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Assessment of risk factors associated with sociodemographic status of hepatitis. A cross-sectional study from Pakistani population

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A B S T R A C T

Introduction: One of the most urgent health concerns in Pakistan is the high prevalence of hepatitis C virus infection. Despite the availability of potent antiviral medications, the overall burden of the illness has not diminished, possibly due to the asymptomatic nature of the infection, leading to delayed diagnosis. This study was conducted to assess risk factors associated with the sociodemographic status of Hepatitis C disease in Pakistani patients.

Methodology: This study adopts a cross-sectional design, employing a questionnaire-based Performa to collect data from the Pakpattan district. This hospital-based, study was conducted in Pakpattan, the largest district in Punjab province, Pakistan, and collected data of 500 patients.

Results: The study reveals a higher frequency of male patients than females, with more individuals belonging to nuclear families than joint families. Unmarried individuals face greater risk than married multiple times, and more people reside in rural areas than urban areas. The average family size does not differ between cases and controls, and the prevalence of uneducated individuals is higher than educated individuals. Gender, family status, and residence exhibit non-significant results, age, marital status, family size, and education status show significant associations. The multivariate analysis indicates p-values below the significance threshold, reinforcing the reliability of the results.

Conclusion: Hepatitis C infections are more prevalent in males, and socioeconomic status significantly influences its distribution in both genders. Education emerges as a crucial factor in the spread of this disease. Establishing Hepatitis-related societies for awareness campaigns is essential to facilitate early detection and treatment.

Keywords: *Hepatitis C, Risk factors, Pakpattan, Cross-sectional studies, Pakistan.*

Introduction

Worldwide, around 71 million individuals suffer from chronic hepatitis C, with 3.5 million of them residing in the United States.[1, 2] The prevalence of hepatitis C in the United States has experienced a steady climb over the last two decades, primarily linked to the growing population of injection drug users.[3] Additionally, there has been a notable rise in hepatitis C cases among pregnant women in recent times.[4] Approximately 3% of the global population, equivalent to 180 million people, is affected by the hepatitis C virus, leading to about 36,600 deaths yearly, primarily from hypertension and primary liver cancer. Studies indicate that between 3 to 8 percent of

Pakistan's total population and 2% of pregnant women are affected by HCV.[5] HCV infections have been related to diseases like cirrhosis and nasopharyngeal cancer, persisting despite extensive research efforts globally. Hepatocellular cancer, the prevalent form of liver cancer, impacts about 71 million people with HCV infection worldwide, resulting in over three million new HCV cases each year and approximately 0.4 million annual deaths.[6]

In Pakistan, the high prevalence of HCV is attributed to factors like insufficient sterilization of medical equipment, needless clinical use of syringes, polluted instruments in barbershops, needle distribution to drug users, and inappropriate blood transfusions. Public lack of awareness regarding viral transmission variables also contributes to the spread of disease. Hepatitis refers to liver inflammation caused by viral infections, with strains A through G identified. Hepatitis A and E spread primarily through contaminated food and water, while types C and D are transmitted through blood-to-blood contact or unsafe intercourse.[7-9]

The chronic nature of HCV and the prevalence of hepatocellular carcinoma have led to increased mortality rates in affected individuals. Pakistan faces a growing burden of hepatitis, with an estimated 10 million Pakistanis affected, making it a significant cause of illness and death in the country. Limited studies on hepatitis C exist in Pakistan due to the lack of a national reporting system. The prevalence varies across demographics, with different prevalence rates observed in the pediatric population, blood donors, adults, pregnant females, healthcare staff, and high-risk sets such as household contacts of infected individuals.[10] Earlier investigations, primarily carried out in large urban centers, have consistently indicated that Pakistan is characterized by high prevalence rates [11-18] with 3 to 8% of the general population and 2% of pregnant females reported to be infected.[12]

Notable risk aspects found in Pakistan involve the reuse of non-sterile syringes[19] and other iatrogenic contacts, including unscreened blood transfusion.[10,11] Pakistan exhibits significant social and economic variations.[8] Pakpattan, specifically, has a higher risk of blood-borne virus transmission compared to other large cities in Pakistan due to factors like lower literacy rates, economic challenges, limited access to healthcare services, and the widespread availability of opium from Afghanistan.[20] This study was conducted to assess risk factors associated with the sociodemographic status of Hepatitis C disease in Pakistani patients.

Methodology

Pakpattan, a district in the southwest of the Punjab province, was chosen as the study site. The cross-sectional study took place from September 2021 to February 2022, focusing on sub-districts Pakpattan and Arifwala within the larger Pakpattan District. The research strictly adhered to the Declaration of Helsinki. Ethical clearance was obtained from the Ethical review board, Ref No. UO/ERC/2024/30 ensuring compliance throughout the study. Formal consent was acquired from the relevant department, specifically addressing the publication of research findings.

This study employed a cross-sectional design, with the choice of study design considered crucial for research success. The study was conducted in a District hospital to understand the causes of HCV infection. This method is more efficient and cost-effective than healthy individuals (controls) with (cases). The data was obtained from cases and controls from the same population.[17] Prior approval from hospital administration was secured before collecting data from patients. Physicians were briefed on the study goals and assisted in identifying cases and controls. Cross-sectional surveys were conducted at the hospital, utilizing consecutive sampling to select cases and controls. A standardized questionnaire covered demographics, socioeconomics, family history, and clinical variables.[5, 6] In this study, a mismatched case-control study, a sample size of 500 was calculated using Google Form, considering a type 1 error risk of 5% and statistical power of 80%.

Descriptive and statistical analyses were performed using IBM SPSS version 26. Variables with univariate $p<0.05$ were included in multivariate analysis to determine true significance, aligning with a similar method used in a Brazilian case-control research assessing risk factors for HCV infection.

R e s u l t s

The primary objectives were to study the risk factors associated with HCV in the Punjab area of Pakistan. The study involved computing the frequencies, means, and standard deviations of different factors to identify and analyze the risk factors associated with hepatitis C.

Analysis of 500 patients revealed a higher frequency of male patients, accounting for 76%, compared to females at 24%. This disproportionate impact on men aligns with previous research findings. The study indicated that 63% were males, while 37% were females. Similarly, Pakpattan found a 76% higher incidence of HCV among men compared to women. The age was categorized into three subgroups: age under 18, age between 19 to 40, and age above 40. The distribution of cases across age groups showed that 14.2% were under 18, 79.4% fell within the 19-40 age range, and 6.4% were over 40.

Table 1: Socioeconomic status of patients

Categories	Number	Percentage
Family status		
Joint families	352	70.4
Nuclear families	148	29.6
Marital status		
Divorced	20	4.0
Married	195	39.0
Single	280	56.0
Widowed	5	1.0
Residential status		
Rural area (more populated)	134	26.8
Rural areas (fewer populated)	91	18.2
Urban area (more populated)	130	26.0
Urban area (fewer populated)	145	29.0
Education status		
Uneducated	286	57.2
1 – 5	84	16.8
6 – 10	73	14.6
11 – 16	57	11.4

Examining the correlation between HCV infection and marital status, the study analyzes four conditions: single, married, divorced, and widowed. The risk appears to increase with the duration of marriage, as indicated by the higher incidence rate among those who have never been married (56.0%). Specifically, 39% of respondents were divorced, 56% were single, 1% were widowed, and 4% were divorced or separated.

Table 1 reveals that 26.6% of the overall sample resides in urban highly populated areas, 18.2% in urban less populated areas, 26.0% in rural highly populated residences, and 29.0% in urban less populous areas. The majority of cases and controls come from urban settings, with 45% from rural and 55% from metropolitan areas. In examining the average family size of individuals and its association with HCV infection, the study considers family size as a continuous variable, with an average family size of seven members across all three samples (7.38±3.71, 7.53±3.84, and 7.4±93.76). There was no significant difference found. The education status is treated as a constant variable, with a breakdown into four subgroups based on educational attainment.

Uneducated individuals comprise 57.2%, while educated individuals make up 42.8%. The study emphasizes the generally high levels of education among patients, making the results applicable to the entire Pakpattan district. Table 2 provides a comprehensive overview of these findings, highlighting the potential influence of education on hepatitis C risk factors and overall well-being.

Table 2: Reveals the univariate study

Variable	Chi-square (p)	Univariate logistic regression	p-value
Sex	3.560	0.6450	0.056
Age	10.450	1.560	0.001
Marital status	39.640	1.980	0.001
Family status	2.570	1.670	0.052
Residence	3.890	4.260	0.005
Family size	0.650	2.010	0.027
Patients'education	188.350	9.450	<0.001

Different tests were employed to observe the significance of relations among variables and disease status. Although gender, family status, and residence show non-significance i.e., (p>0.05), age, marital status, family size, and education status show significance i.e., p<0.05 (Table 2). The multivariate LR analysis was conducted to thoroughly examine and assess relevant risk factors associated with hepatitis C. The table presents regression coefficients and their 95% confidence intervals, accompanied by explanations of their respective implications. The intercept value in this analysis is -0.496. All p-values for various factors are below the significance threshold of 0.05, affirming the reliability of the results.

A significant risk factor studied is a family history of the disease, with a related 95% Confidence Interval CI of (1.6830 to 2.5960). The results reveal that an individual's likelihood of contracting hepatitis C increases by 2.180 times if they have a first-degree relative with the virus. This crucial finding underscores the importance of familial history as a contributing factor to hepatitis C infection (Table 3).

Table 3: Multivariate logistic regression

Variable	B	SE	p-value	95% CI	
				Lower	Upper
Gender	0.496	0.219	0.000		
Age	0.948	0.124	0.000	0.140	0.259
Marital status	1.495	0.268	0.000	2.057	3.267
Family status	0.248	0.239	0.003	1.249	3.045
Residence	0.649	0.193	0.000	1.385	2.595
Family size	0.385	0.134	0.000	1.294	3.295
Patients' education	0.496	0.294	0.000	1.496	2.256
Family history of hepatitis C	0.519	0.238	0.000	1.683	2.596

This multivariate analysis not only provides insights into the various risk factors associated with hepatitis C but also validates the robustness and reliability of the results. The inclusion of a family history of the disease as a significant risk factor further contributes to our understanding of the complex dynamics influencing the prevalence of HCV in the studied population.

Comparisons with similar research in domestic and international literature enhance the broader relevance and applicability of these findings.

Discussion

The research delves into the distinctions among nuclear families NF and joint families JF in Pakpattan. A Gallup poll conducted in the region indicates that nearly two-thirds of respondents prefer living in JF, while over a third opt for NF. As NF has been on the rise, the JF structure has expanded in central Punjab. Individuals in joint households may face a higher risk of contracting hepatitis C due to the frequent sharing of personal items such as kitchen utensils, nail clippers, toothbrushes, and more. Joint family members sharing personal items may inadvertently contribute to the transmission of hepatitis C within the household. In the study, 70.4% live with NF while 29.6% live with JF.

The random selection reveals an estimated frequency of HCV among adults at 6% (62%) and a 95% confidence interval of 5.5–9.6. The elderly were identified as having the highest risk, and the exclusion of young people raises the possibility that this frequency may decline with time. The gender distribution in this study indicates that approximately 76% of cases are males, while 24% are females. This finding aligns with other research, both within and outside Pakistan, where males have been reported to be disproportionately affected by HCV. However, conflicting reports exist, and some studies suggest that females might be more disposed to contracting the infection.[17] The study's significance lies in its use of multiple LR models across various data settings, such as overall data, gender-based data, and urban and rural areas. The inclusion of relevant risk factors is based on a thorough univariate analysis, and only predictors with a p-value less than 0.2 are considered for the final LR Model.

Diagnostic checks for multicollinearity and the identification of outliers are conducted before committing to the final model.[5, 6] Our data uncovered a reasonable positive trend (P = 0.130) linking family size to the risk of HBsAg positivity. The test for trend accounted for socioeconomic and ethnic status. This discovery aligns with findings from other studies.[7] Notably, this study found

no significant difference in average family size between cases and controls. Family size exhibited significant variations concerning the risk of hepatitis C. The prevalence of various risk factors for HCV infection varied across different geographical regions. In Western states and Australia, anti-HCV is related to tattooing, intravenous drug intake, sexual interaction, and history of blood exposure.[21-23] Our study observed a higher proportion of individuals residing in rural areas than in urban areas. However, residence did not exhibit significant differences.

The outcomes suggest that increased age and a history of transfusion, rather than socioeconomic status, are robust risk factors for anti-HCV. Other potential risk factors, including a history of surgery, alcohol use, and cigarette smoking, were also noted, but none demonstrated statistically significant associations with this viral infection. Our data indicated that familial clustering was not a risk factor for anti-HCV. Moreover, we identified only one household member with anti-HCV positivity in households where infection occurred.

This finding suggests that intrafamilial clustering of HCV infection within households is low compared to HBV infections.[24] This study explores risk factors related to HCV in the Pakistani population, encompassing gender, age, family status, residence, marital status, family size, and education status. The results highlight significant differences in age, marital status, family size, and education status, while gender, family status, and residence of patients did not show significant differences.

The investigation revealed that engaging a barber for shaving poses a risk factor for the transmission of hepatitis B and C, aligning with findings in other studies.[25] Barbers in rural settings often employ the same blade on multiple clients, and these rural areas exhibit a higher incidence, as evidenced in the current study. The global occurrence of HCV infection remains relatively low among children, with an anti-HCV incidence rate ranging from 0.2% to 0.4% in the Western world. [26] Local studies indicate that risk factors for HBV and HCV infections in this region differ from those in Western countries.

Noteworthy risk factors here include high poverty coupled with low educational attainment, unwarranted use of injections and syringe reuse, and a lack of awareness regarding the modes of hepatitis transmission. Typically, multiple risk factors are identified in most hepatitis patients. For instance, a study from upper Sindh highlighted HCV as a primary cause of Chronic Liver Disease, with contaminated syringe usage being a prominent risk factor.[26]

Prior reports from Hafizabad demonstrated a high prevalence of anti-HCV antibodies, with reused syringes and frequent therapeutic injections identified as significant risk factors for hepatitis B and C in Pakistan.[21] The common practice of reusing disposable syringes and needles after soaking in tepid water in a boiler or bowl is prevalent in Pakistan. Moreover, the proportion of injections per prescription in Pakistan is considerably higher compared to some other countries. [22] This study underscores the role of syringe use in contributing to Hepatitis C among patients.

Conclusion

To conclude, this is the first work to focus specifically on rural areas and its individuals in Pakpattan District, offering unique insights into the frequency and risk factors related to Hepatitis C. It is crucial to acknowledge that potential risk factors are intertwined with the patient's socioeconomic status, medical history, behavioral features, and family history. The study underscores that Hepatitis C is more prevalent in the male population, emphasizing the gender disparity in the distribution of the disease.

Additionally, various socioeconomic factors play a role in the spread of disease, with education emerging as a crucial factor. The research highlights that illiterate individuals may face challenges in early diagnosis, leading to more complicated cases, Education is identified as a key factor in the distribution of Hepatitis C, emphasizing the importance of awareness and early detection. The call for Hepatitis-related societies to spread awareness among the population is emphasized, aiming to facilitate early diagnosis and timely treatment. The findings underscore the need for a combination of strategies to reduce infection rates, considering the multifaceted nature of the risk factors associated with Hepatitis C.

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