

# Level of Behavioral Development for Hepatitis C Virus Cases versus Their Contacts: Does Infection Make a Difference and What Is Beyond?

Ammal M. Metwally, Lobna A. El Etreby, Rehan M. Saleh, Ghada Abdrabou, Somia I. Salama, Amira Orabi, Mohamed Abdelrahman

**Abstract**—Hepatitis C virus infection is a public health threat in Egypt. To control infection, efforts should be spent to encourage healthy behavior. This study aimed to assess the level of behavioral development in order to create a positive environment for the adoption of the recommended behaviors. The study was conducted over one year from Jan. 2011 till Jan. 2012. Knowledge, attitude and behavior of 540 HCV patients and 102 of their contacts were assessed and the level of behavioral development was determined. The study revealed that the majority of patients and contacts knew that HCV infection is dangerous with perceived concern for early diagnosis and treatment. More than 75% knew the correct modes of transmission. The assessment showed positive attitudes towards the recommended practices with intention to adopt those practices. Strategies of creating opportunities to continue the recommended behaviors should be adopted together with the reinforcement of social support.

**Keywords**—Hepatitis C virus, Level of behavioral development, recommended behaviors.

## I. INTRODUCTION

EGYPT has the highest countrywide prevalence of hepatitis C virus (HCV) in the world. It has higher rates of HCV than neighboring countries as well as other countries in the world with comparable socioeconomic conditions and hygienic standards for invasive medical, dental, or paramedical procedures. Recent data estimate that 14.7% of the people in Egypt have been infected. This is more than ten times greater than in any other country in the world. The predicted future burden of HCV related diseases is another real cause for concern, particularly when the true number of people suffering from severe hepatitis C-related liver is also known to be underestimated. WHO estimates that about 170 million are chronic carriers who are at risk of developing liver cirrhosis and/or liver cancer. The sechronic carriers represent a reservoir sufficiently large for HCV to persist [1].

Despite the magnitude of the public health problems associated with the continuing spread of HCV among

Egyptians, currently little knowledge is known about the extent to which these individuals are participating in practices that limit the spread of Hepatitis C and their level of awareness by Especially, about one third of all cases of hepatitis C usually contracted the infection through unknown means by people who are in no current risk category and who are not aware of their infective status and are not clinically ill, but are a source of infection for others.

## II. AIM OF THE WORK

The broad objective of this study is to assess and analyze the level of behavioral development and what the key players can do to create a positive environment for the adoption of these behaviors. This will help in selecting the communication strategies appropriate to each group of participants targeted according to their level of behavioral development. Working on this will bring about desired changes in behavior and sustain practices over time and bring about changes in the misconception values.

1. To identify the level of behavioral development for cases of Hepatitis C virus infection and their close contacts
2. Identifying behavioral objectives that will contribute in limiting HCV transmission from cases
3. Identifying messages to be conveyed to cases and their contacts so that risk practices can be altered by the proposed developed multimedia tools.

## III. METHODS

A cross sectional national study was conducted during the period of one year starting from January 2011 till January 2012. 540 cases and 102 of their close relatives who are not infected were interviewed. Cases comprised 359 males and 181 females. Cases and their relatives were randomly selected from six governorates out of the 17 governorates in Egypt namely; Benisuef, Assuit, El Dakhlya, El Gharbya, Cairo and Ismailia. These governorates represent the administrative division of Egypt; representing rural and urban Upper Egypt, rural and urban Lower Egypt Middle and Canal division respectively. These governorates were selected as they include the 9 National Treatment Reference Centers of National Hepatology and Tropical Medicine Research Institute- that were established by Egyptian Ministry of Health (MOH). The randomly chosen cases were approximately 55 patients and 12 contacts per each treatment centre.

Ammal M. Metwally, Lobna A. El Etreby, Rehan M. Saleh, Ghada Abdrabou, Somia I. Salama, and Mohamed Abdel Rahman are in Community Medicine Research Department, National Research Center, Giza, Egypt (e-mail: ammal\_mok@yahoo.com, lobnaetreby@hotmail.com, rehansaleh@yahoo.com, basola23\_7\_2003@yahoo.com, somaia2721199@hotmail.com, dr.mohamedabdelrahman@hotmail.com).

Amira Orabi is student in Faculty of Medicine, Ain Shams University, Egypt (e-mail: amiorabi@yahoo.com).

A questionnaire was constructed to identify the level of behavioral development. The questionnaire was designed to cover awareness, attitude and risk behaviors' related questions. The questions included definition, causes of HCV infection, symptoms, complications, methods of HCV transmission, diagnosis, prevention, and treatment of Hepatitis C virus.

The level of behavioral development/change was determined. The stages assessed comprised six levels [2], [3]. Each level was explored for both the cases and their contacts by the following indicators:

1. The percentage that became aware of the problem
2. The percentage that became concerned about the problem, acquired knowledge and internalized the knowledge
3. The percentage that became motivated and had positive attitude to do something about the problem
4. The percentage that developed an intention to act in order to address the problem
5. The percentage that attempted and/or tried out the recommended behavior
6. The percentage that rejected or adopted the recommended behavior

Education and counseling were provided to the participants after fulfillment of the questionnaires.

Statistical analysis of data was done using SPSS program (Statistical Package for Social Sciences) version 7.5. Results were presented in the form of tables. The responses of the interviewed participants were analyzed and demonstrated as comparisons between cases and their close relatives who are not infected.

Behavioral development assessment indicators were classified as four categories; Category number one for topics whose behavioral level is less than 25 %, Category number two for topics whose behavioral level is between 25% to 50 %; Category number three for topics whose behavioral level is between 50% to 75% and Category number four for topics whose behavioral level is more than 75%. When lying in category one or two, means that they are poor. Whereas, when lying in category three, it means neutral and lying in category four, it means good. Whereas, much emphasis should be put on the poor indicators for creating messages for inducement of action for improvement, strengthen of the neutral indicators to be shifted to the good one and maintaining the good one should be out of the priority actions.

#### IV. RESULTS

TABLE I  
 KNOWLEDGE OF SURVEYED PARTICIPANTS BY HCV STATUS

Characteristics	Cases (HCV +ve) (n=540)		Contact (HCV -ve) (n=102)		P value
	No	(%)	No	(%)	
Definition of HCV infection:					
1-Liver inflammation due to bacteria	13	2.4	3	2.9	.23
2-Liver inflammation due to virus	337	62.4	72	70.6	
3-don't know	179	33.1	27	26.5	
4-bilharisiasis	11	2.0	0	0.0	
HCV infection is dangerous:					
1-Yes	402	74.4	85	83.3	.08
2-No	55	10.2	5	4.9	
3- don't know	80	14.8	10	9.8	

TABLE II  
PRIORITIZATION OF AWARENESS OF SURVEYED PARTICIPANTS BY HCV STATUS

Awareness	Cases (HCV+ve) (n=540)		Contact(HCV-ve) (n=102)		P value
	No	(%)	No	(%)	
Sharing shaving equipments, nail cutter or through needle stick injury as methods of HCV transmission	480	88.9	87	85.3	0.3
Using previously used syringes as a method of HCV transmission	471	87.2	86	84.3	0.42
Liver cirrhosis as a complication of HCV infection	468	86.7	86	84.3	0.53
Fatigue from the least effort done as a symptom of HCV disease	458	84.8	77	75.5	0.03
During sessions for teeth treatment as method of HCV transmission	454	84.1	78	76.5	0.08
Liver failure as a complication of HCV infection	434	80.4	76	74.5	0.18
Chronic liver disease as a complication of HCV infection	429	79.4	75	73.5	0.19
Disagreement that shaking hands/hugs are out of the methods of HCV transmission	418	77.4	81	79.4	0.69
Joints pain is out of symptoms of HCV disease	401	74.3	49	48.0	0.00
Ascitis as a complication of HCV infection	372	68.9	65	63.7	3.00
Sharing personal equipments like tooth brush and towels with other family members as methods of HCV transmission	364	67.4	65	63.7	0.49
Organ transplantation as a method of HCV transmission	365	67.6	68	66.7	0.91
Right side abdominal pain as a symptom of HCV disease	363	67.2	60	58.8	0.11
Disagreement that Cough/Hiccough are out of the methods of HCV transmission	354	65.6	70	68.6	0.57
Nausea, Vomiting and diarrhea as a symptom of HCV transmission	341	63.1	56	54.9	0.12
Jaundice in the eyes as a symptom of HCV transmission	328	60.7	48	47.1	0.01
Dark urine as a symptom of HCV transmission	319	59.1	51	50.0	0.10
Jaundice in eyes and skin as a symptom of HCV transmission	318	58.9	59	57.8	0.91
Disagreement that food borne is out of the methods of HCV transmission	313	58.0	67	65.7	0.15
Disagreement that sharing food utensils (cups, plates) are out of the methods of HCV transmission	313	58.0	61	59.8	0.74
Oesophagealvarices as a complication of HCV infection	312	57.8	53	52.0	0.27
Splenomegaly as a complication of HCV infection	308	57.0	49	48.0	0.10
Tatto/Acupuncture(Chinese needles) as a method of HCV transmission	295	54.6	58	56.9	0.74
Haemodialysis as a method of HCV transmission	292	54.1	56	54.9	0.27
Liver cancer as a complication of HCV infection	285	52.8	54	52.9	0.10
Fever as a symptom of HCV transmission	277	51.3	46	45.1	0.74
Hijama as a Method of HCV transmission	264	48.9	50	49.0	0.91
Pregnant mother to her baby as a method of HCV transmission	193	35.7	43	42.2	1.00
Left side abdominal pain as a symptom of HCV transmission	171	31.7	25	24.5	0.28
The patient could show no symptoms for years	162	30.0	33	32.4	1.00
Newborns of infected HCV mothers during delivery as a method of HCV transmission	136	25.2	24	23.5	0.22

TABLE III  
PERCEIVED RISK AND CONCERN ABOUT ISSUES RELATED TO HCV INFECTION BY HCV STATUS

Characteristics	Cases (HCV+ve) (n=540)		Contact(HCV-ve) (n=102)		P value
	No	(%)	No	(%)	
Believing that early diagnosis of HCV disease is important in changing the health status of the patient	493	91.3	92	90.2	.83
Believing about the existence of Treatment for HCV disease	496	91.9	89	87.3	.30
if yes, Believing that HCV treatment therapy is effective in treating HCV infection	376	75.8	60	67.4	.02
Availability of vaccine for HCV infection	90	16.7	22	21.6	.10

TABLE IV  
PRIORITIZATION OF ATTITUDE OF THE SURVEYED PARTICIPANTS TOWARDS HCV STATUS

Attitude towards :	Cases (HCV+ve) (n=540)		Contact(HCV-ve) (n=102)		P value
	No	(%)	No	(%)	
Using new syringes/sharp instruments which are not used before could reduce the risk of becoming infected with	476	88.1	85	83.3	0.30
HCV patients could live many years without knowing that they are infected with the virus	463	85.7	83	81.4	0.15
Correct and successful treatment could clear the virus completely from the patient blood.	370	68.5	66	64.7	0.40
Some treatments for HCV infection like interferon could lead to depression	326	60.4	55	53.9	0.48
HCV patients could be treated by herbs	216	40.0	47	46.1	0.43
It is better to vaccinate HCV patients with Hepatitis A and Hepatitis B vaccines	168	31.1	33	32.4	0.28

TABLE V  
 INTENTION TO ADOPT SAFE PRACTICES THAT CAN PREVENT HCV INFECTION BY HCV STATUS

Characteristics	Cases (HCV+ve) (n=540)		C Contact(HCV-ve) (n=102)		P value
	No	(%)	No	(%)	
Awareness of methods of prevention of HCV infection:					
1-Yes	390	72.2	73	71.6	.75
2-No	74	13.7	16	15.7	
3-Don't Know	76	14.1	12	11.8	
if yes: Methods of prevention are:					
1-Avoid sharing shaving equipments, nail cutter, tooth brush, towels	348	89.2	66	90.4	1.00
2- Avoid using previously used syringes	268	68.7	49	67.1	0.36
3- Using sterilized equipments at the dentist	222	56.9	44	60.3	0.13
4-Be sure that blood is free from Virus C during organ transplantation and heamodialysis and blood transfusion	89	22.8	28	38.4	0.01
5- Use sterilized equipments in acupuncture (Chinese needles)	64	16.4	14	19.2	0.04
6- Use sterilized equipments in hijama	61	15.6	13	17.8	0.04
7- Using condoms	12	3.1	4	5.5	0.01

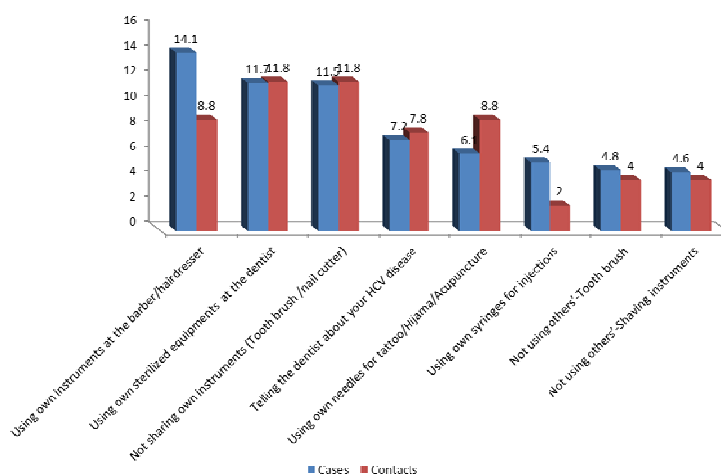


Fig. 1 Percent that tried the recommended safe practices that can prevent HCV infection by HCV status

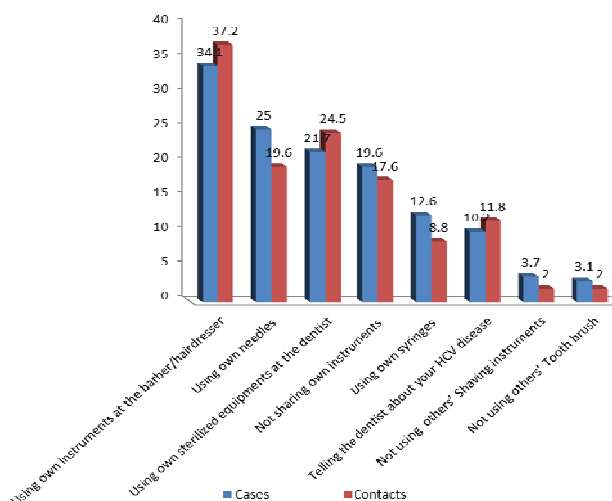


Fig. 2 Percent that rejected the recommended safe practices that can prevent HCV infection by HCV status

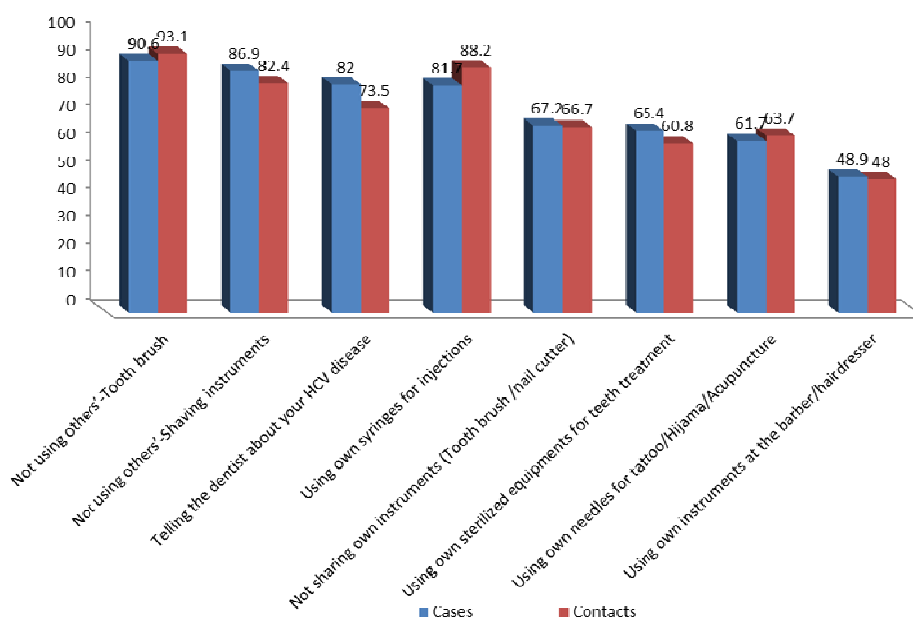


Fig. 3 Percent that adopted the recommended safe practices that can prevent HCV infection by HCV status

TABLE VI  
PERCENTAGE OF CASES AND CONTACTS THAT WRONGLY PERCEIVED MESSAGES ABOUT HCV INFECTION

Wrongly-perceived message	Cases (%)	Contacts (%)	Total Percentage	P value
Causes of HCV infection:				
-Bilharziasis	18.6	9.8	17.2	0.15
Transmission:				
-Mosquito bites	47.4	47.1	47.4	1.00
-Shaking hands	5.7	7.8	6.1	0.37
-Sneezing or coughing	10.9	11.8	11.1	0.86
-Foodborne	60.4	53.9	59.3	0.22
-Sharing utensils with patient	21.9	19.6	21.5	0.69
Complications:				
-Diabetes	0.7	2.3	0.9	0.39
-Hypertension	0.0	2.3	0.3	0.14
Protection is by avoiding direct contact with HCV patient	4.0	5.1	4.2	0.72
Treatment of HCV infection:				
-Easy and treatable	8.9	6.7	8.5	0.77
-Treated by camel milk	1.3	2.2	1.4	0.50
-Treated by herbs	6.6	9.8	7.1	0.41

Regarding the definition of HCV infection, about two thirds of patients knew that it was a liver inflammation due to virus. This percentage increased among contacts to reach (70.6%). While those who didn't know any definition represents about more than one third of patients and (26.5%) of contacts with no difference in distribution among patients and contacts. The majority of patients and contacts know that HCV infection is dangerous.

Liver cirrhosis and liver failure are the most two items known to be caused by HCV infection among both patients and contacts groups with insignificantly higher percentage of cases. Cancer liver is represented by the least percentage of patients (0.2%) (Table I).

Table II prioritizes awareness of the participants by mode of transmission of HCV according to HCV status. Regarding participants awareness of the methods of HCV transmission, the highly known ( $\geq 75\%$ ) methods by patients and contacts to transmit HCV were: sharing shaving equipment, nail cutter or through needle stick injury; using previously used syringes,

and teeth treatment. *The moderately known (50-74%) methods were:-* organ transplantation, having wound in the body like mouth wound and sharing personal equipment like tooth brush and towels with other family members, tattoo/ acupuncture, and hemodialysis with no difference in distribution among patients and contacts. *While the least known methods (<50%)* by both groups were: Hijama, mosquitoes, and transmission from pregnant mother to her baby. Whereas, the commonly and wrongly perceived method known to transmit the disease were in order as follow: shaking hands and hugs with no difference in distribution among cases and contacts groups to be followed by cough/ hiccough, food born, sharing food utensils among both cases and contacts. However, sexual transmission was known by less than one quarter of cases (13 %) and contacts (21.6 %) as a cause for HCV transmission. The same was observed as regard the transmission of the virus from infected mothers to newborns during delivery which was identified by around quarter of both cases and contacts (25.2 % and 23.5% respectively) with no difference between them.

Meanwhile, about one fourth of both patients and contacts were unaware of the possibility of transmission of the virus sexually. About one third of contacts did not know the following mode of transmission for the virus; hijama, haemodialysis, tatto / acupuncture (Chinese needles); infected mother can transmit the virus to her baby during pregnancy and delivery. More than one third and less than half of cases didn't have knowledge about these items with no difference in distribution among cases and contacts.

Regarding participants' awareness of the symptoms of HCV Disease; the commonly known symptoms by patients and contacts are: fatigue from the least effort done; and joint pain for cases only. *The moderately known symptoms* for cases and contacts are: jaundice in eyes and skin, right side abdominal pain, nausea, vomiting and diarrhea, and dark urine. *The least known symptom* for both cases and contacts is left side abdominal pain.

Regarding participants' awareness by complications of HCV infection; Liver cirrhosis is the most frequently known complication of HCV infection by both cases and contacts followed by Ascitis, oesophagealvarices, and ascitis. Spleenomegalis *least known complication* of HCV infection by contacts with no statistical difference in distribution of all items of HCV complications among cases and contacts. Meanwhile, about one fourth of contacts does not know that ascitis is a complication of HCV infection. Around one third of cases and contacts don't know that liver cancer, oesophagealvarices and spleenomegaly are complications of HCV infection.

Arranged descendingly according to frequency, the responses were as follows:

- Early diagnosis of HCV is important in changing the health status of the patient, after HCV infection
- The patient could show no symptoms for a period of time which is years
- The existence of treatment for HCV disease
- HCV treatment therapy is effective in treating HCV infection which is mostly believed by cases and contacts due to improvement of cases
- HCV disease could be discovered through routine examination
- The least perceived concern was about unavailability of vaccine for HCV infection.

Whether cases and contact have developed positive attitudes about recommended practice/behavior is shown in Table IV. The vast majority of both cases and contacts had positive attitude towards certain safe practices to reduce HCV endemicity especially for using new syringes, sharp instruments which are not used before to reduce the risk of becoming infected with HCV. Around two thirds of the participants believe that correct and successful treatment could clear the virus completely from the patient blood. Whereas, the vast majority did not know that it is better to vaccinate HCV patients with hepatitis A and hepatitis B vaccines.

Regarding the intention and ability of cases and contacts to adopt safe practices that can prevent HCV infection, the

assessment has shown positive attitudes about the recommended practices with intention to act. The majority expressed their intention for following safe practices. Table V shows that the highest intention was for avoiding sharing shaving equipment, nail cutter, tooth brush and towels followed by avoiding using previously used syringes and using sterilized equipment at the dentist. While the least awarded of these preventive methods are : being sure that blood is free from virus C during organ transplantation, hemodialysis and blood transfusion, use sterilized equipment in acupuncture (Chinese needles), use sterilized equipment in hijama, avoid using food and drinking utensils of other person without washing and, using condoms.

Regarding the adoption, trials and rejection of the recommended safe practices that can prevent HCV infection by HCV status, the assessment has shown the acceptability of the surveyed cases and contact for the recommended safe behaviors. The percentage of those who tried and adopted the recommended behaviors was statistically higher than those who rejected these behaviors (Figs. 1-3). The order of the adopted behaviors was as follow for cases and contacts respectively:

- Using own syringes for injection (81.7% and 88.2%)
- Telling the dentist about their HCV disease (82.0% and 73.5%)
- Not sharing own instruments (tooth brush, towels and, nail cutter) (67.2% and 66.7%)
- Using sterilized equipment for teeth treatment (65.4% and 60.8%)
- Using own needles for tattoo/hijama and acupuncture (61.7% and 63.7%)
- Using own instruments at the barber and hair dresser (48.9% and 48.0%)
- Definitely not using others' personal objects mainly for: tooth brush (90.6% and 93.1%) and shaving instruments (86.9% and 82.4%).

Table VI shows that both cases and contacts had some wrong beliefs about HCV disease, probably from past misunderstood messages especially regarding the transmission of HCV infection. About 60% of cases and 54% of contacts believed that virus C was a food-borne virus, whereas 47% of both cases and contacts believed that the virus could be transmitted by mosquitoes, with no significant difference between cases and contacts. Other wrong beliefs included diabetes as a complication of HCV infection among 0.7% of cases and 2.3% of contacts .Some cases and contacts (8.9% and 6.7% respectively) believed that HCV infection is an easily treatable disease, while 6.6% of cases and 9.8% of contacts thought that it could be treated by herbs.

## V. DISCUSSION

Although the incidence of HCV has decreased since the early1990s, Egypt has the highest prevalence of Hepatitis C Virus (HCV) in the world. Prevalence remains high because of the slow progression of the disease with HCV-related mortality is expected to double in the next 20 years, apparently due to mass parenteral anti-schistosomal therapy [4].

Current treatment options, however, have several drawbacks: they produce a sustained response in only 50% of patients, have severe side effects, and are expensive [5], [6].

Furthermore, many persons infected with HCV may not even need treatment, and those who do may be either unwilling or unable to access it [7], [8].

In light of the limitations of current treatment options and because there are no vaccines to prevent HCV infection, prevention interventions must focus on reducing risk for exposures. Interventions based on a variety of theories such as cognitive, behavioral skills building and peer-based interventions have been developed and tested for promoting behavior change among intravenous drug users (IDUs) [9]. It seems clear that a priority for public health workers should be the development of behavioral interventions to slow disease progression among infected individuals.

The most important public health issue now in Egypt is to reduce the transmission of HCV from an infected person to a person who is not infected [1]. This study focused on assessing level of behavioral development of a sample of HCV cases and their close contacts in Egypt to be able to creating messages that lead to limit its endemicity and protect noninfected persons especially that the existence of anthropological studies of such behaviors is relatively few.

A growing body of literature demonstrates that patients' beliefs about diseases influence their health behaviors [10]-[12].

Stigma associated with injection drug use, limited access to health services for injection drug users, and limited public health funding for HCV-related services in general may all contribute to inaccurate beliefs about HCV. In this study, both cases and contacts had some wrong beliefs about HCV disease, probably from past misunderstood messages especially regarding the transmission of HCV infection. About 60% of cases and 54% of contacts believed that virus C was a food-borne virus, whereas 47% of both cases and contacts believed that the virus could be transmitted by mosquitoes. Other wrong beliefs included diabetes as a complication of HCV infection among 0.7% of cases and 2.3% of contacts. Some cases and contacts (8.9% and 6.7% respectively) believed that HCV infection is an easily treatable disease, while 6.6% of cases and 9.8% of contacts thought that it could be treated by herbs. There was no significant difference between the percentages of cases and contacts who had wrong beliefs, as the contacts were relatives of the cases, living close to them with both of them having mutual strong influence upon each other. The significance of these wrong beliefs is that they should be the first target to be aimed at in any health education campaign or intervention program.

Targeting inaccuracies might improve public health interventions to foster healthier behaviors and better hepatitis C outcomes. In the present study, the majority of cases and contacts (88.9% and 85.3% respectively) believed that sharing needles was a cause of HCV infection, 74.4% of cases and 83.3% of contacts believed that HCV infection was dangerous while 75.8% and 67.45% believed that HCV infection treatment was effective in curing the disease. These percentages were

slightly higher than a similar study done in the USA where participants were surveyed about their health beliefs regarding HCV.

Regarding the causes, 60% believed sharing needles a risk factor for HCV, 42% believed HCV results in lifelong infection while only 25% believed that there is a potential cure for HCV [13].

The results of the present study showed that the percentage of those who tried and adopted the recommended behaviors was statistically higher than those who rejected these behaviors, e.g.

- Using own syringes for injection (81.7% and 88.2%) of cases and contacts respectively.
- Telling the dentist about their HCV disease (82.0% and 73.5%)
- Not sharing own instruments (tooth brush, towels and, nail cutter) (67.2% and 66.7%)
- Using sterilized equipment for teeth treatment (65.4% and 60.8%).

These results were different from another study done in the USA to evaluate behavior change after disclosure of a positive hepatitis C virus (HCV) antibody test result among a cohort of young injection drug users (IDUs). Participants underwent semiannual interviews, HCV antibody testing, and pretest and posttest counseling. To study changes in the frequencies of high-risk behaviors among 46 IDUs who had a positive HCV test result and among 60 IDUs who did not have a positive HCV test result or who were unaware of their test result. No significant differences were detected between the 2 groups. Both groups continued to share syringes, needles, and other injection paraphernalia. These findings suggest that young IDUs may not be aware of the risk of HCV infection and highlight the urgent need for post-HCV test guidelines and behavioral interventions to reduce ongoing high-risk behavior that perpetuates the risk of HCV transmission [14].

However the results of another more recent study done in the USA were similar to the results of the present study where a behavioral intervention, which taught peer education skills, produced a 29% greater decline in overall injection risk [15].

#### *What Is Beyond?*

Thus, whether or not one is at risk for HCV infection was not the primary issue with this particular participant group (cases and their contact) and need not be a focus of communication messages. The strategies emerging from these data will be our focus to eradicate hepatitis C. Focus on the social acceptability of some recommended behaviors should be promoted for; for example using own instruments at the barber/hairdresser and stress on ensuring sterilized equipment for teeth treatment or using own sterilized equipment for teeth treatment. Moreover, the social acceptability of condom use among cases and to teach negotiating skills between partners so that condom use would not threaten relationships.

From the results of this study, very poor level of behavior indicators (< 25%) was found for knowledge of the danger of HCV infection and for the percentage of study population who tried the recommended safe practices. Behavior indicators

lying between 25% and 50% included awareness of symptoms and complications of HCV infection, and the intention to adopt safe practices like using condoms and sterilized needles for acupuncture and hijama. Neutral indicators (50%-70%) were mainly for the knowledge that hepatitis C is a viral infection and the intention to avoid harmful practices such as using previously used syringes. Good indicators (>75%) were for awareness of methods of transmission of the disease.

For almost all the behavioral development levels, cases and their contacts are similar. This could be explained by that both cases and contacts are very close to each other. They may be direct relatives or close neighbors. Besides they live in the same environment, are of similar socioeconomic standard, hold close levels of education and culture and are exposed to the same external influences and stimuli. However differences between them were detected regarding the symptoms of the disease as jaundice, joint pain and fatigue from least effort. Cases were significantly more aware of these symptoms than the contacts, as they had actually experienced them, in contrast to contacts who may have just heard about them. Cases were also more aware of some methods of prevention of HCV infection as the importance of using sterilized needles in acupuncture and hijama, ensuring safe blood before hemodialysis or transfusion and the importance of condom use. This was probably due to that cases, as a result of their disease, became more cautious than others don't become infected.

Furthermore, the following strategies would be adopted by policy makers for cases and contacts including; Reinforcement of skills and behavior, strategy of addressing traditional beliefs and practices: to reinforce optimizing ones or to modify negative ones, strategy of addressing benefits and costs, strategy of creating or reinforcing positive social, strategy of using focus group to identify issue for combating rumors and reinforcement of social supports.

Out of the recommended messages to address target groups whether cases or contacts is to try and adopt the recommended safe practices for prevention of HCV disease, most importantly to use one's own instruments as toothbrushes, shaving brushes, and syringes. However for contacts additional messages should be stressed upon especially those messages explaining the symptoms of the disease such as jaundice, fatigue and joint pains so that if infected, the disease can be detected in its early stages.

#### VI. CONCLUSION

As the burden of HCV infection continues to mount in Egypt, current therapies and new ones will not combat the disease unless accompanied by increasing levels of awareness and developed behaviors. Accordingly, this study was conducted for creating appropriate messages that can contribute in limiting HCV endemicity. For selection of appropriate messages to be disseminated to the target audience, two steps were done. Step one; assessing the level of behavior development. Step two; creating possible message strategies that might influence cases and contact behavior to limit HCV endemicity.

The study revealed that our target groups are aware and concerned about HCV problem. Moreover, they acquired knowledge and know what to do skills, motivated, intended to act and tried out the majority of the recommended behaviors. So, strategies of creating opportunities to continue the recommended behaviors should be adopted together with that of reinforcement of social support. Meanwhile individual counseling and psychological rewarding of the recommended behaviors is suggested.

Prominent public health messages about HCV appear to have largely been received and remembered by the at-risk population. However, there is some deficit among a minority which may be due some underlying low health literacy or it may reflect that this group has not been effectively exposed to detailed HCV public health messages. The behaviors that might be stressed upon for cases are adopting the recommended safe practices for preventing the spread of infection to contacts, and for contacts are increasing the awareness of symptoms and modes of transmission to avoid the disease as much as possible.

Furthermore, if HCV public health messages have been created on a local level, they may not have effectively connected with the target population. Multimedia tools should be directed towards poor and neutral behavior (< 75%) to raise the level of this behavior to be good (> 75%). Misconception beliefs must also be targeted to be replaced by correct information. At that stage the strategy of using focus group to identify issue for combating rumors and reinforcement of social supports should be adopted.

#### VII. RECOMMENDATIONS

- To combat the endemicity of HCV in Egypt, the use of the following strategies would be recommended for cases and contacts including; Reinforcement of skills and behavior, strategy of addressing traditional beliefs and practices to reinforce optimizing ones or to modify negative ones, strategy of addressing benefits and costs, strategy of creating or reinforcing positive social behavior, strategy of using focus group to identify issue for combating rumors and reinforcement of social supports.
- Disseminating accurate information about HCV may be a key element to modifying patient behavior and may subsequently result in better health outcomes for patients through knowing how to counter myths, dispel rumors, and correct misinformation. Wrong beliefs that should be essentially addressed and corrected include that virus C infection is an easily treatable, food-borne virus that could be transmitted by mosquitoes, could be caused by bilharziasis, is complicated by diabetes and could be treated by herbs.
- To change level of behavioral development for the poor indicators to be neutral i.e. from below 50% to be from 50%-75% and the neutral ones to be good, more than 75%.



- The use of the following messages to achieve the above mentioned objectives would be to try and adopt the recommended safe practices for prevention of HCV disease, most importantly to use one's own instruments as toothbrushes, shaving brushes, and syringes. However for contacts additional messages should be stressed upon especially those messages explaining the symptoms of the disease such as jaundice, fatigue and joint pains so that if infected, the disease can be detected in its early stages. It is recommended to extend this study to answer a research question: Level of Behavioral Development for Hepatitis C virus Cases versus Community: Does Infection Make a Difference.

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**Dr. AmmalMetwally** obtained her M.D (Ph.D), Public Health, and Preventive Medicine, Kasr El Aini, Cairo University, Egypt in 1993. Dr. AmmalMokhtar is the Head of community medicine research Dept., since June 2012. She was appointed as chairman of project formulation committee - National Research Center since 2007. <http://www.nrc.sci.eg/nrc/pages.php?id=13>. Dr. Ammal is the regional board member for Eastern Mediterranean region for the World Hepatitis Alliance. <http://www.worldhepatitisalliance.org/TheWHA/Structure.aspx>. She has experience in working with international agencies in Egypt as preventive medicine and behavioral change advisor for behavioral change in health and hygiene since 1997. She has been hired as advisor since 1997; for UNICEF (six years), Swiss Development Fund (one year), World Bank (two year) and Royal Netherlands Embassy (one year) and PLAN International (short assignments).

**Dr. Lobna El Etreby** achieved her M.D (Ph.D), Public Health, and Preventive Medicine, Kasr El Aini, Cairo University, Egypt in 2001. She is an Assistant Professor Researcher in the Community Medicine research department in National Research Center since 2009.