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Social Awareness and Knowledge of Parenteral Viral Hepatitis (B and C) Among Residences of Menoufia Governorate, Egypt: A Questionnaire-Based Field Study

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Abstract: Egypt had led a unique successful campaign in treating and surveillance of the most prevalent viral infections. However, social awareness evaluation is an unmet need for viral eradication strategic plans. Assess the level of knowledge and awareness of the community about HCV and HBV infections. This community-based cross-sectional survey, was conducted between November 2018 and March 2019 in Menofia Governorate, Egypt. A well-structured pretested questionnaire testing knowledge and awareness regarding HBV and HCV infections and their modes of transmission in 14000 medical and non-medical, urban and rural participants. Knowledge about HBV found to be good regarding transmission (81.9% correct answers), while in cure 51.7% of participants gave false answers. For HCV infection, good knowledge (79.3% of correct answers) was documented, while the curable nature of disease was denied in 40.9%. Blood and blood products (53.2%), sexual contact (27.8%), mother to child during delivery (7.3%) and others were reported as the commonest modes of transmission of HCV respectively. Television and newspapers were the main sources of knowledge (33 and 22% respectively). On asking participants about precautions against HCV infections, 30.2% stated that they are being educated on this issue, 22.3% had heard something like that and 47.5% of participants did not know anything about that. Multivariate logistic regression revealed that for both HBV and HCV knowledge and awareness were affected by age, residence and level of education. Despite the good results, levels of social awareness should be more elevated for proper viral eradication programs.

Keywords: Social Awareness, Knowledge, HCV, HBV, Questionnaire, Field Study

Introduction

Viral hepatitis is estimated to be the 7th leading cause of mortality worldwide (Stanaway *et al*., 2016). Hepatitis C Virus (HCV), is a primary cause for liver fibrosis, cirrhosis and cancer which is responsible for one half of this mortality (Mohd Hanafiah *et al*., 2013; Lavanchy, 2011).

On the other hand, more than 240 million are chronically infected with Hepatitis B Virus (HBV) which is responsible for about 500,000 to 700,000 annual deaths (Toy *et al*., 2011; WHOEB, 2009; WHO, 2012).

Egypt has the highest prevalence of HCV infection. In which HCV antibodies sero-prevalence among adult population aged 15-59 years was 14.7% in 2009 and at 10.0% in 2015 which was substantially higher than global levels as stated in The Egypt Demographic and Health Surveys (EDHS) (Mohd Hanafiah *et al*., 2013; Lavanchy, 2011).

Despite of the lower prevalence of HBV in Egypt (Ismail *et al*., 2017), it still constitutes the second most common viral infection of the liver which needs effective measures for control.

To cope with this challenge, Egypt developed a national project for HCV elimination (Gamal, 2014; EESJU, 2014; EMHP, 2017). The National Committee for Control of Viral Hepatitis (NCCVH) was launched in 2006 by the Egyptian Ministry of Health and Population (MOH) to cope with the serious problem of HCV epidemic in the country (El-Akel *et al*., 2017). On the beginning of its work, The Egyptian NCCVH issued the national treatment strategy for control of HCV infection, which represented the road map for its work (Doss *et al*., 2008).

After successful negotiations for 99% discounted Directly Acting Antiviral drugs (DAA) prices (Kim *et al*., 2015), Egypt started an ambitious national HCV treatment program with the goal to treat over 250,000 individuals with HCV infection per year, with the hope of reduction of HCV prevalence to < 2% by 2025 (McNeil Jr., 2015).

Several studies suggest that the incidence of HCV infection has decreased since the second half of the 20th century. First, most countries have age-specific prevalence of serological evidence of past or present infection, suggesting lower incidence in recent years (Bruggmann *et al*., 2014; Saraswat *et al*., 2015; Liakina *et al*., 2015; Armstrong *et al*., 2000). Second, countries that conduct surveillance for acute hepatitis C reported decreases in the rates (Williams *et al*., 2011). Third, countries that conducted more than one biomarker survey, such as Egypt, reported an evolution over time that suggests a decrease in incidence (MHPICFI, 2015). Fourth, injection safety improved, which reduced the incidence of injection-associated HCV infection (Pépin *et al*., 2014).

Worldwide, 7% of those diagnosed (1.1 million) were started on treatment in 2015. The Eastern Mediterranean Region accounted for the largest proportion of those started on treatment (12%), boosted by the large-scale elimination plans in Egypt (Estes *et al*., 2015). Of those started on treatment in 2015, about half received DAAs. Given that more people were initiated on treatment the following year, WHO (2016) global report on access to hepatitis C treatment estimated that about 1 million persons had accessed DAAs in selected countries. However, there is wide variation in terms of access to DAAs from country to country.

For example, in 2015, the HCV elimination program in Egypt was based on the use of DAAs.

These measures could only succeed if based on good knowledge and awareness of both infections by community members who require comprehensive contribution of both health care delivery system and the Egyptian community.

Thus, this study was conducted on a cohort of population in order to assess the level of knowledge and awareness of the community about HCV and HBV infections.

Study Design and Data Collection

This community based cross sectional survey was conducted between November 2018 and March 2019 in Menofia Governorate which is located at the Nile delta at north of Egypt. This Governorate is populous with a surface area of 2,543 km^2 and a population number of 4,077 million.

We excluded those < 18 years old and those who refused to participate in the study from the start or who refused to complete the questionnaire.

The study was done by using a well-structured pretested questionnaire containing 10 closed-ended (yes/no) and 8 open-ended questions. The questionnaire tested the demographic and socioeconomic characteristics of participants along with 19 questions testing knowledge and awareness regarding HBV and HCV infections and their modes of transmission.

The awareness about prevention of HBV and HCV infections including vaccination status was included in a set of questions with a focus on the source of participants' information. Also, the screening status of participants and their family members was included in these questions, Tables 3, 4, 7 and 8.

This questionnaire was developed on basis of previous studies (Du *et al*., 2012; Denniston *et al*., 2012). The original questionnaires were in English and some of its questions were not suitable with the Egyptian culture. So, we chose some of these questions and translated it to simple questions that could be easily understood. The questionnaire was revised and modified several times by some professors of National liver institute. A small pilot study was done on 50 of the employees of the National Liver Institute and some of the companions of the attending patients to the outpatient clinic of the National Liver Institute hospital before it was finally approved.

The study was done with the help of 5 interviewers (including 4 nurses and one employee from National Liver Institute). The idea of the study and items of the questionnaire was explained to all of the interviewers before starting the study.

Printed copies of the questionnaire were distributed to 14682 participants using systematic random sampling technique by the interviewers.

Of the 14,682 participants, 14000 were recruited in which 682 individuals refused to participate in the study; 1000 from medical students of the Faculty of Medicine, Menoufia University, 3000 were non-medical students from three faculties other than the faculty of medicine belonging to the same University. Five thousand residents were recruited from five rural areas of *Menofia* Governorate and lastly 5000 residents were chosen from other five urban centers of the same Governorate.

After obtaining verbal approval to be included in the study, all participants were asked to fill the

administered questionnaire at their own will and convenience. Then filled questionnaires were anonymously returned to the interviewers. The interviewers helped some participants who felt difficulty to understand some questions and they filled the questionnaire by themselves for illiterate persons.

Important Definitions

However, there is a distinct difference between awareness and knowledge.

Awareness is perceiving, knowing, feeling, or being conscious of events, objects, thoughts, emotions, or sensory patterns.

Knowledge is facts, information and skills acquired through experience or education.

A knowledge score depending on the mean percentage of correct answers was assigned. A percentage of correct answers equal to or greater than 60% of all questions was considered "good", if less than 60% or equal poor.

Statistical Analysis Data were coded, tabulated and analyzed using the Statistical Package for Social Science (SPSS) version 26.0 for Windows (SPSS, Chicago, IL, USA). Continuous variables were described using mean and standard deviation and categorical variables were described using frequencies and percentages. The z-ratio was used for the significance of the difference between two independent proportions and a *p* value less than 0.05 was considered statistically significant. The Analysis of Variance (ANOVA) test was used for the significance of the difference between quantitative variables and a *p*-value less than 0.05 was considered statistically significant.

Results

Socio-Demographics of Participants

A sum of 14682 inhabitants of Menofia Governorate voluntarily participated in this study. Participants were asked to fill out the study questionnaire under supervision of the interviewers. Among all participants, 682 individuals returned unfilled questionnaires or refused to continue the interview (response rate, 95.4%) and they were excluded from the study.

Of all participants, males were 7630 (54.5%) while females were 6370 (45.5%) with mean age ranging from 42±12 years.

As regard students' group (medical and non-medical), (55%) were males and (45%) were females with mean age 24.6±1.1 years ranging between 22-28 yrs.

While for public residents group (urban and rural), males were (47.4% and 47.7%) and females were (52.6% and 52.3%) with mean age (46.4±16.2 and 47.2±17.4 years) and range between (18-65 and 20- 67 years) for residents of rural and urban areas respectively.

According to the socioeconomic level of these residents, (48.7% and 49.4%) were of low and intermediate levels and (51.3% and 50.6%) of high socioeconomic levels for residents of rural and urban areas respectively.

About 49.3% and 56.2% of participants underwent previous screening for hepatitis B and C respectively while 5.6% and 7.2% were not sure about HBV and HCV screening respectively.

Knowledge About HBV

Knowledge about HBV was tested by questions 1 to 6, Table 1. Answers of participants revealed good knowledge (81.9% correct answers) regarding HBV transmission, Table 1 and Fig. 1. But, 51.7% of participants gave false answers about HBV cure, Table 1.

There was no significant difference between percentage of correct answers between medical and non-medical students and between residents of rural or urban areas, Table 2.

Knowledge of participants about HBV transmission was significantly affected by their age category, residence area, current jobs, level of education and socioeconomic standard measured by monthly income ($p < 0.05$), Table 3.

While gender of participants and their marital status did not affect their knowledge about HBV infection, Table 3.

As regard modes of HBV transmission, blood and blood products transfusions (50.9%), followed by sexual contact (30.1%) and from mother to child during delivery (6.7%) were reported as the common modes of HBV infection, Fig. 1.

Table 1: Correct answers to questions testing knowledge and awareness about HBV infection among all participants.

Statements		Correct answers N (%)
Knowledge	Is hepatitis B an infectious/transmissible disease?	12614 (90.1)
	What is the causative agent for hepatitis B?	13342 (95.3)
	Which organ is more affected by Hepatitis B?	13608 (97.2)
	Should every patient undergoing surgery be screened for HBV?	10234 (73.1)
	Is screening of blood donors for HBV mandatory for safe transfusion?	12516 (89.4)
	Can hepatitis B patient be cured completely by treatment?	6902 (49.3)
Awareness	Is hepatitis B infection a preventable disease?	12852 (91.8)
	What are measures to prevent hepatitis B?	13034 (93.1)
	Is there any available vaccine for hepatitis B?	13636 (97.4)
	What are the minimum needed doses of the vaccine to complete vaccination against HBV?	12068 (86.2)

Table 2: Comparison of correct answers about knowledge and awareness about HBV infection among different groups of participants

	Correct responses (%)				p value			
Statements	Non-medical students (3000)	Medical students (1000)	Residents at rural areas (5000)	Residents at urban areas (5000)	P1	P2	P3	P4
Question 1	87.2	95.2	74.3	90.8	0.042	0.044	0.40	0.82
Question 2	89.5	98.0	92.4	93.0	0.005	0.81		
Question 3	96.1	98.8	97.0	93.6	0.38	0.12		
Question 4	65.7	64.5	82.0	72.9	0.75	0.26		
Question 5	79.0	90.4	94.0	93.9	0.03	0.84		
Question 6	42.4	41.5	36.6	39.0	0.76	0.90		
Question 7	84.2	92.2	84.0	97.9	0.12	0.043		
Question 8	87.0	93.0	87.3	93.4	0.09	0.48	0.31	1.01
Question 9	95.0	98.6	97.2	96.0	0.23	0.71		
Question 10	84.0	87.2	81.8	67.9	0.47	0.15		

p- value < 0.05, considered statistical significant; p-value by Z ratio; p1 and p3= non-medical vs. medical students; p2 and p4 = residents of rural vs. urban areas

Table 3: knowledge of participants about HBV prevention, (n = 14000).

					Univariate logistic (good vs. poor)		Multivariate logistic (good vs. poor)	
Variable	Frequency	Mean score	p- value (a)	Knowledge (good/poor)	OR (95% CI)	p- value	OR (95% CI)	p- value
Gender:								
Male (R)	7630 (54.5%)	15.1 (3.77)	0.49	3024/4615	1	0.08	1	0.13
Female	6370 (45.5%)	14.8 (3.74)		2142/4219	0.7 (0.6-1.02)		0.77 (0.51-1.2)	
Age /years:								
< 25 (R)	5040 (36.0)	14.8 (3.79)	0.001	1736/1637	1	0.02	1	0.008
25 - < 35	3696 (26.4)	15.6 (3.33)		1906/2345	1.5 (1.08-2.2)		1.7 (1.1-2.5)	
35 - < 45	2408 (17.2)	14.9 (3.98)		1081/ 1887	1.08 (0.7-1.6)	0.67	1.2 (0.7-1.6)	0.39
45 - < 55	1736 (12.4)	13.8 (3.94)		1118/2217	0.6 (0.4-1.04)	0.09	0.7 (0.4-1.04)	0.36
≥ 55	1120 (8.0)	11.2 (3.1)		36/ 37	0.5 (0.3-1.01)	0.06	0.6(0.3-1.01)	0.27
Residence:								
Rural (R)	8330 (59.5)	14.1 (4.03)	0.002	1118/4582	1	0.006	1	0.023
Urban	5670 (40.5)	15.3 (3.52)		3390/4910	1.85 (1.19-2.8)		1.68 (1.07-2.7)	
Marital status:								
Single	2688 (19.2)	14.5 (4.12)	0.24	898/1796	1	0.35	---	----
Married	10990 (78.5)	15.05 (3.7)		4123/ 6872	1.2 (0.8-2.2)		---	
Widow or divorced	322 (2.3)	15.18 (3.2)		146/ 165	1.8 (0.6-4.9)	0.27	---	-----
Job:								
Healthcare workers	1848 (13.2)	16.1 (3.0)	0.043	825/1026	1	0.29	1	0.76
Farmer	4074 (29.1)	15.1 (3.92)		1007/1910	0.81 (0.47-1.2)		0.9(0.06-1.52)	
Governmental work	3374 (24.1)	14.6 (3.9)		550/600	0.69 (0.41-1.0)	0.18	0.88(0.52-1.5)	0.62
Non- Governmental work	490 (3.5)	14.82 (4.0)		808/1700	0.65(0.27-1.5)	0.29	0.7(0.26-1.71)	0.39
Private business	994 (7.1)	14.6 (3.92)		420/444	0.63(0.33-1.2)	0.17	1.1(0.49-2.5)	0.81
Student	1456 (10.4)	14.2 (3.7)		165/330	0.61(0.38-1.1)	0.06	1(0.55-1.83)	0.99
Retired	1400 (10.0)	15.1 (3.82)		329/660	0.62(0.25-1.8)	0.43	1.14(0.41-3.09)	0.83
Unemployed	280 (2.0)	15.0 (3.8)		934/1924	0.66(0.24-1.9)	0.41	1.01(0.43-2.98)	0.81
Others	84 (0.6)	14.9 (3.76)		128/240	0.67(0.26-1.8)	0.38	0.95(0.07-1.42)	0.84
Level of education:								
Illiterate or Primary education	938 (6.7)	12.47(4.89)	0.0001	183/751	1	0.052	1	0.23
Secondary education	6622 (47.3)	14.8(3.51)		2199/4416	2.06(0.99-4.2)		1.58(0.74-3.46)	
Diploma degree	3542 (25.3)	15.2(3.8)		1411/2126	2.7(1.31-5.77)	0.008	1.75(0.78-4.01)	0.19
University	2394 (17.1)	15.41(3.91)		1099/1301	3.44(1.6-7.51)	0.002	2.29(0.94-5.41)	0.06
Postgraduate	518 (3.7)	16.75(2.31)		275/239	4.79(1.7-10.0)	0.003	3.2(1.08-9.6)	0.039
Family income (LE):								
≤ 2000 (R)	3360(24.0)	14.1(4.1)	0.002	935/2419	1	0.46	1	0.95
2001-3000	3262(23.3)	14.81(3.55)		1026/2236	1.18(0.78-1.9)		1.03(0.66-1.68)	
3001-4000	2296(16.4)	15.33(2.89)		825/1466	1.49(0.91-2.3)	0.13	1.24(0.75-2.05)	0.45
4001-5000	1610(11.5)	15.22(3.65)		678/935	1.89(1.12-3.3)	0.02	1.64(0.94-3.0)	0.09
> 5000	3486(24.9)	15.5(4.09)		1704/1776	2.51(1.63-3.8)	0.0001	1.89(1.18-3.08)	0.01

(a) Analysis using Analysis of Variance (ANOVA)
CI confidence interval, OR odds ratio, R reference group, LE Egyptian pounds, SD standard deviation

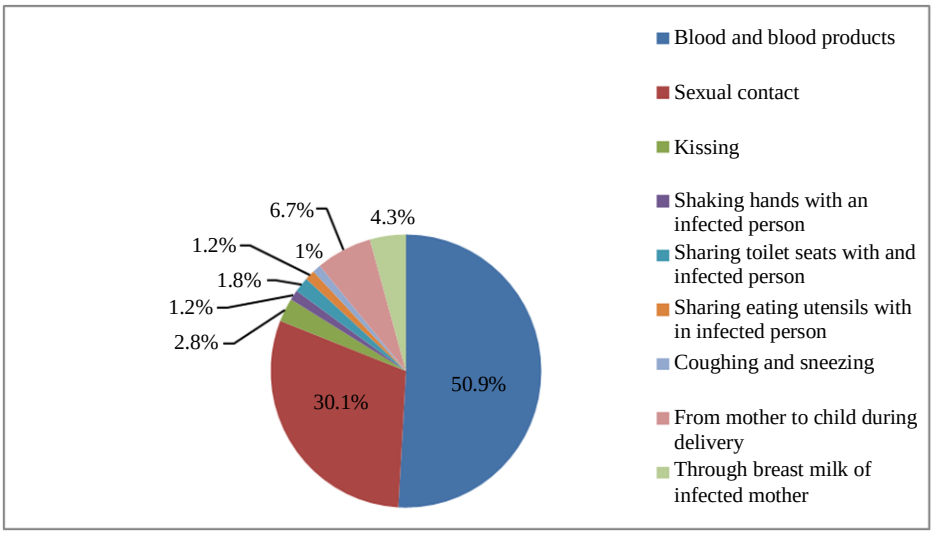

Fig. 1: Knowledge of modes of HBV transmission among 14000 person allover Menoufia Governorate in Egypt

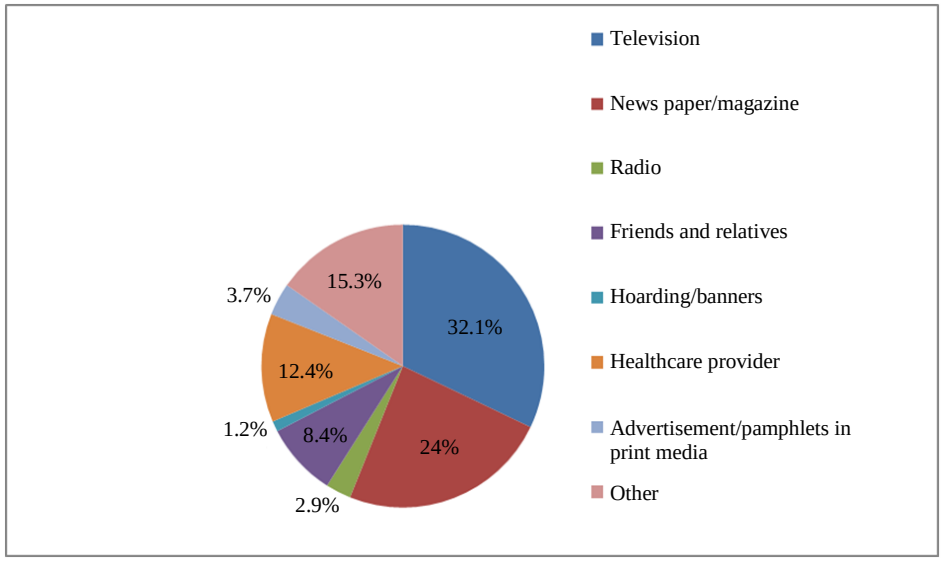

Fig. 2: Source of knowledge about hepatitis B among 14000 person allover Menoufia Governorate in Egypt

About 72.6% of participants were vaccinated for hepatitis B infection while 7.2% did not know about their vaccination status. Amazingly, 47.3% participants stated that none of their family members were vaccinated against HBV and 21.5% were not sure whether about vaccination status of their family members.

Source of participants' knowledge was variable. About (32.1%) gained their knowledge from television materials and (24%) of them gained it from newspapers and magazines, Fig. 2.

Awareness About HBV

Awareness about HBV preventive measures was tested by questions number 7 to 10, Table 1. Participants had good awareness about measures of HBV prevention and availability of HBV vaccine with (92.13%) correct answers to supplied questions.

Percentage of correct answers was not significantly different among different study groups, Table 2.

On Univariate analysis, age category, residence, marital status and level of education of participants was significantly related to their level of awareness about HBV prevention. Whereas, gender, job and no monthly income had no significant relationship, Table 4.

Knowledge About HCV

The study revealed good knowledge (79.3% of correct answers) regarding HCV infection (reflected by the first six questions in Table 5) among all participants except for the curable nature of HCV,

where 40.9%, of participants gave an answer denying that patients can be completely cured of HCV infection, Table 5 and Fig. 3.

The percent of correct answers did not differ between medical and non-medical students and between residents of rural and urban areas, Table 6.

Knowledge about HCV transmission was significantly related to participants' age category, residence area, current jobs and level of education and socioeconomic standard of participants. While, gender and marital status of participants had no significant relationship, Table 7.

Table 4: Awareness of participants about HBV infection prevention, (n = 14000)

					Univariate logistic (good vs. poor)		Multivariate logistic (good vs. poor)	
Variable	Frequency	Mean score	p- value (a)	Knowledge (good/poor)	OR (95% CI)	p- value	OR (95% CI)	p- value
Gender:								
Male (R)	7630 (54.5%)	1.88 (1.31)	0.123	2766/4857	1	0.11	1	0.14
Female	6370 (45.5%)	2.1 (1.29)		2675/3702	1.26(0.9-1.7)		1.53 (1.07-2.2)	
Age /years:								
< 25 (R)	5040 (36.0)	1.71 (1.29)	<0.001	1393/3646	1	<0.001	1	0.006
25 - < 35	4256(30.4)	2.18 (1.21)		1431/1570	2.23(1.55- 3.2)		2.08 (1.37- 3.2)	
35 - < 45	2968 (21.2)	2.05 (1.34)		1246/ 1723	1.9 (1.26 –2.9)	0.002	1.82 (1.13 –2.9)	0.41
45 - < 55	1176(8.4)	2.24 (1.44)		843/897	2.44(1.5- 3.98)	<0.001	2.95 (1.58- 5.51)	0.39
≥ 55	560 (4.0)	2.22 (1.45)		530/ 721	2.51 (1.4 –3.9)	<0.001	2.76(1.49 – 5.2)	0.24
Residence:								
Rural (R)	8316 (59.4)	1.87 (1.30)	0.001	806/1887	1	0.96	1	0.026
Urban	5684 (40.6)	2.32 (1.28)		4636/6671	1.61 (1.14-2.4)		0.96 (0.64– 1.5)	
Marital status:								
Single	2688 (19.2)	1.62 (1.32)	<0.001	806/1887	1	0.012	1	----
Married	10990 (78.5)	2.09 (1.3)		4544/6450	1.7(1.13 –2.4)		1.30 (0.79– 2.1)	
Widow or divorced	322 (2.3)	1.54(1.13)		92/221	0.99(0.31– 2.9)	0.97	0.89 (0.27–2.93)	-----
Job:								
Healthcare workers	1848(13.2)	1.95 (1.30)	0.75	660/1191	1	0.65	1	0.72
Farmer	4074 (29.1)	1.94 (1.36)		1558/2510	1.12(0.66-1.8)		1.22(0.73-2.01)	
Governmental work	3374 (24.1)	2.05 (1.29)		1411/1961	1.30(0.8-2.15)	0.31	1.29(0.75-2.21)	0.70
Non- Governmental work	490 (3.5)	1.77 (1.23)		147/348	0.75(0.31-1.9)	0.56	1.37(0.49-3.76)	0.40
Private business	994 (7.1)	2.14 (1.43)		147/550	1.45(0.74-2.8)	0.29	1.08(0.49-2.37)	0.84
Student	1456 (10.4)	1.93 (1.25)		1045/1214	1.04(0.63-1.7)	0.88	0.97(0.54-1.74)	0.98
Retired	1400 (10.0)	2.30 (1.53)		183/183	1.82(0.69-4.7)	0.23	1.42(0.51-3.98)	0.85
Unemployed	280 (2.0)	2.21 (1.51)		195/398	1.79(0.71-4.3)	0.26	1.39(0.49-3.88)	0.86
Others	84 (0.6)	2.09 (1.48)		97/202	1.34(0.72-3.9)	0.28	1.09(0.51-2.41)	0.83
Level of education:								
Illiterate or Primary education	938 (6.7)	1.28(1.20)	<0.001	783/875	1	0.005	1	0.26
Secondary education	6622 (47.3)	1.99(1.33)		2675/3940	2.79(1.34-5.7)		3.58(1.67-7.71)	
Diploma degree	3542 (25.3)	2.03(1.24)		1411/293	2.73(1.29-5.8)	0.009	4.58(2.01-10.41)	0.21
University	2380 (17.0)	2.03(1.38)		898/1503	2.46(1.16-5.3)	0.024	4.14(1.76-9.76)	0.08
Postgraduate	518 (3.7)	2.65(1.17)		775/847	4.7(1.74-13.0)	0.003	7.61(2.56- 22.6)	0.04
Family income (LE):								
≤ 2000 (R)	3360(24.0)	1.81(1.38)	0.286	1246/2107	1	0.59	---	---
2001-3000	3262(23.3)	1.98(1.21)		1301/1961	1.13(0.74-1.7)		---	
3001-4000	2296(16.4)	2.08(1.37)		916/1374	1.14(0.72-1.8)	0.62	---	---
4001-5000	1610(11.5)	2.01(1.20)		586/1026	0.98(0.58-1.6)	0.89	---	---
> 5000	3472(24.8)	2.08(1.36)		1393/2090	1.14(0.76-1.7)	0.57	---	---

(a) Analysis using Analysis of Variance (ANOVA)
CI confidence interval, OR odds ratio, R reference group, LE Egyptian pounds, SD standard deviation.

Table 5: Correct answers to questions testing knowledge and awareness about HCV infection among all participants.

Statements		Correct answers N (%)
Knowledge	Is hepatitis C an infectious/transmissible disease?	12474 (89.1)
	What is the causative agent for hepatitis C?	13104 (93.6)
	Which organ is more affected by Hepatitis C?	13552 (96.8)
	Should every patient undergoing surgery be screened for HCV?	9576 (68.4)
	Is screening of blood donors for HCV mandatory for safe transfusion?	12208 (87.2)
	Can hepatitis C patient be cured completely by treatment?	5726 (40.9)
Awareness	Is hepatitis C infection a preventable disease?	12474 (89.1)
	What are measures to prevent hepatitis C?	12614 (90.1)
	Is there any available vaccine for hepatitis C?	13552 (96.8)

Table 6: Comparison of correct answers about knowledge and awareness about HCV infection among different groups of participants

	Correct responses (%)				p value			
Statements	Non-medical students (3000)	Medical students (1000)	Rural residence individuals'	Urban residence individuals'	P1	P2	P3	P4
Question 1	91.9	98.7	85.7	92.1	0.04	0.041	0.39	0.80
Question 2	81.0	97.3	92.0	93.9	0.003	0.80		
Question 3	94.7	98.0	98.1	93.0	0.36	0.10		
Question 4	78.2	74.3	84.2	79.9	0.73	0.22		
Question 5	80.4	90.0	94.8	93.0	0.03	0.81		
Question 6	58.3	55.3	43.2	40.2	0.72	0.89		
Question 7	88.4	92.0	87.2	96.2	0.11	0.04		
Question 8	89.6	94.2	88.1	89.2	0.07	0.46	0.29	1
Question 9	94.8	98.0	95.7	96.0	0.21	0.70		

$p < 0.05$, considered statistical significant; p value by Z ratio; p1 and p3 = non-medical vs. medical students; p2 and p4 = residents of rural vs. Urban areas

Table 7: knowledge of participants about HCV infection, (n = 14000).

					Univariate logistic (good vs. poor)		Multivariate logistic (good vs. poor)	
Variable	Frequency	Mean score	p- value (a)	Knowledge (good/poor)	OR (95% CI)	p- value	OR (95% CI)	p- value
Gender:								
Male (R)	7520 (53.7%)	14.9 (3.74)	0.46	3034/4505	1	0.09	1	0.14
Female	6480 (46.3%)	13.9 (3.54)		2192/4269	0.73(0.7-1.1)		0.82 (0.53-1.4)	
Age /years:								
< 25 (R)	4910 (35.07)	13.9 (3.73)	0.002	1700/1643	1	0.03	1	0.006
25 - < 35	3416 (24.4)	15.2 (3.31)		1806/2355	1.49 (1.1-2.3)		1.78 (1.13-2.3)	
35 - < 45	2508 (17.9)	14.5 (3.78)		1181/1860	1.1 (0.72-1.6)	0.71	1.22 (0.74-1.7)	0.41
45 - < 55	1956 (13.97)	14.1 (3.82)		1125/2237	0.6 (0.5-1.14)	0.08	0.72 (0.44-1.06)	0.39
≥ 55	1210 (8.64)	11.5 (3.23)		43/ 50	0.53 (0.4-1.0)	0.07	0.65(0.33-1.1)	0.24
Residence:								
Rural (R)	8105 (57.9)	14.2 (4.13)	0.003	1008/4592	1	0.005	1	0.026
Urban	5895 (42.1)	15.4 (3.49)		3440/4960	1.87 (1.2-2.77)		1.78 (1.1-2.75)	
Marital status:								
Single	2408 (17.2)	14.7 (4.32)	0.26	918/1726	1	0.37	---	----
Married	10790 (77.1)	15.21 (3.9)		4143/ 6092	1.3 (0.7-2.31)		---	
Widow or divorced	802 (5.7)	15.23 (3.3)		476/ 645	1.7 (0.5-4.87)	0.28	---	-----
Job:								
Healthcare workers	1600 (11.4)	16.13 (3.2)	0.045	710/1041	1	0.31	1	0.72
Farmer	4274 (30.5)	15.3 (3.94)		1207/1710	0.83 (0.5-1.22)		0.91(0.1-1.57)	
Governmental work	3382 (24.2)	14.61 (4.0)		590/660	0.71 (0.43-1.1)	0.21	0.88(0.52-1.62)	0.70
Non- Governmental work	530 (3.8)	14.85 (4.1)		600/1808	0.69(0.29-1.6)	0.27	0.76(0.36-1.77)	0.40
Private business	854 (6.1)	14.62 (3.9)		470/494	0.66(0.35-1.3)	0.19	1.13(0.52-2.52)	0.84
Student	1476 (10.5)	14.21 (3.8)		135/300	0.64(0.37-1.2)	0.08	1.23(0.59-1.87)	0.98
Retired	1520 (10.86)	15.17 (3.8)		339/680	0.68(0.23-1.7)	0.40	1.16(0.46-3.19)	0.85
Unemployed	260 (1.86)	15.3 (3.72)		940/1938	0.69(0.25-1.8)	0.45	1.11(0.48-2.94)	0.86
Others	104 (0.74)	15.1 (3.79)		132/246	0.66(0.3-1.77)	0.41	0.99(0.17-1.52)	0.83
Level of education:								
Illiterate or Primary education	900 (6.4)	12.67(4.9)	0.0002	213/521	1	0.05	1	0.26
Secondary education	6640 (47.4)	14.84(3.6)		2099/4516	2.56(0.9-4.33)		1.61(0.71-3.76)	
Diploma degree	3562 (25.4)	15.21(3.82)		1461/2176	2.74(1.4-5.81)	0.007	1.79(0.88-4.1)	0.21
University	2234 (15.95)	15.51(4.0)		1149/1201	3.46(1.6-7.53)	0.001	2.31(0.90-5.46)	0.08
Postgraduate	664 (4.74)	16.76(2.33)		375/289	4.82(1.8-10.1)	0.002	3.24(1.18-9.66)	0.04
Family income (LE):								
≤ 2000 (R)	3220(23.0)	14.43(4.21)	0.003	825/2429	1	0.49	1	0.98
2001-3000	3402(24.3)	14.89(3.59)		1056/2286	1.16(0.82-1.7)		1.13(0.86-1.78)	
3001-4000	2230(15.9)	15.53(2.92)		845/1336	1.52(0.92-2.1)	0.17	1.26(0.79-2.15)	0.47
4001-5000	1626(11.6)	15.32(3.71)		778/965	1.91(1.22-3.1)	0.04	1.72(0.91-3.4)	0.11
> 5000	3522(25.2)	15.58(4.12)		1604/1876	2.53(1.65-3.7)	0.0002	1.91(1.38-3.18)	0.02

(a) Analysis using Analysis of Variance (ANOVA).
CI confidence interval, OR odds ratio, R reference group, LE Egyptian pounds, SD standard deviation.

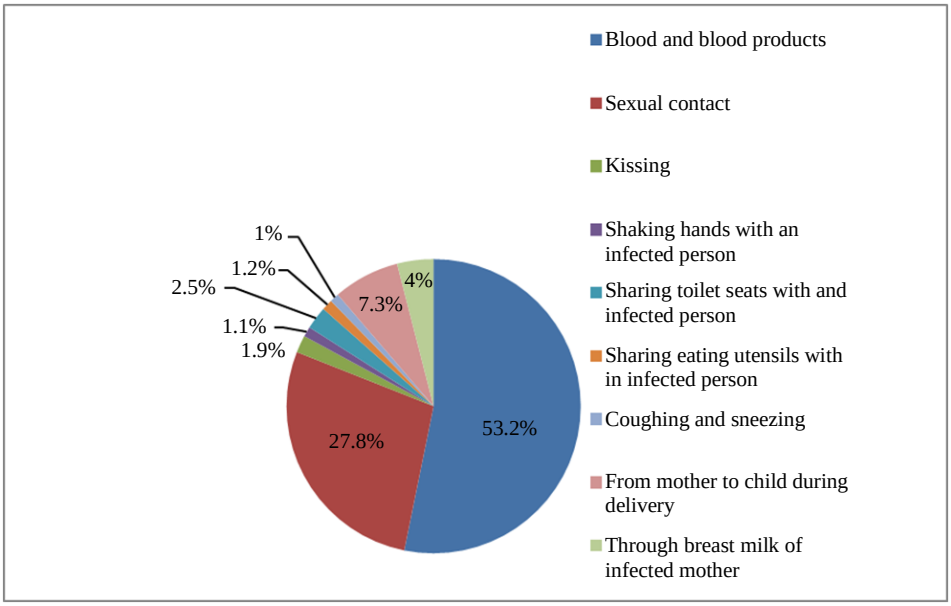

Fig. 3: Knowledge of modes of HCV transmission among 14000 person allover Menoufia Governorate in Egypt

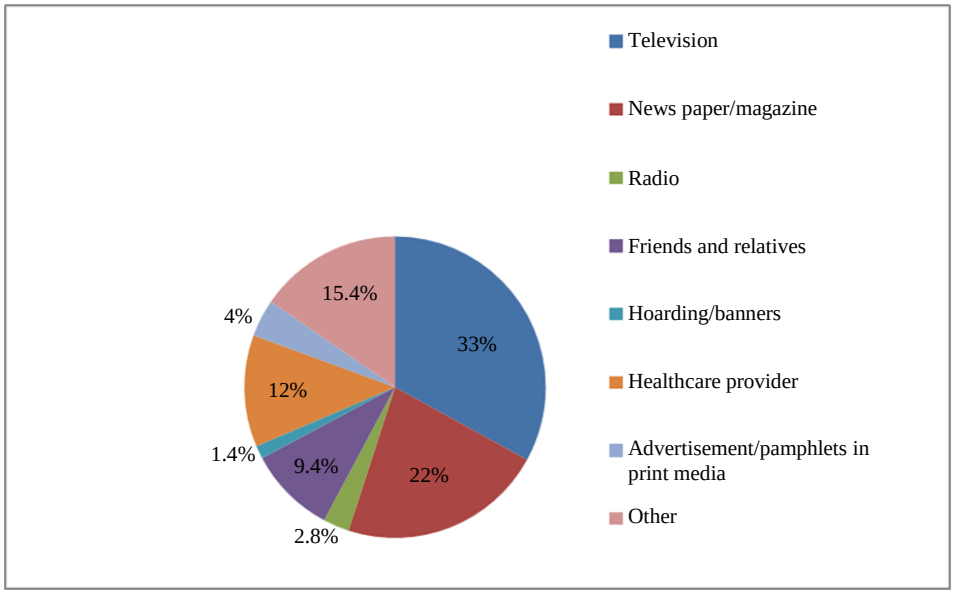

Fig. 4: Source of knowledge about hepatitis C among 14000 person allover Menoufia Governorate in Egypt

Blood and blood products (53.2%), sexual contact (27.8%), mother to child during delivery (7.3%) and others were reported as the commonest modes of transmission of HCV respectively, Fig. 4.

Participants stated that they had their knowledge mainly from television materials and newspapers (33 and 22% respectively), Fig. 4.

Awareness About HCV

The awareness of participants about measures to prevent HCV was tested by the last 3 questions in Table 5. About (92%) of participants gave correct answers on these questions.

Age of participants, their residence area, marital status and education level varied significantly with their awareness about prevention of HCV infection, Table 8.

On asking participants about precautions against HCV infections, 30.2% stated that they are being educated on this issue, 22.3% had heard something like that and 47.5% of participants did not know anything about that.

Table 8: Awareness of participants about HCV prevention, (n = 14000)

Variable	Frequency	Mean score	p-value (a)	Knowledge (good/poor)	Univariate logistic (good vs. poor)		Multivariate logistic (good vs. poor)	
					OR (95% CI)	p- value	OR (95% CI)	p- value
Gender:								
Male (R)	7230 (51.6%)	1.82 (1.39)	0.126	2706/4837	1	0.12	1	0.14
Female	6770 (48.4%)	2.3 (1.31)		2735/3722	1.24(1.0-1.71)		1.57 (1.13-2.3)	
Age /years:								
< 25 (R)	5020 (35.9)	1.77 (1.35)	<0.001	1223/3686	1	<0.001	1	0.006
25 - < 35	4276(30.5)	2.22 (1.29)		1541/1670	2.21(1.59- 3.0)		2.11 (1.34-3.14)	
35 - < 45	2338 (16.7)	2.11 (1.39)		1226/ 1503	1.9(1.3-2.87)	0.001	1.82 (1.13-2.8)	0.41
45 - < 55	1286(9.2)	2.27 (1.49)		863/998	2.48(1.59-3.9)	<0.001	2.91 (1.62-5.54)	0.39
≥ 55	1080 (7.7)	2.20 (1.42)		650/ 640	2.5(1.44-3.8)	<0.001	2.82(1.45-5.3)	0.24
Residence:								
Rural (R)	8106 (57.9)	1.89 (1.31)	0.002	800/1893	1	0.91	1	0.026
Urban	5894 (42.1)	2.34 (1.29)		4536/6771	1.67(1.2-2.44)		0.98 (0.6-1.48)	
Marital status:								
Single	2428 (17.3)	1.64 (1.35)	<0.001	806/1267	1	0.014	1	----
Married	11140 (79.6)	2.12 (1.33)		4624/6670	1.73(1.1-2.5)		1.32 (0.81-2.2)	
Widow or divorced	432 (3.1)	1.57(1.19)		231/402	0.97(0.3-2.82)	0.93	0.91 (0.24-2.98)	-----
Job:								
Healthcare workers	1408(10.1)	1.98 (1.34)	0.78	500/1291	1	0.71	1	0.72
Farmer	4184 (29.9)	1.96 (1.37)		1588/2530	1.14(0.68-1.7)		1.24(0.77-2.12)	
Governmental work	3474 (24.8)	2.08 (1.31)		1011/1661	1.3(0.82-2.13)	0.39	1.25(0.77-2.23)	0.70
Non- Governmental work	520 (3.7)	1.79 (1.29)		357/548	0.79(0.3-1.98)	0.61	1.33(0.51-3.81)	0.40
Private business	964 (6.9)	2.22 (1.52)		347/450	1.49(0.8-2.79)	0.31	1.11(0.49-2.39)	0.84
Student	1426 (10.2)	1.95 (1.29)		1155/1004	1.1(0.69-1.78)	0.84	0.99(0.56-1.85)	0.98
Retired	1460 (10.4)	2.33 (1.57)		253/383	1.84(0.71-4.9)	0.26	1.44(0.53-3.90)	0.85
Unemployed	310 (2.2)	2.24 (1.59)		265/178	1.81(0.75-4.9)	0.31	1.41(0.51-3.82)	0.86
Others	254 (1.8)	2.12 (1.51)		197/282	1.38(0.76-4.1)	0.29	1.11(0.50-2.46)	0.83
Level of education:								
Illiterate or Primary education	728 (5.2)	1.31(1.23)	<0.001	563/895	1	0.004	1	0.26
Secondary education	6732 (48.1)	2.11(1.36)		2765/2950	2.81(1.3-5.71)		3.61(1.71-7.74)	
Diploma degree	3102 (22.2)	2.07(1.26)		1531/2063	2.79(1.3-5.83)	0.006	4.60(2.11-10.43)	0.21
University	2520 (18.0)	2.07(1.41)		968/813	2.49(1.2-5.42)	0.023	4.18(1.79-9.78)	0.08
Postgraduate	918 (6.5)	2.72(1.19)		632/820	4.81(1.7-13.2)	0.002	7.66(2.6-22.41)	0.04
Family income (LE):								
≤ 2000 (R)	3110(22.2)	1.82(1.39)	0.291	1256/1807	1	0.61	---	---
2001-3000	3392(24.2)	2.10(1.23)		1341/1987	1.17(0.78-1.8)		---	
3001-4000	2396(17.1)	2.11(1.39)		1019/1154	1.1(0.79-1.83)	0.67	---	---
4001-5000	1720(12.3)	2.03(1.21)		669/1110	0.99(0.53-1.8)	0.91	---	---
> 5000	3382(24.2)	2.09(1.39)		1393/2264	1.17(0.78-1.9)	0.62	---	---

(a) Analysis using Analysis of Variance (ANOVA).
CI confidence interval, OR odds ratio, R reference group, LE Egyptian pounds, SD standard deviation.

Multivariate Analysis

Multivariate logistic regression of significant factors which affected participants' answers revealed that knowledge and awareness about HBV infection were affected by age category of participants, their residence and increased level of education, Table 3 and 4.

While for HCV infection, awareness about HCV infection was significant with participants' age category, residence and level of education, Table 8. In addition to these factors, knowledge about HCV infection was affected by the monthly income of these participants, Table 7.

Discussion

Hepatitis C constitutes a major health problem in Egypt, which has strong negative clinical, social and economic impact on patients and their families and also on the healthcare systems. Many studies tried to measure the level of knowledge and awareness about HCV and HBV infections among different groups of population in Egypt. But, results of these studies were heterogonous (Shalaby *et al*., 2010; Norton *et al*., 2014).

This community-based cross sectional study was conducted on 14000 residents of Menoufia Governorate residents of different socio-economic and education levels in order to provide comprehensive data about knowledge and awareness of community members about HCV and HBV infections.

In this study, we found that 81.9% of participants had good knowledge about HBV infection and 92.13% had good awareness about HBV prevention. This was surprisingly higher than expected especially when compared with other studies from countries with high prevalence of HBV infection.

In a study by Rajamoorthy *et al*. (2019) they found only 36.9% of their study population had good knowledge and 38.8% had good awareness about HBV infection.

In another study on healthcare workers and University students at Malaysia, they also revealed that 39.1% of participants had good knowledge and 37.2% had good awareness about HBV infection (Lim and Rashwan, 2003).

On the other hand, participants' knowledge in our study about HCV infection was less than for HBV infection (79.3%). This may be attributed to false concepts about disease curability. This agreed with other studies on public population in Egypt which revealed lack of knowledge about HCV transmission (Chemaitelly *et al*., 2014; Sultan *et al*., 2018). But, awareness about HCV prevention was good among participants (92%).

Recently, many attempts occurred to improve awareness about viral hepatitis in Egypt by the Information, Education and Communication systems through hotlines, counseling, vaccination campaigns and celebration of World Hepatitis Day. The World Hepatitis Day celebration brought stakeholders together and conveyed important messages to the community (Wanis *et al*., 2014).

In our study, many participants stated that they had their information about HCV and HBV infection through television programs or newspapers, which reflects the success of this policy as regard improved knowledge and awareness about viral hepatitis in our study population.

This agreed with a study by Shalaby *et al*. (2010) who assumed that friends and relatives (47.9%), television (43%), newspapers (36.7%) and doctors (30%) were the main sources of information. Also, Chemaitelly *et al*. (2014) stated that the media is the main sources of HCV knowledge.

The level of education (illiterate, primary or secondary education, diploma, university and postgraduate levels) was one of the most important factors that affected knowledge and awareness about HCV and HBV infections. Also, there was difference between medical and non-medical students.

These results were similar to findings reported by the study at the University of Dammam, Kingdom of Saudi Arabia (Chemaitelly *et al*., 2014), at University of Lome students (Sultan *et al*., 2018), in the Medical College of Bitola (Wanis *et al*., 2014) and in medical colleges of Karachi, Pakistan, which revealed excellent knowledge about HBV and HCV transmission (Almansour *et al*., 2017).

The impact of education on knowledge about HBV infection had been reported also in studies from Australia (Bagny *et al*., 2015), Canada (Prodanovska Stojcevska *et al*., 2010; Khan *et al*., 2010), British Columbia, China (Hajarizadeh *et al*., 2015), Kenya (Wu *et al*., 2009), Poland (Yau *et al*., 2016)], Singapore (Han *et al*., 2017) and among Cambodian Americans in the US (Ngaira *et al*., 2016). But in another study at Malaysia among university students, only 50.3% of the participants had good Knowledge about HBV infection (Ganczak *et al*., 2016).

In our study, the socioeconomic level of participants (measured by the monthly income and job of participant) affected knowledge but did not affect awareness about HCV and HBV infections which agreed with other studies (Wai *et al*., 2005; Taylor *et al*., 2002; Ahmad *et al*., 2016; Tosun *et al*., 2018). This may explain difference between answers of residents or rural than those of urban areas in our study.

In our study, most of the participants were high level students (medical and non-medical) and on the other hand, one half of included public participants were living in urban areas with better socioeconomic and education levels. This may explain the relatively better levels of knowledge and awareness about HCV and HBV infection.

Another point to be considered is the time of the study between 2018 and 2019, which was parallel to the successful national project of screening and treating HCV in Egypt. During this period, many campaigns, television programs, newspapers widely discussed the problems of HCV and other viral infections. This may have helped to raise community knowledge and awareness about these two health problems

Conclusion

Knowledge and awareness about HBV and HCV infections is the base at which the solution of these health problems should be built. Despite of the good results of this study about the level of knowledge and awareness about HBV and HCV infection and prevention, there is a need to do more studies on different population sectors at various socioeconomic and educational levels.

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Authors' Contributions

Wesam S Morad: Contributed to study concept, design and data collection and statistical analysis and interpretation of the data, writing of the paper, critically revised and finalized paper and read approved the final manuscript.

Maha Elsabaawy and Mahmoud H Allam: Clinical investigator in the study contributed to writing of the paper and read approved the final manuscript.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the International Conference on Harmonisation guideline for good clinical practice and the ethical principles of the

Declaration of Helsinki. All patients gave written informed consent, which was reviewed and approved by an independent ethics committee or institutional review board of National Liver Institute (IRB00003467). This study was approved (approval numbers 00129/2018).

Consent for Publication

Patients provided written informed consent for use of their anonymized and aggregated data for research and sharing with other parties.

Data Availability Statement

The data used to support the findings of this study were supplied by National Liver Institute, Menoufia University under license and so cannot be made freely available. Requests for access to these data should be made to [National Liver Institute Top manager, Menoufia Governorate, Egypt].

The qualitative and quantitative data used to support the findings of this study are restricted by the [National Liver Institute ETHICS BOARD] in order to protect [PATIENT PRIVACY]. Data are available from [National Liver Institute Top manager, Menoufia Governorate, Egypt] for researchers who meet the criteria for access to confidential data.

The qualitative and quantitative data used to support the findings of this study are available from the corresponding author upon request for researchers who meet the criteria for access to confidential data.

The qualitative and quantitative data used to support the findings of this study have not been made available because [National Liver Institute Top manager].

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