A multimedia multilanguage web-based platform can assess and increase the awareness on HCV infection of Pakistani people living in Italy

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A multimedia multilanguage web-based platform can assess and increase the awareness on HCV infection of Pakistani people living in Italy.

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Significance statement: A multimedia web-based educational strategy proved useful in assessing and increasing the level of knowledge and awareness on Hepatitis C Virus (HCV) infection among Pakistani people living in Italy. The basal level of knowledge was modest. Subjects with poorer knowledge were more likely to be male, with low instruction level, a history of use of intravenous

drugs, and no previous HCV testing. After viewing the educational video, a significant and relevant improvement was reported. The study methodology allowed us to overcome the prohibitions of people gatherings due to COVID-19 pandemic.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ABSTRACT

Global eradication of Hepatitis C Virus (HCV) is hindered by infection persistence among high-prevalence ethnic groups with insufficient access to care. Educational interventions to raise awareness on HCV have led to identification of submerged HCV cases. Our aim was to evaluate the effectiveness of a web-based platform to assess and raise the awareness on HCV among Pakistani people living in Northern Italy. We created a website in Italian and Urdu language (https://survey-hcv6.webnode.it), and shared it to Pakistani people in Emilia-Romagna through Facebook groups. Participants had to fill a 15-item questionnaire on HCV infection, then watch a video on HCV, and respond to the questionnaire again. McNemar's chi square and negative binomial multivariable regression analysis yielding incidence rate ratio (IRR) were applied. 339 subjects from 600 (57%) participated and filled the baseline questionnaire. The knowledge on HCV infection was scanty. For instance, 32% were not aware of HCV, 42% only knew that HCV infection may be long-term, and only 14% knew the access to DAA treatment is provided by the Health Service. Independent predictors of worse knowledge on HCV were male gender (IRR 1.19), low instruction level (IRR 1.26), Urdu language preference (IRR 1.22), past use of intravenous drugs (1.2), and no previous HCV testing (IRR 1.36). The educational video significantly improved the knowledge on HCV among 67 subjects who re-filled the questionnaire, as 97% were later aware of HCV, 99% of the long-term duration of HCV infection, and 93% of the access to DAAs provided by Italian Health Service. We found a modest level of knowledge on HCV infection among Pakistani people in Northern Italy, identifying predictors of worse awareness. We provided a multimedia platform which significantly improved the knowledge on HCV infection. Consequently, this approach might translate into an improved linkage to care.

INTRODUCTION

Hepatitis C Virus (HCV) infection and its complications are a major public health burden: in 2015, an estimated 71 million people had HCV infection globally and approximately 399,000 people died from HCV in 2016, mostly from developing cirrhosis and hepatocellular carcinoma [1]. Thus, the World Health Organization (WHO) has acknowledged the elimination of HCV as a public health priority [2].

Global elimination of HCV is hindered by infection persistence among high-risk and high-prevalence groups with suboptimal knowledge on HCV infection, i.e., people who inject drugs (PWID), men who have sex with men (MSM), blood transfusion recipients and members of migrant communities native to high prevalence regions [3]. In fact, even though the global prevalence of HCV is around 1%, the infection rate is unevenly distributed among countries, peaking to 10-12% in Pakistan and Egypt [4–6]. As a result, in an increasingly global and connected world, immigrants from high HCV prevalence countries to less or non-endemic areas are more likely to have an increased risk of HCV infection due to exposure in their native countries and segregation in the host countries [7].

Achieving a linkage to care for HCV through awareness-raising campaigns might be a sound option. Most of the existing studies focused on educational interventions among high-risk groups such as people who inject drugs (PWID) [8,9], while only a few studies targeted ethnic communities with culturally and linguistically appropriate interventions [10,11]. Given that around 130,000 Pakistani citizens (71,6% males) are esteemed to be legally residing in Italy, with the majority of them being settled in the Northern regions of Lombardy (32,5%), Emilia-Romagna (17,4%) and Tuscany (7%) [12], and the high prevalence of HCV infection in Pakistan (8.6%) [6], compared to 2.3% in the general population in Italy [13], Italian-Pakistanis can potentially represent both a high-risk and high-prevalence group for hepatitis C in Italy.

The aim of the present study was twofold: on one hand, we aimed at exploring the basal level of knowledge on HCV infection among Pakistani people living in Northern Italy, also identifying predictors of poorer awareness; on the other hand, we aimed at assessing the

effectiveness of a web-based platform in raising awareness on HCV among given high-risk population.

METHODS

In view of the pandemic linked to the SARS-CoV-2 infection, given the multiple social restrictions and the impossibility of meetings and gatherings, we opted for a computer-based communication. We created a website, in Italian and Urdu language, whose address was provided through social channels (i.e. Facebook) and through the mailing list of Pakistani people residing in Emilia-Romagna in Northern Italy (i.e. *Giovani Pakistani in Italia*). The website link is the following: https://survey-hcv6.webnode.it. The site provided a 15-item questionnaire to be filled in pseudo-anonymous form, containing also the main demographic characteristics for each participant. The 15 questions explored the knowledge of the main aspects of HCV infection. After completing the questionnaire, an informative video in Italian and Urdu language dealing with the main information on hepatitis C was provided. The subject was subsequently invited to respond to the questionnaire once again. Illiterate people were helped either by an investigator who knew the Urdu language (i.e. U. Sikandar) or by a relative, depending on their preference or possibility.

Study outcomes

The primary outcome of the study included (i) the basal level of knowledge about HCV infection among Pakistani people living in Northern Italy, as assessed through the 15-item questionnaire, and (ii) the effectiveness of the multimedia educational strategy in improving the level of knowledge and awareness on hepatitis C, as expressed through increase in the proportion of correct answers. Secondary outcomes were the level of accessibility and adherence to the questionnaire by the target population, and factors related to a worse knowledge of HCV infection.

Statistical analysis

Continuous variables are described as mean and standard deviation (SD) when normally distributed; otherwise, they are reported as median and interquartile range (IQR). In order to identify any improvement in the knowledge of the main aspects of HCV infection, we used the

McNemar Chi-square test to compare the answers provided before the video with those given later.

In order to identify factors associated with a worse level of knowledge of HCV infection before viewing the video, we computed the number of correct answers for each participant and performed a negative binomial multivariable regression analysis; the significance of the association was assessed by analyzing the Incidence Rate Ratio (IRR) and the corresponding 95% confidence interval (CI).

RESULTS

Demographic characteristics

Through the divulgation of the questionnaire in multimedia form, in the period between June 2020 and September 2020, 339 people of Pakistani origin took part in the survey on a total of 600 subjects contacted via mailing list. The mean age was 29 ± 10 years (range 18-70), and 76% of the participants were male. As regards the level of education, 35% had received a university education, 60% had attended secondary school up to the age of 18, 4% had attended primary school up to the age of 10 and 1% did not receive any formal education. Eighty-three (24%) subjects had been previously tested for HCV, and 7% (n=23) of the participants reported previous injection of drugs. Forty-three percent (n=147) completed the questionnaire in Italian, while 57% (n = 192) preferred the Urdu language. The demographic characteristics are detailed in **Table 1**.

Level of knowledge on HCV infection

The main results of the questionnaire in the 339 participants, before watching the informative video, are shown in **Table 2**. As regards the level of awareness on hepatitis C, 68% of the participants were aware of the hepatitis C virus (HCV), whereas 17% knew that the frequency of HCV infection in the population of Pakistani origin is around 10%. Half of the participants believed that HCV can be transmitted from one infected person to another; in details, 44% deemed the transmission of HCV through sex possible, and 50% believed that HCV can be transmitted through sharing personal care objects such as the toothbrush. Sixty-one percent of respondents believed that hepatitis C can cause significant liver disease and induce the development of hepatocellular carcinoma. Twenty-six percent were unaware of a curative treatment for HCV infection, and 14% knew that this therapy is provided by the Italian Health System.

Factors associated with a worse knowledge of HCV infection

The risk factors for a lower knowledge of HCV infection in the 339 subjects participating in the multimedia questionnaire before viewing the informative video were: (I) male sex (IRR 1.19, 95% CI 1.05-1.35), (II) non-university education level (IRR 1.26, 95% CI 1.12-1.42), (III) having

preferred the Urdu language for compiling the questionnaire (IRR 1.22, CI 1.07-1.39) (IV) having used drugs intravenously (IRR 1.18, 95% CI 1.01-1.38) and (V) not being ever tested for HCV in the past (IRR 1.36, 95% CI 1.20-1.54). The details of the analysis are shown in **Table 3**.

Impact of the multimedia divulgation platform

Sixty-seven subjects took part again in the questionnaire after viewing the multimedia information content on HCV infection. The baseline characteristics of this group were not significantly different from subjects who did not answer the questionnaire for the second time, except for an older age (32 + 11 vs. 28 + 9 years, p=0.003) (see **Table 4**). The percentage of correct and wrong answers, before and after viewing the multimedia content in such subjects is reported in **Table 5**. In detail, 58% were aware of the HCV before watching the video, versus 97% after (p <0.001). Before the video, 45% believed that HCV infection can be transmitted from one infected person to another, compared to 97% after (p <0.001). Before the educational intervention, less than half (42%) of the respondents deemed the transmission of HCV through sexual intercourse possible, compared to 94% after (p <0.001). In the pre-video questionnaire, only 58% believed that HCV transmission was possible by sharing personal items such as the toothbrush, vs. 90% after (p <0.001). Before watching the educational clip, only 40% of respondents were aware of the fact that HCV infection can last for a lifetime, vs. 64% after (p = 0.004). Before the video, 73% believed that HCV infection can lead to significant liver disease and induce hepatocellular carcinoma, vs. 91% after (p = 0.005). Before the educational intervention, 88% of subjects were already aware of the existence of a curative treatment for HCV infection, against 99% after (p = 0.008). Before the video, 6% of respondents knew that HCV treatment is provided by the Italian Health System, vs. 70% after (p <0.001).

DISCUSSION

In this study, we demonstrated on a sample of over 300 Pakistani people living in Italy that knowledge of the main epidemiological and clinical aspects related to HCV infection is suboptimal. We identified some social and demographic factors related to a worse knowledge of HCV infection: male sex, lower level of education, worst knowledge of Italian language with preference for Urdu language, previous intravenous drug injection, and absence of a previous HCV test. The use of an informative multimedia platform (i.e., website with bilingual video) was found to be significantly effective in improving knowledge of the main aspects relating to HCV infection.

Communities of migrated people often represent a challenge for public health policy, owing to cultural and language issues [14]. Also, traditional campaigns on health-related topics based on meetings and conferences are difficult to organise: this is especially true nowadays, owing to the COVID-19 pandemic. The rate of participation to our online survey was around 57%, being higher than other community-setting surveys on HCV among South Asian migrant communities in Europe, where the response rate was 40% or less [15]. These results are encouraging, as they underline the feasibility and the potential of web-based, multimedia platforms. Only 57% of the enrolled subjects answered the questionnaire in Urdu. This might be consistent with Urdu being not the most spoken language in Pakistan. However, Urdu is the official language of Pakistan and the teaching language of state schools. Given that the mean age of participants was 29 years, and that more than 90% of them had attended secondary school or university, either in Italy or Pakistan, we feel that no language-related bias may have occurred.

Overall, the basal knowledge of enrolled subjects on the main topics about HCV infection was modest, especially regarding the frequency of infection in the Pakistani population, the methods of transmission, the clinical consequences and costs of therapy. For instance, only 17% were aware of the real frequency of HCV infection in Pakistan and only half of the participants knew that HCV infection can be transmitted from one person to another. Furthermore, only 50% knew that it can be transmitted by sharing personal hygiene items (e.g., toothbrush) and a mere 44% was aware of transmission through sexual intercourse. This is relevant if we consider that 35% of the participants had a university level of education. Our results are consistent with a recent survey about the awareness of chronic liver disease risk factors in 368 patients admitted

in Dr Ruth Pfau Civil Hospital, in the southern city of Karachi, Pakistan [16]. In this study, even though 39% of the sample had received no formal education and only 6% had received university education, 70% of interviewees (vs. 61% in our study) acknowledged HCV as a cause of chronic liver disease and, similarly to our survey, only half of the respondents correctly answered about HCV transmission via unprotected sexual contact, sharing of personal hygiene items and via mother to foetus. As for the cost of treatment, only 14% of the participants to our survey knew that this is provided by the Italian Health System, whereas 30% believed it was an expensive therapy. This misconception is not justifiable, especially in light of the fact that also in Pakistan, where there is local manufacture of generic medicines, a 12-week course of sofosbuvir/daclatasvir costs as low as $34 for the patient [17], and should pave the way to informative campaigns on DAA treatment.

Identifying factors independently related to a worse knowledge on HCV infection may help to focus educational interventions on a specific subgroup of ill-informed people, possibly increasing their effectiveness. At multivariable analysis, we found four sociodemographic factors linked to a worse basal performance at the questionnaire on HCV infection: male gender, lower level of education, insufficient knowledge of the Italian language with preference for the Urdu version of the questionnaire, previous intravenous drug injection, and absence of a previous HCV test. These data make sense and are consistent with the published literature. In fact, in a 2002 community survey Pakistani women appeared to be more informed about viral hepatitis [18]; higher level of education has proved both among immigrant and indigenous high-prevalence communities to be positively associated with a better awareness about HCV [11,16]; and PWID have demonstrated inadequate baseline knowledge about HCV in previous studies [19,20]. The absence of a previous HCV test may represent a risk factor as testing is often proposed along with epidemiological and clinical information about viral hepatitis.

The relevant improvement in participants' knowledge about HCV infection deserves a comment. Such a result underlines the potential of educational initiatives and introduces an element of novelty, as our project was entirely web-based. This might be of particular interest for healthcare promoters, in light of the current social restrictions owing to the SARS-CoV-2 pandemic. However, the 20% rate of participants answering the questionnaire after viewing the educational video is dissatisfactory, even though suboptimal results were obtained also by other

studies [10]. The web-based design of our project might partly explain such result, as participants were not subject to any control nor committed to compile the questionnaire twice. Nevertheless, such group of participants was quite representative of our study sample, as all baseline characteristics were similar except for a slightly older age (i.e. 31 vs. 28 years). Therefore, we might infer such results to our sample with an acceptable risk of bias.

Our study has strengths and limitations. We were able to reach more than 50% of the invited subjects, by means of social network-based invitations. However, only a subset of subjects repeated the questionnaire on HCV infection after watching the educational video, thus our results on the effectiveness of the multimedia platform in improving the knowledge of HCV infection are exploratory and not conclusive. Nevertheless, looking at other studies with a similar educational approach to ours, multilingual informative videos can be considered valid strategies to improve HCV awareness among high-risk ethnic groups [10]. We invited Pakistani people through a mailing list derived from a social network group, probably introducing a selection bias as the mean age of the participants was 29 years. However, we can speculate that participating people might spread information to their families, thus reaching also older people; further, the mean age of Pakistani people living in Italy is 29 years [12], therefore our sample is quite representative of the population from which it was drawn. Further, the multivariable analysis showed that the increasing age of participants was not significantly related to a worse knowledge on HCV-related topics, thus we can speculate that such results might apply also to older people. Seventy-six percent of respondents were male, however this data mirrors the demographics of the Pakistani community in Italy, where females constitutes less than 30% of the population [12]. Owing to the COVID-19 pandemic, we were not able to verify whether this initiative would translate into a linkage to care. Nevertheless, this should be the core of future studies.

In conclusion, in this study we provided a web-based multimedia bilingual platform which allowed us to found a modest level of knowledge about HCV infection among Pakistani people living in Italy, identifying a subgroup of subjects with worse awareness. Through the platform, we divulgated an educational video which significantly improved the knowledge of participants on HCV infection. It is desirable that these results would translate into a greater ability to identify "submerged" cases of HCV infection, thus improving linkage to care.

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TABLES

Table 1. Demographic and social characteristics of the Pakistani people living in Northern Italy participating to the initiative.

Characteristics	**Study sample (n = 339)**
Mean age + SD (years)	29 ± 10 years
Male gender, n (%)	258 (76%)
Marital status, n (%)	
Divorced	3 (1%)
Single	171 (50%)
Married	165 (49%)
Education, n (%)	
Illiterate	3 (1%)
Primary school (i.e. <10y)	13 (4%)
Secondary school (i.e. <18y)	206 (60%)
University	117 (35%)
Previous testing for HCV, n (%)	83 (24%)
Previous PWID, n (%)	23 (7%)
Previous hemotransfusion, n (%)	20 (6%)

HCV, hepatitis c virus; PWID, people who inject drugs; SD, standard deviation.

Table 2. Questions and answers related to HCV knowledge among 339 participants, before the educational video.

Questions		Participants' responses, n (%)		
		Yes	No	I don't know
Q01	Do you know what the Hepatitis C Virus (HCV) is?	232 (68%)	107 (32%)	-
Q02	Can HCV infection be transmitted by an infected person to another?	170 (50%)	66 (20%)	103 (30%)
Q03	Do you believe HCV can be transmitted by shaking hands with an infected person?	27 (8%)	222 (66%)	90 (26%)
Q04	Do you believe HCV can be transmitted by kissing an infected person?	76 (22%)	146 (43%)	117 (35%)
Q05	Do you believe HCV can be transmitted by having sex with an infected person?	147 (44%)	70 (20%)	122 (36%)
Q06	Do you believe HCV can be transmitted to the baby by an infected mother during pregnancy and/or delivery?	153 (46%)	57 (16%)	129 (38%)
Q07	Do you believe HCV can be transmitted by sharing personal hygiene items (such as toothbrush) with an infected person?	169 (50%)	52 (15%)	118 (35%)
Q08	Do you believe HCV can be transmitted by injuring yourself with a needle or sharp instrument (e.g. razor, blade) contaminated with an infected person's blood?	235 (69%)	26 (8%)	78 (23%)
Q09	Do you believe HCV can be transmitted by working with an infected person?	27 (8%)	202 (60%)	110 (32%)
Q10	Do you believe HCV infection can cause liver damage and/or cancer?	208 (61%)	13 (4%)	118 (35%)
Q11	Do you believe someone with HCV can have health issues?	237 (70%)	17 (5%)	85 (25%)
Q12	Do you believe there is a curative treatment for HCV infection?	252 (74%)	12 (4%)	75 (22%)
	Other questions			

Q13	What is the prevalence of HCV infection in Pakistan?	**<1%**	**10%**	**20%**	**I don't know**
		4 (1%)	58 (17%)	111 (33%)	166 (49%)
Q14	What is the duration of HCV infection?	**Only some days**	**Only some months**	**It may persist all life**	**I don't know**
		3 (1%)	46 (14%)	143 (42%)	147 (43%)
Q15	How much is the HCV therapy?	**It costs a lot**	**It depends on the income**	**It is free**	**I don't know**
		102 (30%)	43 (13%)	48 (14%)	146 (43%)

Table 3. Risk factors for worst baseline knowledge on hepatitis C virus (HCV) among 339 participants. CI, Confidence Interval; IRR, incidence rate ratio; PWID, people who inject drugs.

Variable	IRR (95%CI)	P
Male gender	1.19 (1.05-1.35)	0.007
Urdu language preference	1.22 (1.07-1.39)	0.003
Non-university level of education	1.26 (1.12-1.42)	<0.001
No history of HCV testing	1.36 (1.20-1.54)	<0.001
Previous PWID	1.18 (1.01-1.38)	0.047

Increasing age (IRR 0.91, CI 0.80-1.04), marital status (IRR 0.99, CI 0.87-1.12 for married people vs. others) and history of blood transfusion (IRR 1.18, CI 0.98-1.42) were included in the multivariable analysis but are not reported in the table as they were not significant.

Table 4. Demographic and social characteristics of the Pakistani people, according to whether the questionnaire was compiled after viewing the educational video or not.

Characteristics	Patients answering the questionnaire twice	Patients answering the questionnaire once	p*

	(n = 67)	(n = 272)	
Mean age + SD (years)	31 ± 11	28 ± 9	0.003
Male gender, n (%)	50 (75%)	208 (76%)	0.751
Marital status, n (%)			0.112
Divorced	0 (0%)	3 (1%)	
Single	27 (40%)	144 (52%)	
Married	40 (60%)	125 (46%)	
Education, n (%)			0.363
Illiterate	1 (1%)	2 (1%)	
Primary school (i.e. <10y)	3 (4%)	10 (4%)	
Secondary school (i.e. <18y)	45 (68%)	161 (59%)	
University	18 (27%)	99 (36%)	
Previous testing for HCV, n (%)	17 (25%)	66 (24%)	0.874
Previous PWID, n (%)	8 (12%)	27 (10%)	0.384
Previous hemotransfusion, n (%)	2 (3%)	18 (7%)	0.388

HCV, hepatitis c virus; PWID, people who inject drugs; SD, standard deviation.

* unpaired t-test, or Fisher's exact test as appropriate.

Table 5. Impact of the web-based platform on the level of knowledge on HCV, among 67 participants.

Question	Correct response before educational intervention, n (%)	Correct response after educational intervention, n (%)	P
Q01	38 (58%)	65 (97%)	<0.001
Q02	30 (45%)	65 (97%)	<0.001
Q03	44 (66%)	54 (81%)	0.035
Q04	30 (45%)	33 (49%)	0.414
Q05	28 (42%)	63 (94%)	<0.001
Q06	32 (48%)	32 (48%)	0.999
Q07	39 (58%)	60 (90%)	<0.001
Q08	47 (70%)	66 (99%)	<0.001
Q09	40 (60%)	44 (66%)	0.371

Q10	27 (40%)	43 (64%)	0.004
Q11	49 (73%)	61 (91%)	0.005
Q12	52 (78%)	62 (93%)	0.012
Q13	15 (22%)	8 (12%)	0.09
Q14	59 (88%)	66 (99%)	0.008
Q15	4 (6%)	47 (70%)	<0.001