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The Burden and Risk Factors of Hepatitis C Virus Infection in the Sikh Community of Punjab, Pakistan: A Community Based Case Control Study

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Abstract

Background: Hepatitis C is an infection disease of human liver which is caused by HCV virus his study was conducted to find out the prevalence and associated risk factors of HCV among the Sikh community of Nankana sahib Punjab, Pakistan. Because data related to study on such topic does not exist previously in Pakistan.

Methods: 222 individuals were interviewed regarding risk factors for HCV between 6 October 2018 and 13 October 2018. Data were analyzed using SPSS version 22.00 by performing uni-variable analysis and those variables which are <0.25 in uni-variable analysis were retained to multivariable analysis.

Results: The overall prevalence of HCV was 19 (9%) cases. Associated risk factors was analyzed by performing of uni-variable analysis in which employment status, vaccination status, undergone dental procedures, patient with diabetics, positive history for HCV, imprisoned in last five years, self-flagellation with Kirpan with p-values of (0.003), (0.001), (0.01), (0.002), (0.003), (0.004), (0.001). The results were significant in uni-variable analysis, Variable having p-value<0.25 in the uni-variable analysis were retained in the multivariable logistic regression.

In multivariable logistic regression, Low level of education was in association with HCV sero-positive with (OR=1.7595%). Similarly sharing of comb (Kanga) was highly associated with the spread of HCV with (OR=2.058; 95).

Conclusion: This is a need to give education in regards to associated risk factors for the spread of HCV among the Sikh community of Nankana sahib. Hepatitis B vaccine should be administered to all new born babies regardless of maternal HBsAg status.

Keywords: Prevalence; Sero-positive; Uni-variable; Multivariable

Introduction

Hepatitis C virus has been studied to be one of the most likely pathogens that has impeded the medical community all over the world. Since from its discovery HCV has been considered as major cause of chronic liver diseases worldwide and due to exceeding hepatitis B virus HCV involved for major health problems for about more than 3% of population worldwide That is more than 170 million peoples infected and only 20%-30% of individuals exposed to HCV recovered spontaneously and remaining 70%-80% developed HCV infection. However, about 3%-11% of population will developed liver cirrhosis within 20 years. With associated risk of liver failure and Hepatocellular Carcinoma (HCC). It's now widely recognized as one of the common etiological agents for cirrhosis of the liver and also one the leading cause of liver transplantation and is the most common blood born infection in developed countries like USA. The socioeconomic impact of HCV infection is there for enormous and the burden of the diseases is expected to increases around the world as diseases progress in patients who contracted for HCV years ago, since it discovery it's not up to only prevalence of HCV, but this virus also shown different patterns of diseases within clinical presentation with their therapeutic response. However due to its large distribution its shows large degree of geographical variability and endemic in spread worldwide, countries with highest prevalence include Asia and Africa but having lower prevalence in developed countries. In countries like south Africa prevalence level is higher is some area reaching up to 10%. In European region HCV prevalence is varies in general population from 0.4% in Sweden, Germany and Netherlands to more than 2%-3%. In some countries have relatively higher prevalence of HCV including Taiwan (4.4%) and Vietnam (2%-2.9%).

HCV prevalence found much higher in Egypt with prevalence rate of 20%. Yamen is heavily populated and second largest and poorest country in Arabian Peninsula; the prevalence of HCV found to be 1.7% in healthy volunteers though it reached 2.7% among blood donors. Such prevalence reached about 60% in hemodialysis patients. In Pakistan prevalence of HCV in about 6.8% and about 6% in normal population of Pakistan [1]. Pakistan is considered as to be the second

highest prevalence of HCV after Egypt in worldwide distribution of HCV according to world health organization more than million cases are reporting HCV in Pakistan each year. This spread in estimated in overall population of Pakistan if we talk about the spread of HCV in accordance to the different community then unfortunately there is no such record in history of Pakistan. There is need to assed the different religion practices and analyzed data how their religious practice can contribute as a risk factors is spread of HCV and what are the risk factors which are contributing in spread of HCV in that specific community. So their fore present study was undertaken to estimates the prevalence and associated risk factors of HCV. In relation with age, gender, education, monthly income, among Sikh community of Nankana sahib Punjab, Pakistan. Numbers of individuals among Sikh community in Nankana sahib is about 1500 which are in sub-minority group and there is need to assess the prevalence of HCV in this population [2].

Case Report

Seven hundred and thirty-eight individuals were screened in outreach screening camp among Sikh community of Nankana sahib. Out of 738 randomly 222 individuals were interviewed regarding risk factors questionnaire from 6 October 2018 to 13 October 2018 and 100% was response rate. Three milliliter blood sample from apparently healthy subjects belonging to all socioeconomic group was collected in EDTA vacutainers. All subjects were screened for hepatitis C virus antibodies by using one step cassette style anti-HCV device as per instruction from the manufacturer (rapid anti-HCV test, intec, China). Positive samples were confirmed by enzymes linked immunosorbent assay (DRG, HCV antibodies the USA). According to the age, gender educational level monthly income subjects were categorized and then correlated with risk factors. All the collected data were analyzed using SPSS Version 22.00. Data cleaning was performed on Epi data and excel. Variables were assessed on Chi square for the association. The uni-variable analysis was performed to compute the odd ratios at a 95% confidence interval.

Variable having p-value greater than 0.25 were retained in the multivariable logistic regression. Hosmer and Lameshow test was used to assess the model goodness of fit to the data. The data normality was assessed by the Kolmogorov test [3].

Results

Seven hundred and thirty eight individuals were screened in out-reach screening and vaccination camp among Sikh community of Nankana sahib Punjab, Pakistan out or seven thirty eight individuals out of this 738 individuals two hundred and twenty eight screened individuals were interview with questionnaire of associated risk factors for HCV, 19 cases were diagnosed positive for HCV with a prevalence rate of 9%, out of this 9% majority positive cases were with female gender 16 (84.2%) and males were 3 (15.8%) as details are shown in Table 1.

Screening results HCV	Gender		Total
	Male	Female	
Positive	3 (15.8%)	16 (84.2%)	19 (9%)
Negative	44 (21.7%)	159 (78.3%)	203 (91%)

Table 1: Screening results.

As all the study participants were interview through questionnaires, females 175 (78%) were more than male 47 (21.2%) majority of individuals participated between age of 16 yrs to 30 yrs old and most of them were unmarried there is very less literacy rate 40 (18%) among Sikh community of Nankana sahib, only 19 (9%) of individuals reports they have completed HBV vaccination doses, 168 (75.5%) individuals mentioned that they inject intravenous and intramuscular injection, 102 (45.5%) individuals reports that they have undergone dental procedure, 44 (19.8%) individuals say they have family history of HBV, similarly 62 (27.5%) individuals are with family history of HCV. 127 (57.2%) respondents reports that they were sharing their tooth brushes with other within their family [4]. About 113 (50%) respondents say that they received injections other than health care settings which play a good role in the spread of infection [5]. Sharing of Comb (Kanga) within their family is 161 (72%) which is one of the major risk factors of intra-familiar spread. As details are mentioned in Table 2.

Variables	Details	N (%)	HCV positive subjects	HCV negative subjects
Gender	Male	47 (21.2%)	3 (15.8%)	44 (21.7%)
	Female	175 (78.8%)	16 (84.2%)	159 (78.3%)
Ages	10-15	33 (14.86%)	0 (0%)	33 (15%)
	16-30	81 (36.4%)	2 (1%)	79 (35.8%)
	31-45	70 (31.5%)	7 (3.3%)	63 (28.9%)
	46-60	29 (13.06%)	8 (3.9%)	21 (9.8%)
	61-75	8 (3.60%)	2 (1%)	6 (2.9%)
	>75	1 (0.45%)	0 (0%)	(10.5%)
Marital status	Married	73 (32.9%)	0 (0%)	73 (32.9%)
	Unmarried	149 (67.1)	19 (8.6%)	130 (64.0%)

Employment status	Employed	49 (22.1%)	1 (0.5%)	48 (21.6%)
	Unemployed	173 (77.9%)	18 (8.1%)	155 (69.8%)
Educational status	Educated	40 (18%)	1 (0.5%)	18 (8.1%)
	Uneducated	182 (81%)	18 (8.1%)	185 (83.3%)
Monthly income	1-30000	196 (88.3%)	16 (7.2%)	180 (81.1%)
	31-75000	21 (9.5%)	2 (0.9%)	19 (8.6%)
	>75000	5 (2.3%)	1 (0.5%)	4 (1.8%)
Have you been vaccinated for HBV infection	Yes	19 (8.6%)	5 (2.3%)	14 (6.3%)
	No	203 (91.4%)	14 (6.3%)	189 (85.1%)
Have you ever received any Intravenous or intramuscular injection	Yes	168 (75.7%)	13 (5.9%)	155 (69.8%)
	No	54 (24.3%)	6 (2.7%)	48 (21.6%)
How many injections have you received In last 5 years	Numbers of injections			
	0	1 (0.5%)	1 (0.5%)	0 (0%)
	1-10	3 (1.4%)	5 (2.3%)	3 (1.4%)
	11-20	167 (75.4%)	11 (5%)	102 (46.6%)
	21-30	25 (11.4%)	1 (0.5%)	24 (10.9%)
	31-50	5 (2.3%)	0 (0%)	5 (2.3%)
	51-70	16 (7.2%)	1 (0.5%)	15 (6.8%)
	71-100	1 (0.5%)	0 (0%)	1 (0.5%)
	>200	3 (1.3%)	0 (0%)	3 (1.4%)
Have you ever received blood transfusion	Yes	21 (9.5%)	2 (0.9%)	17 (7.7%)
	No	201 (90.5%)	19 (8.6%)	184 (82.9%)
Have you ever donated blood	Yes	19 (8.6%)	1 (0.5%)	18 (8.1%)
	No	203 (91%)	18 (8.1%)	185 (83.3%)
Have you ever under gone any surgical procedure	Yes	84 (37.8%)	11 (5%)	73 (32.9%)
	No	138 (62.2)	8 (3.6%)	130 (58.6%)
Have you ever undergone any dental procedure	Yes	102 (45.9%)	14 (6.3%)	88 (39.6%)
	No	120 (54.1%)	5 (2.3%)	115 (51.8%)
Have you ever done tattooing In the last five years	Yes	49 (22.1%)	6 (2.7%)	13 (5.9%)
	No	173 (77.9%)	43 (19.4%)	160 (72.1%)
Have you been hospitalized for any reason in the last five years	Yes	77 (34.7%)	9 (4.1%)	10 (4.5%)
	No	145 (65.3%)	68 (30.6%)	135 (60.8%)
Have you ever cut yourself By sharp object accidently	Yes	41 (18.9%)	3 (1.4%)	39 (17.6%)
	No	180 (81.1%)	16 (7.2%)	164 (73.9%)
Do you use recreational drugs or have you ever used	Yes	5 (2.3%)	0 (0%)	5 (2.3%)
	No	217 (97.7%)	19 (8.6%)	198 (89.2%)
Do you drink alcohol or have used it in past	Yes	9 (4.1%)	1 (0.5%)	8 (3.6%)
	No	213 (95.9%)	18 (8.1%)	195 (87.8%)
Do you have diabetes	Yes	40 (18.0%)	9 (4.1%)	31 (14.0%)
	No	182 (82%)	10 (4.5%)	172 (77.5%)
Does anyone in your family is positive for HBV	Yes	44 (19.8%)	6 (2.7%)	38 (17.1%)
	No	130 (58.6)	9 (4.1%)	121 (59.6%)
	Don't Know	48 (21.6)	4 (1.8%)	44 (19.8%)
Does anyone in your family is positive for HCV	Yes	62 (27.9%)	10 (4.5%)	52 (23.4%)
	No	120 (54%)	5 (2.3%)	104 (46.8%)
	Don't Know	40 (18.4%)	4 (1.8%)	47 (21.2%)
Have you been imprisoned in last five years	Yes	40 (18.0%)	7 (3.2%)	33 (14.9%)
	No	182 (82%)	12 (5.4%)	170 (76.6%)

Do you share tooth brush with others at home	Yes	127 (57.2%)	11 (5%)	116 (52%)
	No	95 (42.8%)	8 (3.6%)	87 (39.2%)
Have you received Injection outside healthcare settings	Yes	113 (50.9%)	12 (5.4%)	101 (45.5%)
	No	109 (49.1%)	7 (3.2%)	102 (45.9%)
Have you been to any other country outside Pakistan in the last Five years	Yes	29 (13.1%)	2 (0.9%)	27 (12.2%)
	No	193 (86.9%)	17 (7.7%)	176 (79.3%)
Do you share hair Kanga with someone else	Yes	161 (72.5%)	11 (5%)	150 (67.6%)
	No	61 (27.5%)	8 (3.6%)	53 (23.9%)
Have you self-flagellated yourself with Kirpan accidently	Yes	17 (7.7%)	5 (2.3%)	12 (5.4%)
	No	205 (92.3%)	14 (6.3%)	191 (86%)
Have you ever self-flagellated Yourself by sharp object accidently	Yes	87 (39.2%)	9 (4.1%)	78 (35.1%)
	No	135 (60.8%)	10 (4.5%)	125 (56%)

Table 2: Descriptive details of study variables.

Those variables which are <0.25 were retained in the multivariable logistic regression [6]. In uni-variable analysis, there is a significant association between vaccination status and hepatitis results as only 19 (6.9%) individuals say they completed their vaccination dose with (p-value <0.05) similarly dental procedure was significantly associated with HCV spread with (p value <0.01) [7]. family history for HCV shown significant results with P-value 0.03. Similarly, self-flagellations of individuals with Kirpan found highly significant with (p-value <0.001). As details are mentioned in Table 3.

Variables	Category	N (%)	P-Value
Employment status	Employed	49 (22.1%)	0.035
	Unemployed	173 (77.9%)	
Educational status	Educated	40 (18%)	0.21
	Non-educated	182 (81%)	
Vaccination status	Yes	19 (6.9%)	0.015
	No	203 (91.4%)	
Undergone surgical procedures	Yes	84 (37.8%)	0.064
	No	138 (62.2%)	
Undergone dental procedure	Yes	102 (45.9%)	0.01
	No	120 (54.1%)	
Have you undergone tattooing in the last 5 years?	Yes	49 (22.1%)	0.191
	No	173 (77.9%)	
Hospitalization for any reason in last five years	Yes	77 (34.7%)	0.234
	No	145 (65.3)	
Diabetics	Yes	40 (18.0%)	0.002
	No	182 (82.0%)	
Anyone in the family is positive for HCV	Yes	62 (27.9%)	0.034
	No	109 (49.1%)	
Imprisoned in last five years	Yes	40 (18.0%)	0.041
	No	182 (82.0%)	
	Yes	113 (50.9%)	0.21
	No	109 (49.1)	
Sharing of the comb(Kanga) with others	Yes	161 (72.5%)	0.151
	No	61 (27.5%)	
Self-flagellation with kirpan accidently	Yes	17 (7.7%)	0.008
	No	205 (92.3%)	

Table 3: Uni-variable logistic regression for risk factors associated to HCV.

In multi-logistic regression variables which contributing as risk in spread of HCV includes sharing of comb (Kanga) in overall population in Sikh community of Nanakana sahib among which females were

more exposed to this risk of 131 (81.4%) and males were 30 (18.6%) with (odd ratio=2.058, CI) [8]. Such type of risks in spread of HCV is common [9]. Because in families sharing of the comb is very common practice and if someone was positive for HCV within the family [10]. Then that individual can be the source for HCV transmission within the family and which is also called intra-familiar spread of HCV another major contribution is low literacy rate, only 19 (8.6%), (odd ratio=1.057), individuals reports they are educated in which 7 (36.8%) were male and 12 (63.2%) were females. Details related to multi-logistic regressions is mentioned in the Table 4.

Variables	Category	B (coefficient)	S.E	Odds ratio (95% C.I)	P-Value
Employment status	Employed	1.718	1.041	5.574	0
	Unemployed				
Educational status	Educated	0.56	1.057	1.751	0.5
	Non-educated				
Vaccination status	Yes	-1.573	0.59	0.207	0.001
	No				
Undergone surgical procedures	Yes	-896	4.87	0.408	0.06
	No				
Undergone dental procedure	Yes	-1.297	0.54	0.273	0.01
	No				
Have you undergone tattooing in the last 5 years?	Yes	-0.541	0.523	0,582	0.3
	No				
Hospitalization for any reason in last five years	Yes	-0.58	0.483	0.56	0.2
	No				
Imprisoned in last five years	Yes	-1.1	5.12	0.333	0.03
	No				
Does any in your family is positive for HCV	Yes	-1.171	0.487	0.31	0.001
	No				
Have you received injection outside healthcare setting	Yes	-0.549	0.496	0.578	0.2
	No				
Sharing of comb (Kanga) with others	Yes	0.722	0.491	2.058	0.14
	No				
Self-flagellation with Kirpan accidently	Yes	-1.738	0.6	0.176	0.004
	No				
Do you have diabetes	Yes	-1.608	0.499	0.2	0.001
	No				

Table 4: Multivariable logistic regression for risk factors associated with HCV.

Discussion

HCV infection is one of the major cause for liver cirrhosis, hepatic failure and hepatocellular carcinoma resulting in a steady and mark an able reduction in the quality of life. This study calculated the prevalence and related risk factors of HCV infection among the Sikh community of district Sri Nankana sahib. And asses its association with gender, age marital status job and its history of associated risk factors. Prevalence of HCV in this was detected as 9% and the highest prevalence was seen in age ≤ 50 years old (1.35%) however there was a significant association between educational status, sharing of comb (Kanga), undergone surgical procedures, undergone dental procedures, family history for HCV, self-flagellation with Kirpan accidently. From finding of our study, sharing of comb (Kanga) is identified as one of the major risk factors for spread HCV among Sikh community of Nankana sahib, sharing of comb among females were 131 (81.4%) and among males were 30 (18.4%), from both genders 11 (57.9%) subjects

were positive for HCV, this was due to the fact that in females this is common practice to share comb and wounds under hairs due to dryness give drop of blood to comb in a results infected blood transferred to healthy individual. Results of our study are similar to the study conducted by Kamaldeep Singh among the Sikh community of Amritsar. Due to sharing of comb HCV is prevalent up to (8.3%). Self-flagellation with kirpan shows association with spread of HCV (Kirpan is made-up of melt Iron and very sharp in C sharp. Which is wear by Sikh community at every time to fulfill their religious practices) 17 (7.7%) individual reports they accidently self-flagellate their self with Kirpan out of which 5 (26.3%) were positive for HCV, outer part of Kirpan is sharp so some time due to careless attitude of individual skin can cut hence Kirpan becomes the carrier to transfer the infected blood to healthy once. However, the results of our study are in similarity with the results of a study conducted by kumaon region of Uttarakhand on Sikh community. HCV positive subjects due to accidental injury of Kirpan between the ages of 18-30 were (0.72%).

In the present study, female patients were 175 (78.8%) out of which 16 (84.2%) were positive for HCV and male patients were 47 (21.2%) out of which 3 (15.8%) were positive for HCV. Females are in a greater amount than males. This may be due less concentration of males towards females in regards to their health aspects, which is similar to the finding of a study conducted in Ethiopia. HCV is more prevalent in females as compared to male. In very less amount of individuals who reports that they are educated (18%) out this 1 (5.3%) were positive for HCV and (77.9%) individuals report they are uneducated out of which 18 (94.7%) were positive for HCV, which shows what can be the level of awareness among Sikh community in regards to associated risk factors for HCV. This is due to fact that being in minority they think that their children's are not safe in schools and colleges specially their females due to which they did not admit their children's in schools and colleges, which leads to low their literacy rate. Results of present study is similar with results of study conducted by Zobia Afsheen, among population of district Nowshera kpk finding of this study shows that HCV is more prevalent among illiterate peoples (x=48.00, DF=5; P=0.025). Dental procedure is in one of risk for spread of HCV. In our study dental procedure was performed by 102 (73.7%) individuals in which 14 (73.7%) are positive for HCV, dental procedure is one of the risks for spread HCV which is referred to a study conducted. Dental treatment and HCV indicates that dental care providers lack the precaution to control infection during their practice (e.g. poor sterilization and unsafe injections and use of contaminated needles) illiterate patients masking their decision making to opt for safe treatment. Bleeding due to dental procedures increase the risk of diseases transmission. A single prick during tooth extraction could deliver the participant prone to acquire HCV infection. Disregard less of numbers and frequencies of tooth extraction was performed in the past.

There is an association between diabetes and HCV in our study. 40 (18%) individuals report that they are diabetic in which 9 (47.4%) were positive for HCV which is similar to one of the study results of this study shows that (33%) of individuals were found to have diabetes compared with 5.6% in the control group without liver diseases. Family history of HCV can be one of the risk factors for positive cases of HCV within the family. Results of our study shows that 62 (27.9%) reports were positive family history for HCV in which 10 (52.6%) individuals were positive for HCV on screening, the results of our study is similar to results of the study conducted in Birjand hepatitis researches center, Birjand medical university Iran results of this study shows that patients with a family history of HCV infection were 26.3 times more prevalent than patients with no family history ($p<0.001$).

However socio-demographic variables are highly associated with risk factors. Nanakana sahib is a rural area and there is a very low level of awareness among the population so with the help this outreach approach peoples get aware regarding the mode of transmission for HCV and HBV. And know what is the importance of vaccination and how much HCV is dangerous for the health of the individual.

Conclusion

In comparison with quantity of Sikh community. The prevalence of HCV infection among the Sikh community of Nankana sahib is high (9%). Sharing of comb (Kanga) (Odd ratio=2.058) is one of the major risk factors for spread of HCV among Sikh community of Nanakana sahib. One of another major risk factor was low literacy rate, only 19 (8.6%), (Odd ratio=1.057) individuals were reported they are educated. In health care facilities proper sterilization of surgical instruments must be carried out to prevent the spread of HCV as well as HBV. Educational session must be conducted in regards to give strong awareness about these infections and their mode of transmission. The immunization activity needs to enhance among the Sikh community of Nanakana sahib to full coverage.

Limitation of Study

Due to resource constrained and limitation of time, this study did not measure the prevalence of HCV virus in the different subgroups of chronic liver diseases classification.

Ethical Consideration

This study was started after getting permission from the research department and ethical committee of Pakistan kidney liver institute and research center. From all participant, a written consent form was obtained by following the guideline of the declaration of Helsinki this study protocol was design.

Conflict of Interest

The authors have declared that no conflict of interest exists.

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