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# The knowledge and high seroprevalence of hepatitis A in a high-risk group (agricultural reproductive-aged women) in the southeastern region of Turkey

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**Background/aim:** The aim of this study was to determine the seroprevalence of antihepatitis A virus (HAV), risk factors, and the knowledge of female farm workers living in the Southeastern Anatolia Region (SAR) of Turkey.

**Materials and methods:** This representative cross-sectional survey was conducted between January and April of 2013 in the SAR. A total of 705 reproductive-aged women were randomly selected by clustering method using Epi Info software. The sera were analyzed for anti-HAV antibodies using ELISA. Sociodemographic information and the knowledge of female farm workers regarding hepatitis A were collected using a questionnaire.

**Results:** Of the female farm workers, 99.1% were seropositive for anti-HAV. The anti-HAV seroprevalence was significantly higher in the adults than in the adolescents ($P < 0.05$). Of the participants, 64.5% had 7 or more family members, 58.4% had 5 or more pregnancies, 68.1% were illiterate, 65.2% were family farmers, 90.6% were poor, 71.9% used unsafe water, 58.9% had toilets outside, and 68% had no knowledge about hepatitis A.

**Conclusion:** Turkey is considered to have high endemicity and female farm workers are considered a high-risk group for hepatitis A. This high HAV exposure might be reduced with vaccination, as well as improvements in sanitation, living conditions, health care utilization, safer drinking water, and health education.

**Key words:** Anti-HAV, reproductive-aged women, agricultural area, seroprevalence

## 1. Introduction

The hepatitis A virus (HAV) causes hepatitis A infection, which is closely associated with unsafe water, food contaminated with the feces of an infected person, poor sanitation and personal hygiene, a sexual partner of someone with acute hepatitis A infection, and close physical contact with an infectious person travelling to areas of high endemicity without being immunized and injecting drugs (1). Every year there are an estimated 1.4 million cases of hepatitis A worldwide. It is estimated that most children (90%) will be infected with the HAV before the age of 10 in developing countries with very poor sanitary conditions and hygienic practices. The geographical distribution of the prevalence of HAV varies globally and high, intermediate, or low endemic areas are determined (1). Turkey has an intermediate level of anti-HAV seroprevalence (2,3). In Turkey, anti-HAV IgG seroprevalence depends on geographic location, socioeconomic level, and age (4,5). However, this anti-HAV IgG seroprevalence appears to differ considerably in various parts of Turkey. An Expanded Program on Immunization, including hepatitis A infection, has been implemented in Turkey since 2012 for children and it is funded by the Turkish government (6).

Agriculture is the second greatest source of employment and one of the three most hazardous sectors in the world. It is estimated over one-third of the world's workforce (1.3 billion people) depends on agriculture. Agriculture is the most important sector for female employment in many countries, especially in Africa and Asia (7). In Turkey, 24.6% (6,143,000 persons) of the labor force is employed in the agriculture sector (8).

Although the majority of previous studies on the seroprevalence of HAV have generally analyzed data obtained from children and patients admitted to hospitals or health care services, there are limited studies on

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the data of HAV burden of disease and anti-HAV IgG seroprevalence in community-based reproductive-aged female farm workers in Turkey. In light of this, we conducted a cross-sectional study to determine the prevalence of anti-HAV according to sociodemographic variables in reproductive-aged female farm workers living in the Southeastern Anatolia Region (SAR) of Turkey. The SAR is also an ancient Upper Mesopotamian plain, where the Euphrates and Tigris rivers pass through. There are huge dams constructed on these rivers and part of the Mesopotamia region consists of nine provinces of Turkey. As a result of these huge dams, agricultural output and raw materials, as well as the rural labor force and capital, will be the basis of agroindustries, other industrial sectors, and services to contribute to the further development of the national and global economy (9). The current assessment of anti-HAV seroprevalence will be used as representative data to monitor HAV rates in agricultural populations of Turkey.

## 2. Materials and methods

### 2.1. Study area

The SAR (Adiyaman, Batman, Diyarbakır, Gaziantep, Kilis, Mardin, Siirt, Şanlıurfa, and Şırnak provinces) is one of the least developed regions of Turkey. Nearly one-tenth of the total Turkish population lives in the SAR. Of these, 25% work in the agriculture sector and 49.5% of the agriculture workers are women (10).

### 2.2. Study design

In this study, hepatitis A variables from the representative multipurpose cross-sectional research data of the Southeastern Anatolia Project (GAP) Agricultural Health Survey/2013, conducted by the authors in collaboration with the Harran University Scientific Research Council and GAP Regional Development Administration, were analyzed. This survey was approved by the ethics committee of the Faculty of Medicine at Harran University. The National Turkish Statistics Institution data were used to calculate the optimum sample size using a 95% confidence level, and the selected households were chosen using the probability cluster sampling method. The cluster size was identified as 10 households. If there was more than one woman of reproductive aged in a house, one of the women was randomly enrolled in the study using the person selection method. Working in agriculture and animal husbandry was determined in 1128 of a total of 1200 households. A total of 137 households (12.1%) were rejected from enrollment or refused to give a blood sample, 41 of which (3.6%) could not be located during home visits, and there was no appropriate person to interview in seven (0.6%) households. Therefore, this study was successfully conducted in 705 households (the response rate was 75%).

During home visits, the aim of the study was explained to the participants and informed consent was obtained from each participant. Data were collected by face-to-face interview using a structured questionnaire that included sociodemographic variables such as family size, age groups (15–19 years old and 20–49 years old), education attainment, type of work (seasonal migratory worker/family farmer), number of pregnancies (parity), access to water in agricultural areas, localization of toilets, knowledge levels about the symptoms, transmission routes, and precautions for preventing regarding hepatitis A.

### 2.3. Blood samples and serologic markers

Blood samples were collected in gel vacuum tubes from female farm workers aged between 15 and 49 years. The tubes containing the blood were then labeled and transferred to the Harran University Microbiology Laboratory under suitable conditions, separated by centrifugation, and stored at –80 °C until use. The sera were tested for anti-HAV IgG using the enzyme-linked immunosorbent assay (Abbott ARCHITECT, Abbott Laboratories, Abbott Park, IL, USA).

The ARCHITECT qualitative serological assay anti-HAV IgG calculated a result based on Sample RLU/Cut-off RLU (S/CO). Specimens with S/CO values < 1.00 were considered negative and S/CO values ≥ 1.00 were considered positive for anti-HAV IgG. The cut-off RLU was calculated by multiplying the medium calibrator RLU value by 0.29 (11). The sensitivity of the test for measuring antibodies was reported as >98% and the specificity was reported as >99.17% (12).

### 2.4. Statistical analysis

Data entry and analyses were performed using the Statistical Package for the Social Sciences, version 11.5. Associations among the variables were assessed using Fisher's exact test. The level of statistical significance was accepted as $P < 0.05$ for each statistically significant factor.

## 3. Results

A total of 705 reproductive-aged female farm workers were enrolled in this study, with a mean age of 36.16 ± 9.79 and a mean household size of 8.12 ± 0.12. Of the participants, approximately 65% had 7 or more family members, 54.5% were >35 years of age, 68.1% were illiterate, 34.8% were seasonal migratory farm workers, 58.4% had 5 or more children, 90.6% were at the poverty level, 71.9% used unsafe water, and 58.9% had toilets outside of their homes.

Of the enrolled female farm workers, 699 (99.1%) were seropositive for anti-HAV antibodies.

As presented in Table 1, the prevalences were given according to age groups, size of the household, education attainment, type of work, being migratory farm workers or family farm workers, development of provinces, number

**Table 1.** Distribution of anti-HAV seroprevalence according to sociodemographic variables.

| Variables | Total | | Positive | | Negative | | Fisher's exact test |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Age groups | | | | | | | |
| Adolescent (15–19 years old) | 11 | 1.6 | 10 | 90.9 | 1 | 9.1 | 0.003 |
| Adults (20–49 years old) | 694 | 98.4 | 689 | 99.3 | 5 | 0.7 | |
| Household size | | | | | | | |
| 6 and below | 250 | 35.5 | 249 | 99.6 | 1 | 0.4 | 0.309 |
| 7 and above | 455 | 64.5 | 450 | 98.9 | 5 | 1.1 | |
| Number of pregnancies (parity) | | | | | | | |
| 4 or below | 293 | 41.6 | 290 | 99.0 | 3 | 1.0 | 0.494 |
| 5 or above | 412 | 58,.4 | 409 | 99.3 | 3 | 0.7 | |
| Education attainment | | | | | | | |
| Illiterate | 480 | 68.1 | 475 | 99.1 | 5 | 0.9 | 0.380 |
| Primary school and above | 225 | 31.9 | 224 | 99.6 | 1 | 0.4 | |
| Type of work | | | | | | | |
| Family farmers | 460 | 65.2 | 456 | 99.1 | 4 | 0.9 | 0.652 |
| Seasonal migratory workers | 245 | 34.8 | 243 | 99.2 | 2 | 0.8 | |
| Poverty | | | | | | | |
| Yes | 639 | 90.6 | 634 | 99.2 | 5 | 0.8 | 0.447 |
| No | 66 | 9.4 | 65 | 98.5 | 1 | 1.5 | |
| Access to water (agricultural area) | | | | | | | |
| Unsafe (contaminated) | 507 | 71.9 | 503 | 99.2 | 4 | 0.8 | 0.538 |
| Safer (clean) | 198 | 28.1 | 196 | 99.0 | 2 | 1.0 | |
| Toilet location | | | | | | | |
| Indoors | 290 | 41.1 | 287 | 99.0 | 3 | 1.0 | 0.479 |
| Outdoors | 415 | 58.9 | 412 | 99.3 | 3 | 0.7 | |
| Total | 705 | 100.0 | 699 | 99.1 | 6 | 0.9 | |

Fisher's exact test was used. The level of statistical significance was accepted as $P < 0.05$ for each statistically significant factor.

of pregnancies, access to water in agricultural area, and location of the toilet.

When analyzed according to age groups, anti-HAV seroprevalence was higher in adults (20–49 years old) than in adolescents (15–19 years old) ($P < 0.05$). On the other hand, other sociodemographic factors were not associated with hepatitis A exposure ($P > 0.05$), since the anti-HAV seroprevalence was similar (99% or above) in different groups of female farm workers with different conditions.

### 3.1. Participants' knowledge about HAV

The female workers' knowledge with regards to HAV is listed in Table 2.

According to the responses for evaluating their knowledge of hepatitis A, as seen in Table 2, 31.7% of the farm workers had no knowledge about the symptoms of hepatitis A, while 59.4% were aware that jaundice was a symptom of hepatitis A. Of the female farm workers, 68.9% had no knowledge of the transmission routes of HAV, while 31.1% had at least one correct response. Of all the participants, 68.1% also had no knowledge about the prevention of hepatitis A, while 31.9% knew at least one correct prevention route. This study indicated that the general awareness of hepatitis A, transmission, and prevention among female farm workers was very low.

## 4. Discussion

In this cross-sectional study, we investigated the seroprevalence of anti-HAV among reproductive-aged female farm workers from nine provinces of the SAR of Turkey. To our knowledge, this is the first community-

**Table 2**. Knowledge level of the reproductive female women about hepatitis A.

| Symptoms | % | Route of transmission | % | Precautions | % |
|---|---|---|---|---|---|
| Jaundice | 59.4 | Unknown | 68.9 | Unknown | 68.1 |
| Unknown | 31.7 | Human to human | 12.6 | Vaccination | 14.6 |
| Tiredness, weakness | 3.0 | Contaminated water and food | 7.3 | Washing hands | 4.9 |
| Weight loss, lack of appetite | 1.0 | Fear | 4.6 | Being clean and paying attention to hygiene | 2.1 |
| Nausea, vomiting | 1.0 | Stress | 2.6 | Avoiding infected people | 2.1 |
| Liver diseases | 1.0 | Heat | 2.0 | Cutting ear, tongue, and dorsum of the body with razor blades for bleeding out dirty blood | 1.4 |
| Anemia | 1.0 | Animals | 1.3 | Consumption of sweet things (like molasses) | 1.4 |
| Death | 1.0 | Share eating utensils | 0.7 | Not eating spicy, salty, greasy foods | 0.7 |
| Dizziness | 1.0 | | | Avoiding stress | 0.7 |
| | | | | Not sharing eating utensils | 0.7 |
| | | | | Avoiding animals | 0.7 |
| | | | | Using drugs | 0.7 |
| | | | | Going to the hospital | 0.7 |
| | | | | Boiling water | 0.7 |
| Total | 100.0 | | 100.0 | | 100.0 |

based study to report the prevalence of anti-HAV in representative agricultural reproductive-aged women in this region. The findings indicated that approximately all of the reproductive-aged female farm workers (99.1%) had anti-HAV seroprevalence. Thus this region is considered to have high endemicity. The detected anti-HAV IgG seroprevalence is similar to that in reports from developing countries (13–16) and Turkey reporting a high seroprevalence (17).

The anti-HAV seroprevalence in this study was similar to or higher than those of studies based on the overall population who were admitted to hospitals or other health care services conducted in different regions of Turkey (18–22). When we compared ours to other studies conducted in 1998 and 1999 based on age groups, they presented similarity. In these studies, while the anti-HAV seroprevalence was 92.5% in patients admitted to hospitals, 91.1% was reported in the community-based study (18,23). The seroprevalence of anti-HAV has not changed in the last 1.5 decades in Turkey. This also emphasized that the behavior of the communities on safer water usage and hygiene, and institutional sanitary arrangements had not changed for the prevention of hepatitis A, and so the agricultural communities were a higher-risk group for hepatitis A. The major contributing factors to such a high anti-HAV seroprevalence among female farmworkers depends on exposure to unhealthy conditions, poor hygienic and sanitation conditions, crowded families, poverty, and pathogenic agents including bacteria, viruses, and protozoa related to agricultural life style.

The assessment of the association between anti-HAV seroprevalence and age revealed that anti-HAV seropositivity increased with age due to environmental exposures ($P < 0.005$), as reported in many other studies (19,21–26). In our study, educational attainment, size of the household, type of work, and poverty were not associated with anti-HAV seropositivity. Thus, individual social characteristics did not change behaviors toward the prevention and awareness of the disease. This might be explained by the obstacles to accessing healthy living standards and healthcare services, and limited access to safe water in agricultural areas. In the present study, 71.9% of the farm workers used unsafe water, e.g., spring water, river water, boreholes, well water, groundwater, and storage water in containers, which was emphasized as a risk factor for HAV, as in other studies (27–29). As is known, the female farm workers were also working as housewives; thus, they used this unsafe water for drinking, washing vegetables and fruit, washing kitchen utensils, etc.

In the current study, the majority of female farm workers had no toilets in the agricultural area. They discharged urine or feces in the agricultural area, as also mentioned in other studies (27,30).

In the present study, the overall level of knowledge about hepatitis A was generally poor among the female farm workers. Unfortunately, two out of every three female farm workers had no knowledge about the transmission and prevention routes of hepatitis A. This might be explained by the low level knowledge and unawareness on hepatitis A.

In conclusion, this study emphasized that the majority of the reproductive-aged female farm workers had natural immunity (anti-HAV IgG). The reproductive-aged female farm workers' children who did not have immunity are an at-risk group and are susceptible to HAV because of direct transmission of HAV from their infected mothers. This is a huge public health problem in Turkey. Thus, these children should be provided with vaccination against HAV, funded by the Turkish government (6), in order to avoid the severe hepatitis A seen at older ages. Vaccination against HAV should be considered an exclusive route of HAV protection, as reported in the literature (31,32). However, it should be kept in mind that when sanitation conditions are ignored, the high-risk group of female farm workers would be exposed to other particularly pathogenic agents, including bacteria, viruses, and protozoa that are transmitted by oral–fecal routes. Therefore, besides immunization program, this high HAV exposure might be decreased with improvements in sanitary conditions, living arrangements, and health care utilization in agricultural areas.

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