Screening for hepatitis C virus infection among school children

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Abstract

Background: Hepatitis C virus (HCV) infection is a global health problem. Cirrhosis and end stage liver disease are considered main complications among adults and children. Epidemiologically, Egypt show higher level of anti HCV antibodies than other countries. The current study aimed to screen (HCV) infection among school children. Research design: A cross-sectional research design was used to achieve the aim of this study. Sample: Two randomly selected schools at Minia district (one urban and one rural) were included in the study, 750 students were included out of 862 with response rate 87%. Tools: A structured interviewing questionnaire that includes part one: demographic data related to studied group, part two: included risk factors associated with HCV infection such as history of taking any injectable medications drug use, history of blood transfusion, history of hospital operation... etc. while part three was a rapid HCV antibody test. Results: The mean age of the study sample was 15.18 ± 1.959 years, regarding to results of advanced quality rapid HCV antibody test, only 0.7% of school children were positive anti HCV. The most prevalent risk factors among studied school children were ear piercing, history of taking injectable medications from informal care provider, circumcision, scarification and history of dental procedure 99.3, 94.9, 88.8, 88.5, and 62.5% respectively. Regarding relation between risk factors and percentage of anti HCV among school children, blood transfusion, sharing shaving instruments and tooth brush are statistically significant. Conclusion: The study was concluded that the percentage of school children (aged 12-18) years old who are probably infected with HCV was 0.7% (5 out of 750) in Minia district. Recommendations: Future studies should focus on the screening of HCV and methods of prevention in some other nearby communities at Minia governorate to make early detection and provide proper treatment.

Keywords: Screening, hepatitis c virus, school children.

Introduction

Hepatitis C virus is one of the most common viral hepatitis that affects the liver and was first identified in 1989 [(1)]. It is a lethal human virus that can cause a chronic lifelong infection of the liver resulting in progressive liver disease that culminates in the development of cirrhosis and hepatocellular carcinoma (HCC) [(2)]. Globally, an estimated 130–170 million persons (2%–3% of the world's population) are living with HCV infection. More than 350 000 deaths are attributed to HCV infection each year, most of which are caused by liver cirrhosis and hepatocellular carcinoma (HCC) [(3)].

National Egyptian health (2015) issues survey was conducted to describe the prevalence of HCV infection. Age group of (15–59 years) age, the prevalence of HCV antibody was found to be 10.0% and that of HCV RNA to be 7.0%. while children 1–14 years old, prevalence of HCV antibody and HCV RNA were 0.4% and 0.2% respectively [(4)].

Hepatitis C virus is most commonly transmitted through exposure to infected blood. This can occur through; contaminated blood transfusions, blood products and organ transplants, injections given with contaminated syringes and needle-stick injuries in health-care settings. Other modes of transmission such as social, cultural, and behavioral practices using percutaneous procedures (e.g. ear and body piercing, circumcision,) can occur if inadequately sterilized equipment is used [(5)].

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 because of maternal-neonatal transmission or infection transmitted from mother to newborn. 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 [(6)].

Community health nurse's roles during screening are ensuring that the client understands the reason for screening and the procedure, ensuring that follow-up is available, monitoring and evaluating screening activities, documenting both the process and the results, and using screening activities as an opportunity to provide health education [(7)]

Significance of the study

Hepatitis C virus infection is a global health problem that can progress to cirrhosis and end stage liver disease in a substantial proportion of patients [(8)]. In Egypt, the situation is quite worse. Epidemiologically, Egypt show higher level of anti HCV antibodies than other countries [(2)]. Egypt has the highest recorded prevalence of HCV in the world with an estimate of 10 % of the population are infected while 7 % are chronically ill which is highly infectious, mortality is estimated by 40 000 Egyptians a year and at least 1 in 10 of the population aged 15 to 59 is infected [(9)].

Screening asymptomatic patients who may have an increased likelihood of being infected with HCV is an important step toward improving the detection and ultimately treatment of infected individuals [(10)]. Even though HCV infection is one of the major causes of chronic hepatitis and HCC in Egypt, there are no nationally representative estimates of HCV prevalence among children under 15 years of age in Egypt[(9)]. So that screening for HCV is an important aspect for disease prevention among children by early detection of the virus and providing early and proper treatment and maintaining good health for all individuals in the community.

Aim of the Study

This study aimed to screen HCV infection among school children (aged 12-18) years old in Minia city.

Research questions

1. What is the percentage of school children who are probably infected with HCV؟
2. What are the most common risk factors associated with HCV infection during school age؟

Subject and Methods

Research design:

A cross-sectional design was used to achieve the aim of the present study.

Setting:

The current study was conducted in Zohra secondary school located in Zohra village as a rural school and an Islamic preparatory school in Minia city..

Sample

- Stage I:

Two areas: one rural and another urban were selected randomly; Zohra village and Minia city.

- Stage II:

Two schools out of 62 (total preparatory and secondary in Minia district) were chosen randomly, Zohra secondary school from Zohra village and Islamic preparatory school from Minia city.

- Stage III:

Among 510 of school children in Zohra village, 432 children (response rate 84.7%) and 318 out of 352 children in Islamic school (90.3%) were included in the study.

Inclusion criteria:

- School children 12-18 years old.
- Both males and females.
- Excluded students who are diagnosed with HCV

Tools of data collection:

Structured interview questionnaire: it was developed by the research investigator after extensive review of related literature with the consultation of the experts in the field of community health nursing and public health from faculties of medicine and nursing at Minia university. The questionnaire was in English language and composed of 23 questions within three parts as the following:

- Part I: Personal and demographic data: such as (age, gender, place of residence, number of family members, and occupation of parents…etc.).
- Part II: It includes risk factors associated with hepatitis c virus infection such as (blood transfusion, surgery, needle stick, attending dentistry clinic…etc.)
- Part III: Rapid HCV antibody test.

Validity and Reliability

The content validity of the data collection tool was examined by three experts who were affiliated to Faculty of Nursing, and Faculty of Medicine Minia University at community health Nursing Department and Public Health and Preventive Medicine Department. The tool was examined for content coverage, clarity, relevance, applicability, wording. Based on experts` comments and recommendations; minor modifications had been made such as rephrasing and rearrangements of some sentences.

Ethical consideration:

A written approval was obtained from the Research Ethical Committee the Faculty of Nursing, Minia University. An official permission was obtained from Directorate of Education in Minia city. Oral consent was obtained from the students' parents. The directors of schools and the school children were informed about the nature, purpose of the study and its benefits. School children were informed that participation in the study was voluntary and they have the rights to withdraw from the study at any time without giving any reason. Confidentiality was also assured through coding the data. Each participant was interviewed individually by the investigator to fulfill the necessary data.

Study procedure

The investigator initially introduced himself to all school children. Open discussion about HCV was initiated to discover to what extent the school children have knowledge about HCV and the purpose of study screening. Interview conducted to all school children to fill personal data and identify the risk factors they were exposed. The investigator asked school children questions in the questionnaire and marked their response in structured interview questionnaire. The time taken to conduct the structured interview questionnaire for each school child ranged from 3-4 minutes and rapid anti HCV test was done and the time taken until result obtained was 5-7 minutes. Rate was 18-20 school children / day. Data collection was conducted over a four months period extending from February 2016 till May 2016.

Statistical design:

The collected data were, coded, categorized, tabulated, and analyzed using the Statistical Package for the Social Science (SPSS 20.0). Descriptive data were expressed as mean and standard deviation. Qualitative data were expressed as frequency and percentage. Fisher exact and Pearson correlation tests were used to investigate the presence of a statistical significance differences with P. value < 0.05.

Results:

Table (1): Distribution of common risk factors associated with HCV among school children (n = 750)

Risk factors associated with HCV(Variables)	Yes		No		Unknown	
	No	%	No	%	No	%
HCV infected mother	6	.8	742	98.9	2	.3
HCV infection in relatives (not mother)	177	23.6	552	73.6	21	2.8
Taking any injectable medications from informal health care provider	712	94.9	36	4.8	2	.3
Blood transfusion	31	4.2	716	95.4	3	.4
Hospital operation	350	46.7	400	53.3	0	.0
Exposure to dental procedure	469	62.5	281	37.5	0	.0
Hospitalization	167	22.3	579	77.2	4	.5
Needle stick injury	255	34.0	471	62.8	24	3.2

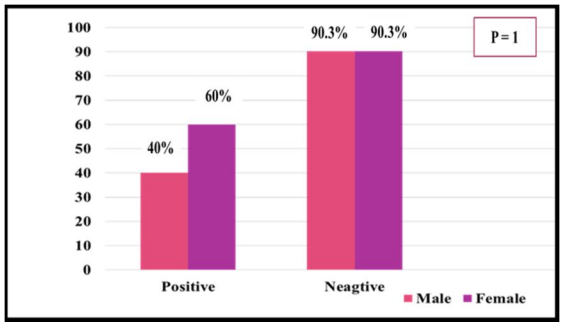
Risk factors associated with HCV(Variables)	Yes		No		Unknown	
	No	%	No	%	No	%
Circumcision (male or female)	666	88.8	84	11.2	0	.0
Piercing {female only}	447	99.3	3	0.7	0	.0
Sharing of shaving instruments.	99	13.2	649	86.5	2	.3
Sharing of tooth brush	85	11.3	655	87.3	10	1.3
Scarification	664	88.5	73	9.7	13	1.7
Exposure to blood or body fluids	50	3.3	42	8.9	8	.7

Table (1) shows the most prevalent risk factors among studied school children were ear piercing, history of taking any injectable medications from informal health care provider, circumcision, scarification and history of dental procedure 99.3, 94.9, 88.8, 88.5, and 62.5% respectively.

Table (2): Percentage distribution of studied school children who may probably have HCV (n = 750).

Result of Advanced Quality rapid HCV antibody test.	No	%
• Positive	5	.7
• Negative	745	99.3
Total	750	100

Table (2) reveals that the number of school children who may probably have HCV infection. As the results of advanced quality rapid HCV antibody test denoted that only 0.7% of school children were positive.



*p < 0.05

Figure (1): Relationship between the result of anti-HCV test and the gender of studied school children, Minia district,2016.

Table (3) Relationship between the common risk factors and percentage of positive and negative anti HCV among school children (n = 750).

Risk factors	Hepatitis c antibody					P – value By Fisher Exact
	Positive		Negative			
	Yes (%)	No (%)	Yes (%)	No (%)	Unknown (%)	
Taking any injectable medications from informal health care provider	60	40	95.1	4.6	0.3	0.062
Blood transfusion	40	60	3.9	95.7	0.4	0.029*
Hospital operation	40	60	46.7	53.3	.0	1.000
Exposed to dental procedure	80	20	62.4	37.6	.0	0.656
Hospitalization	40	60	22.1	77.3	0.5	0.330
Circumcision (male and female)	10	.0	88.7	11.3	.0	1.000
Needle stick injury	40	60	34	62.8	3.2	1.000
Piercing {female only}	80	20	99.3	0.7	.0	1.000
Sharing of shaving instruments	60	40	12.8	87	0.3	0.031*
Sharing of tooth brush	80	20	10.7	87.9	1.3	0.002*
Scarification	80	20	88.6	9.7	1.7	0.457

*P – value < 0.05

Regarding exposure to risk factors for HCV infection and the results of anti HCV test among studied school children, blood transfusion, sharing shaving instruments and sharing of toothbrush were higher among positive school children than negative (40% versus 3.9%, 60% versus 12.8% and 80% versus 10.7%) respectively and these differences were statistically significant p = (0.02, 0.03, 0.002) respectively.

History of exposure to dental procedure, hospitalization, circumcision and needle stick injury were more frequent among positive anti HCV school children than negative ones but these differences did not reach to a statistical significance. All positive anti HCV school children don't have HCV infection among their mothers and relatives.

Discussion

Hepatitis C virus (HCV) is a major global health care problem. The World Health Organization (WHO) estimates that up to 3% of the world's population has been infected with the virus. The infection rate ranges from as low as 0.1% in Canada to the extremely high rate of 18.1% in Egypt. Indeed, HCV infection is now the leading cause for liver transplantation worldwide. Few studies have evaluated the epidemiology and risk factors of HCV infection in children in Egypt [(11)].

Table (1) showed that the most prevalent risk factors among studied school children were ear piercing, history of taking any injectable medications from informal health care provider, circumcision, scarification, history of dental procedure, surgical operation, needle stick injury and HCV infection in relatives (not mother) 99.3, 94.9, 88.8, 88.5, 62.5, 46.7, 34, 23.6% respectively.

On the other hand, Barakat SH and El-Bashir N, 2011, Egypt. A representative random sample of 500 children, age between 6 and 15 years, was selected from 10 schools in Alexandria, Egypt. The aim of their study was to estimate the prevalence and identify the risk factors of (HCV) infection among healthy Egyptian children. They found that Almost all study participants had injections; in 30% of the sample (150 children mainly of the very low or low socioeconomic class), these had been given by both formal and informal health care providers. However, none of the studied children reported sharing toothbrushes, needles or syringes. Only four children reported living with an HCV-infected family member. The most common potential risk factor for HCV infection was surgery (approximately 11%) [Sutures, abscess draining, tonsillectomy and appendectomy]. The second highest risk factor was the use of intravenous catheters (approximately 7%), and dental procedures (approximately 5%) were in third place. Only three children (between 7 and 10 years old) received blood transfusions. [(11)] From the investigator's point of view, this change due to difference in the age group and setting.

The result of screening for HCV infection among studied school children (Table 2) indicated that only 0.7% of school children were positive. According to the Egypt Health Issues Survey 2015 (EHIS) percentage of positive HCV antibody test (10-14 years) was 0.7%, and percentage of positive HCV antibody test (15-19 years) was 1% .[(12)] On the other hand, Abed N T, et al (2016), Benha, Egypt screened Six hundred children (6-17 years) for HCV antibodies (HCV Ab) and hepatitis B surface antibody concentration (HBsAb). Regarding HCV, 4.7% of children were diagnosed as HCV seropositive by ELISA for anti-HCV. [(13)] This change in the results due to the difference in the test which used to detect HCV antibody.

Kandeel A, et al (2017) described the HCV burden in 2015, compare the results with the national survey conducted in 2008 and they showed that a significant reduction in the overall prevalence of HCV antibody from 14.7 to 10.0%, and HCV RNA from 9.9 to 7.0%, between 2008 and 2015 among those aged 15–59 years. [(14)]

In this study (Figure 1) showed that 60% of positive children were females compared to males 40% and this is like Nigerian study by Eke C et al (2016). This was a cross-sectional seroepidemiological study involving children aged 10-18 years. Four hundred and twenty children were selected and screened comprising 210 (50.0%) males and females. The seroprevalence of anti-HCV was 4 (1.0%). Three (75%) out of the four positive cases for the anti-HCV were females while one was a male. [(15)]

In this study (Table 3), blood transfusion is a significant risk factor for HCV infection (p=0.029) and it is like Barakat SH et al, 2011, Egypt, they found that the most significant risk factors for anti-HCV positivity include blood transfusion, dental procedures, surgery and intravenous catheterization [(12)]. These findings also agree with Abed N T, et al (2016). [(13)]

In this study, Sharing shaving instrument in this study is statistically significant (p =.031) and the reused and/or unsterilized razors may transmit HCV and this result is agreement with the study which evaluate Factors Influencing Hepatitis C Virus Sero-prevalence among Blood Donors in North West Pakistan Khattak, M .et al (2008) in which household contacts of hepatitis C patients are known to have increased risk of HCV infection, most likely due to sexual contact and non-sexual household contacts like sharing of razors or tooth brushes. [(16)]

In this study (Table 5), 80% of positive anti HCV school children shared tooth brush versus 10.7% of negative anti HCV School children shared tooth brush. Therefore, sharing of tooth brush was a significant risk factor for transmission of HCV in this study. HCV–RNA and infectious HCV particles have been detected in the saliva and tears obtained from patients with chronic hepatitis C. [(17)]

Davaalkham D et al ,2006, A nationwide cross-sectional survey among elementary school children was conducted in four main geographical regions and the metropolitan area of Mongolia, through multistage, stratified, random cluster sampling. Their study showed that not significant but higher risks were found in their study for the variables of living with chronic hepatitis C carriers and sharing toothbrushes. HCV can be transmitted within families and between sexual partners; and that personal articles (such as toothbrushes, razors, washcloths, and other items that might have blood on them or pierce the skin) should not be shared among family members. However, the association of anti-HCV positivity and a household member's chronic hepatitis in their study may be attributed to extra-familial transmission such as from iatrogenic sources of infection. [(18)]

Conclusion:

It was concluded from the current study results that the percentage of school children (aged 12-18) years old who are probably infected with HCV was 0.7% in Minia city. Eighty percent of rural school children versus 20% of urban school children were positive for anti HCV test but this difference was not significance. Regarding relation between risk factors and positivity of anti HCV among school children, history of taking injectable medications, blood transfusion, sharing shaving instruments and sharing of tooth brush are statistically significance. History of exposure to dental procedure, hospitalization and needle stick injury were more frequently among positive anti HCV school children than negative ones but these differences did not reach to a statistical significance. All positive anti HCV school children don't have HCV infection among their mothers and relatives.

Recommendations

Based on results of the present study the following can be recommended:

1) Regular screening for school children as they have prevalent risk factors for HCV infection.
2) Future studies should focus on HCV among school children to make early case detection and preventions in some other communities at Minia governorate.
3) Encourage future educational program for school children, teachers, children's parents that focusing on: definition about HCV infection, mode of transmission, sign and symptoms and methods of prevention.
4) Educate the student good behaviors such as avoiding sharing tooth brush and shaving instruments.

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