RISKY EXPOSURES AND NATIONAL ESTIMATE OF HCV SEROPREVALENCE AMONG SCHOOL CHILDREN IN URBAN EGYPT

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ABSTRACT

Hepatitis C virus (HCV) is a significant cause of morbidity and mortality all over the world, particularly in Egypt. Limited data are available concerning the national seroprevalence and the possible modes of transmission of HCV in the pediatric age group. The aim of this study was to obtain a better estimate of the national hepatitis C seroprevalence and the possible risky exposures among healthy school children in Alexandria; the second biggest city in Egypt. HCV knowledge and counseling for school children were also investigated. A total of 500 school children, age between 6 and 15 years were evaluated for HCV seropositivity and interviewed for potential disease risk factors. The seropositivity for Anti-HCVAb was 2.8 %. About 71.4 % of seropositive children were 10–15 years old. Urban residence, chronic disease, male circumcision and invasive procedures were detected as significant risk factors for acquiring HCV infection among the studied children. The level of awareness of hepatitis C among school children was very low (3.6 %) and was correlated with the age and educational level. HCV infection continues to occur in children and is frequently unrecognized. This mandates immediate intervention and robust control strategies in the settings of exposure combined with health education programs to limit further HCV spread.

INTRODUCTION

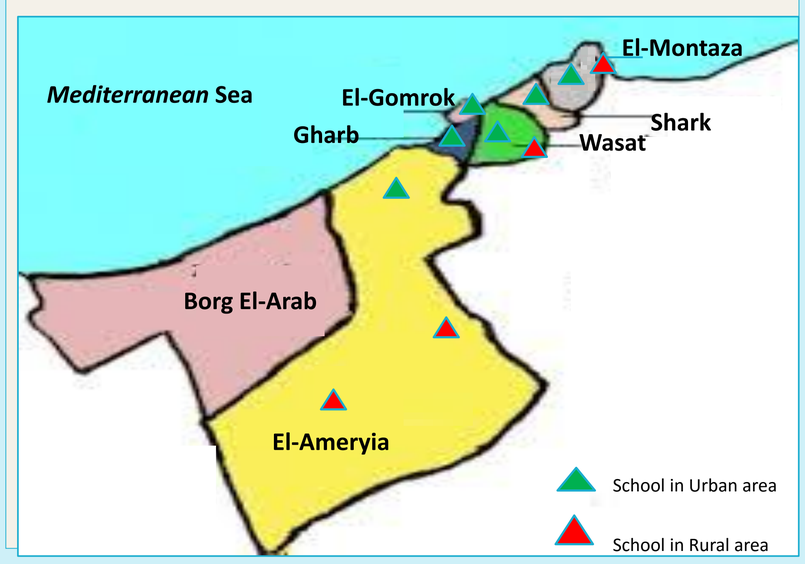
Data about Hepatitis C virus (HCV) infection in children is limited compared to adults. Many infected children remain unidentified as children are less likely to have symptoms from their HCV infection. New infections in children continue to occur as a result of maternal-neonatal transmission or infection transmitted from mother to newborn, which both accounts for a sizeable group of children with HCV infection. Horizontal transmission, either from adult to child in a household, or child-to-child at home or at school does not seem to be an important risk factor. The prevalence of pediatric infection varies from 0.05 to 0.36 % in the USA and Europe and a mount for 1.8–5.8 % in some developing countries, with the highest prevalence been found in Egypt. Parenteral acquisition of HCV remains a major route for infection among Egyptian children. Insufficient screening of transfusions, unsterilized injection equipment and re-used needles and syringes continue to be major routes of HCV transmission in developing countries, whereas vertical transmission and adolescent high-risk behaviors as injection drug abuse, are the major routes in developed countries. Rural children and young adults who were not exposed to the parenteral antischistosomiasis injections campaigns led in Egypt between 1970 and 1980 have relatively high anti-HCV prevalence. This means that other modes of transmission have perpetuated the infection in the community. Education about HCV and the potential routes of transmission is crucial for disease prevention. One study conducted in Australia found children's knowledge about HCV is extremely poor. Although school age children are not expected to know about HCV infection, infectious disease education and health promotion for school students is important in disease endemic countries. Updated data on HCV infection among school age children in Egypt are lacking. Earlier studies pointing to a national prevalence of 3–9 % in rural areas in 2001 and 5.8 % in an urban city (Alexandria) in 2005. With the advances in methods of HCV screening and management, HCV prevalence is expected to be lower than previous reports..

OBJECTIVES

This study was conducted to update the estimates the national prevalence and to identify the current risk factors of HCV infection among a representative sample of healthy Egyptian children from different residential areas and with different socioeconomic classes. The present work discerns also school children's knowledge and sources of information on HCV infection.

METHODS

Study population and sampling method According to the Egyptian Central Agency for Public Mobilization and Statistics, the population in Alexandria governorate is stratified as 60 % Urban and 40 % Rural. Alexandria is composed of 7 municipal districts namely; El-Montazah (urban and rural), Shark (urban), Wasat (urban), Gharb (urban), El-Gomrok (urban), El-Ameryia (rural), and Borg El-Arab (rural) (Map. 1).



METHODS

Using the computer Epi-info version 6.04, and based on the results of an earlier study for HCV prevalence among school children in Alexandria, that was estimated to be 5.8 % [3], desired degree of precision 3 %, and confidence limits 95 %, the minimum required sample size was calculated to be 360. As the prevalence of HCV infection was expected to be low, a sample size of 500 healthy school children (aged between 6 and 15 years) were recruited. Since the community composition in Egypt is 60 % urban and 40 % rural, we used proportionate allocation sampling method to select proportionate number of schools from urban and rural areas in Alexandria. At the first stage of selection, using the school directory in Alexandria governorate, 10 schools were randomly selected from 10 different regions in Alexandria (6 urban and 4 rural) (Map. 1). In April 2014, a sample of 500 children was proportionally allocated as 300 from urban and 200 from rural regions in Alexandria. Using simple random sampling, 50 children were selected from student sheets of each school. Children with any chronic illness were excluded during selection.

Data collection

Children below 12 years were interviewed in presence of their parents/caregivers. Responses were obtained from students themselves if they were above 12 years of age. Questionnaires were used to collect socio-demographic data, potential risk factors and knowledge for exposure to HCV. Sociodemographic, community acquired, behavioral, medical history and iatrogenic risk factors associated with HCV positivity. The socioeconomic status of the studied children was classified as high, middle, low and very low according to Fahmy and Sherbini.

Laboratory testing

About five ml blood samples were collected in vacationer tubes through vein puncture and allowed to clot naturally and completely. Sera were separated and stored according to the standard guidelines until analyzed for the serologic evidence of HCV infection by detecting HCV antibodies in serum, using commercially available 4th generation Enzyme Linked Immunosorbent Assay (Adaltis Srl. V. 4.0, ElAgen, Italy), according to the manufacturer's instructions. A second serum sample was retested for confirmation.

Statistical analysis

Data were fed to the computer using IBM SPSS (Statistical Package for the Social Sciences) software version 16.0 (SPSS Inc., Chicago, IL, USA). Qualitative data were described using number and percent, mean and standard deviation. All risk factors were tested for association with anti-HCV positivity in bivariate analysis using the Chi square test, Fisher's exact test or Monte Carlo correction with the calculation of odds ratios (OR) and 95 % confidence intervals (95 % CI). Significance test results are quoted as two-tailed probabilities. Logistic regression has been used to determine most important risk factors in which [Exp (B)[0.38] was considered to be statistically significant. A P\0.05 was considered to be statistically significant.

Ethical statement

The study was approved by the institutional review board and ethics committee of the High Institute of Public Health, Alexandria University—Egypt. The investigator communicated with key personnel including authorized mangers of each school centers in order to facilitate implementation of the study. An acquaintance visit was done to the localities and the researcher presented herself to the staff there, explained in details the aims and concerns study and administrated an institutional statement of request. The authorized managers accepted the implementation of the study in favors of school children after assuring the confidentiality of the data collected by the interview questionnaire, as well as that of the laboratory tests. The investigator received indepth training specific to interviewing the children and sensitivity regarding the sexual behavior was considered. A written consent was obtained from parents/caregiver in addition to an assent from children before enrollment in the study. Data was collected by interviewing each parent/child separately in a private room to ensure the confidentiality of the responses.

RESULTS

Table 1: Sociodemographic data and community acquired risk factors of the enrolled children

	Total participants	Anti HCV-anti BS		OR (95 % CI)	*P* value
	n = (500) No (%)	Normal (n = 486) No (%)	HCV (n = 14) No (%)		
Age					0.017*
6–	99 (19.8)	98 (99.0)	1 (1.0)	1	
8–	123 (24.6)	120 (97.6)	3 (2.4)	2.4 (0.3–24)	
10–	114 (22.8)	106 (93.0)	8 (7.0)	7.4 (1–60)	
12–15	164 (32.8)	162 (98.8)	2 (1.2)	1.2 (0.1–13.5)	
Sex					0.979
Male	284 (56.8)	276 (97.2)	8 (2.8)		
Female	216 (43.2)	210 (97.2)	6 (2.8)		
Residence					0.045*
Urban	200 (60.0)	288 (96.0)	12 (4.0)	4.2 (0.9–19.4)	
Rural	200 (40.0)	198 (99.0)	2 (1.0)		
Education					0.636
Illiterate	5 (1.0)	5 (100.0)	0 (0.0)		
Primary	376 (75.2)	364 (96.8)	12 (3.2)		
Preparatory	119 (23.8)	117 (98.3)	2 (1.7)		
SES					0.653
Low	152 (30.4)	149 (98.0)	3 (2.0)		
Middle	275 (55.0)	267 (97.1)	8 (2.9)		
High	73 (14.6)	70 (95.9)	3 (4.1)		

RESULTS

Overall prevalence of anti-HCV

Of the 500 children [284 (56.8 %) males and 216 (43.2 %) females, 14 (2.8 %)] were positive for anti-HCV (Table 1). No significant gender difference was observed but significant higher rates for urban residents [12 (4 %) compared to that of rural inhabitants [2 (1 %)], (P = 0.045). Seropositivity was highest in the age group (8–12 years), (P = 0.017), (Fig. 2). Middle social class has relatively higher prevalence compared to the low and high socioeconomic levels.

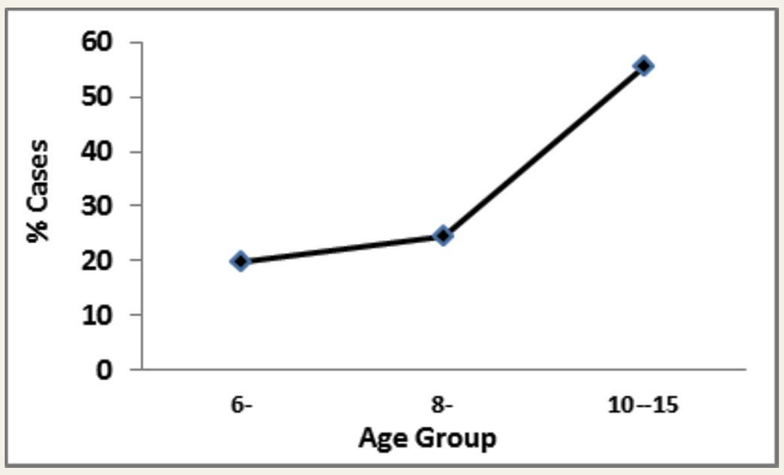


Figure 2: Seropositivity of HCV with age

Frequency of exposures and association with HCV Seropositivity

In our multiple logistic regression model and after removing of confoundings, urban residence, chronic disease, male circumcision and invasive procedures although were not evident as risk factors in the univariate analysis, appeared as significant risk factors for acquiring HCV infection among the studied children (Table 2).

Table 2: Multiple logistic regression model for HCV risk factors among the enrolled school children

Risk factor	Sig.	OR	95.0 % CI	
			LL	UL
Residence (Rural)	0.05	0.255	0.025	0.991
Chronic disease	0.048	1.804	1.1	6.072
Invasive procedure	0.018	5.016	1.36	10.96
Circumcision	0.039	1.33	1.14	14.94
Constant	0.117	0.074		

HCV knowledge and counseling

The results indicate that the level of awareness of hepatitis C among school children was very low (3.6 %). This was strongly correlated with age (100.0 % in age group 12–15, P\0.0001). There was no statistically significant difference in HCV prevalence between those who have heard of HCV infection and those who have not (P = 0.6). Awareness of the disease and modes of transmission was higher among males (66.7 %) and urban residents (66.7 %). Among those who had heard about hepatitis C, 3 children (16.7 %) had previously received information about the illness though physicians either at school or at school health insurance clinic. Only the later were able to name at least one way the illness can be transmitted; that it could be contracted through a blood transfusion. Others mentioned food (66.7 %), clothes (27.8 %) and water (11.1 %) as sources of infections.

CONCLUSION

Although the prevalence of anti-HCV among school age children in the present study showed a decline than that has been previously reported, the impact of HCV infection on this age group can be significant in terms of lost years of healthy well-being as children have a lifetime to develop the severe complications of HCV. The results of this study pointed to some risk factors for HCV infection that can guide intervention programs to be appropriately focused. At present, ensuring good infection control in health care setting are of highest priority.