years, > 55 years. The Bioethical Committee of Medical University of Lublin authorized the project (permission No. KE-0254/177/2014).

Serological analysis. The presence of anti-HEV IgG was detected by ELISA (Anti-Hepatitis E virus (HEV) ELISA IgG, Euroimmun). Microtiter wells were coated with mixed recombinant antigens of Hepatitis E virus genotypes 1 and 3. The results above or equal 2.2 relative units/ml (RU/ml) were considered as positive, below 1.6 RU/ml as negative, whereas borderline results were ≥ 1.60 and < 2.2 RU/ml. The test was carried out and the results were interpreted according to the manufacturer’s instructions.

The obtained data were analysed statistically using Statistica v. 10 software. The Chi-square test was performed for nominal features in order to detect statistically significant dependence. For data expressed numerically nonparametric Mann-Whitney U and Kraskala-Wallisa test was performed. The assumptive level of significance was p = 0.05.

The results for anti-HEV IgG in hunters group were as follows: 8 positive samples (3.81%), 10 borderline (4.76%) and 192 negative (91.43%). Anti-HEV IgG in the foresters group were detected in 3 samples (5%) at positive level and in 1 sample (1.67%) at borderline level. Anti-HEV antibodies were not reported among 56 (93.33%) foresters. The statistical analysis shows no significant differences in the titers anti-HEV IgG between the groups of hunters and foresters (p = 0.5278). The titers of anti-HEV IgG were presented in Table I.

Significant statistical differences (p = 0.004) in titers of anti-HEV IgG between the age group 36–55 (0.58, SD 0.71), and the age group > 55 (1.06, SD 2.94) for all the tested subjects were found. There were also significant statistical differences (p = 0.0194) in IgG titers between the age group of ≤ 35 (1.08, SD 3.05) and the age group > 55 (1.06, SD 2.94) for all the tested subjects. Significant statistical differences (p = 0.0119) in titers of anti-HEV IgG between the age group 36–55 (0.59, SD 0.75) and the age group > 55 (0.89, SD 2.08) for the hunters were found.

In our study 210 hunters aged 23–80 were examined. At the beginning of the experiment we assumed that the forester group, without the direct contact with animals, would be the control group of the study. Positive results anti-HEV IgG were present in 3.81% of the samples of the hunters group and in 5% of the samples of the foresters. The statistical analysis in our study showed no significant differences in the results anti-HEV IgG between the groups of hunters and foresters. The higher titers anti-HEV IgG was in the older age groups, significantly higher antibody titers demonstrated in the age group > 55 years.

In the study of Sadowska-Todys et al. (2015) performed in Poland among 1027 hunters (17 to 85 years of age), in 206 persons (25%) anti-HEV IgG were found by means of ELISA test (positive and borderline result). Anti-HEV IgM were confirmed in 3 persons. The study showed that the percentage of persons with anti-HEV IgG is the highest in the age group ≥ 70 and the difference is statistically significant comparing to other age groups. No relation between the percentage of seropositive persons and the duration of hunting activities was found.

In our study 210 hunters aged 23–80 were examined. At the beginning of the experiment we assumed that the forest group, without the direct contact with animals, would be the control group of the study. Positive results anti-HEV IgG were present in 3.81% of the samples of the hunters group and in 5% of the samples of the foresters. The statistical analysis in our study showed no significant differences in the results anti-HEV IgG between the groups of hunters and foresters. The higher titers anti-HEV IgG was in the older age groups, significantly higher antibody titers demonstrated in the age group > 55 years.

It has already been described by Carpentier et al. (2012) in France, which forestry workers, particularly woodcutters are group endangered with HEV infec-
tion. French forestry workers (n = 593) were tested for anti-HEV antibodies. One hundred eighty five subjects had anti-HEV antibodies (31.2%) with prevalence increasing steadily from 15.7% in 15–34-year-olds to 46.2 in subjects older than 55 years of age. Among the 135 controls with no direct contact with the forest environment (drivers, gardeners, traders) 26 (19.2%) had anti-HEV antibodies with the prevalence increasing from 4.5% in subjects aged 15 to 34 to 39% in elders. In the study of Montagnaro et al. (2015) performed in central Italy (Latium region) HEV seroprevalence was noted among 25% of the examined hunters. In Italy several authors have demonstrated an appreciable frequency of HEV infection, generally in travellers returning from endemic areas, however autochthonous cases have also been documented pointing to a possible autochthonous circulation of the virus in human population, sustained by the presence of an animal reservoir of HEV. In the study of Schielke et al. (2015) on 126 hunters (median age 55; 94% male) 21% tested were positive for anti-HEV IgG antibodies. Anti-HEV prevalence was the highest in the age group of the 70–79 (67%). Hepatitis E has been observed in Germany since 2001. Since then, the number of recorded cases has been increasing steadily each year. Men between 50–69 years of age are the most affected group with 67%. Hepatitis E has been observed in Germany using novel genotype 3- and rat Hepatitis E virus-specific immunoglobulin G ELISAs. Med. Microbiol. Immunol. 201:189–200.


In conclusion, the zoonotic risk of HEV is well established but seroprevalence in humans varies drastically between studies and countries. Numerous animal species seropositive for IgG anti-HEV, contaminated food, water and environment must be considered as potential sources of HEV infections in humans.

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