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HCV TRANSMISSION PATTERNS AMONG INJECTING DRUG USERS IN REGION OF PAKISTAN: A CROSS-SECTIONAL STUDY

Original Research

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ABSTRACT

Background: Injecting drug users (IDUs) in Pakistan represent a high-risk group for Hepatitis C Virus (HCV) transmission due to unsafe injection practices and limited access to harm reduction services. This study aimed to assess HCV identifies key transmission patterns among IDUs in Abbottabad, Pakistan.

Methods: A cross-sectional study was conducted from January 2023 to January 2025, involving 412 cases recruited from rehabilitation centers and community outreach programs. Participants completed a structured questionnaire covering sociodemographic, drug use history, health behaviors, and HCV awareness. Blood samples were tested using rapid diagnostic kits, with confirmatory PCR for HCV RNA. Descriptive statistics, bivariate analysis, and multivariate logistic regression were conducted using SPSS Version 26.0.

Results: The overall HCV prevalence was 69.4%. Significant risk factors included injecting drug use for over five years (AOR = 2.71, p = 0.001), recent needle sharing (AOR = 2.25, p = 0.002), obtaining syringes from peers or informal sellers (AOR = 1.68, p = 0.030), and a history of imprisonment (AOR = 1.91, p = 0.004). Only 18.7% of participants accessed clean needles through outreach programs, highlighting a substantial harm reduction gap.

Conclusion: This study underscores a high burden of HCV among Pakistani IDUs, driven by preventable behaviors and structural barriers to harm reduction. Targeted interventions, including needle exchange programs, prison-based services, and expanded outreach, are urgently needed to curb HCV transmission in this population.

Keywords: Hepatitis C, Injecting Drug Users, Pakistan, Harm Reduction, HCV Transmission, Needle Sharing.

INTRODUCTION

Hepatitis C virus (HCV) infection remains a significant global public health challenge, with an estimated 58 million people living with chronic HCV infection and approximately 1.5 million new infections annually worldwide [1]. In Pakistan, HCV prevalence ranks among the highest in the world, with national estimates ranging between 4.9% and 6.7%, translating to approximately 8–10 million people infected [2,3]. Among the most at-risk populations are injecting drug users (IDUs), who contribute disproportionately to the HCV epidemic due to unsafe injecting practices, needle sharing, and inadequate access to harm reduction services [4]. Globally, it is estimated that up to 52.3% of IDUs are living with HCV, reflecting the high efficiency of parenteral transmission via contaminated injection equipment [5]. In Pakistan, studies have reported HCV prevalence rates as high as 70–94% among IDUs in urban centers such as Lahore, Karachi, and Rawalpindi [6, 7]. The convergence of drug use, poverty, incarceration, and social stigma creates a fertile ground for the rapid transmission of bloodborne infections among this marginalized population [8].

Despite this evidence, national HCV control strategies in Pakistan have largely focused on the general population, with limited integration of targeted interventions for high-risk groups such as IDUs [9]. Additionally, the absence of systematic surveillance, underreporting, and poor healthcare-seeking behavior contribute to the underestimation of disease burden in this group [10]. There is an urgent need to generate context-specific data to understand the patterns, behaviors, and structural vulnerabilities that fuel HCV transmission among IDUs in Pakistan. Such evidence is essential to design effective harm reduction programs, inform policy decisions, and achieve the World Health Organization's goal of eliminating viral hepatitis as a public health threat by 2030 [11]. The lack of comprehensive data on HCV prevalence and associated risk behaviors among this population poses a critical barrier to effective policy formulation, prevention, and treatment efforts. This study seeks to address this gap by conducting a cross-sectional analysis of HCV transmission patterns among injecting drug users in Pakistan.

METHODS

This study employed a cross-sectional design to capture a snapshot of HCV prevalence and its correlates within this high-risk population. The research was conducted over a six-month period (January 2023 to January 2025) across rehabilitation centers and community outreach programs in Abbottabad. The target population consisted of Pakistani nationals aged 20 years or older who reported injecting drug use within the past 24 months. Ethical approval was obtained from the Institutional Review Board (IRB) of the lead institution and supporting organizations. Participation was voluntary, with full assurance of confidentiality and anonymity.

Inclusion Criteria

- Self-reported injecting drug use (at least once in the past 12 months)
- Age ≥ 20 years
- Resident of the study area for ≥ 6 months
- Provided written informed consent to participate

Exclusion Criteria

- Individuals currently undergoing HCV treatment
- Co-infection with HIV or Hepatitis B (to isolate HCV-specific patterns)
- Mentally incapacitated individuals unable to give informed consent
- Sample Size and Sampling Technique

A sample size of 412 participants was estimated based on an assumed HCV prevalence of 70% among IDUs, with a 5% margin of error and 95% confidence interval. A purposive sampling method was employed. Data were collected using a structured interviewer-

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administered questionnaire, developed in English and translated into Urdu. The questionnaire consisted of four sections such as sociodemographic profile: Age, gender, education, marital status, occupation, and housing, drug use behaviors: duration and frequency of injecting drug use, types of drugs injected, needle sharing history, source of syringes, and injecting practices, health and sexual behaviors: History of blood transfusion, tattooing, imprisonment, condom use, and previous HCV testing, and knowledge and awareness of HCV transmission and prevention. All participants were tested for HCV antibodies using WHO prequalified rapid diagnostic test kits (e.g., SD Bioline HCV). Positive results were confirmed via HCV RNA PCR testing, conducted in collaboration with certified diagnostic laboratories. Data were entered into SPSS Version 26.0 for statistical analysis. Descriptive statistics (frequencies, means, and standard deviations) summarized the population characteristics and HCV prevalence. Bivariate analyses were performed to identify associations between HCV positivity and independent variables. Variables with $p < 0.2$ in bivariate analysis were included in a multivariable logistic regression model to determine independent predictors of HCV infection. A p-value < 0.05 was considered statistically significant.

RESULTS

Table 1 represents the sociodemographic characteristics of study population. The sample predominantly consisted of male participants (95.1%), which align with previous findings indicating higher injection drug use prevalence among men in Pakistan. The mean age of 32.8 years suggests a young adult population vulnerable to high-risk behaviors. A significant portion (62.1%) was unemployed, highlighting the link between socioeconomic vulnerability and substance abuse. Low levels of formal education and employment further suggest limited access to health information and harm reduction services.

Table 1: Sociodemographic Characteristics of Participants (n = 412)

Variable	Category	Frequency (n)	Percentage (%)
Age (Mean ± SD)	-	32.8 ± 7.4	-
Gender	Male	392	95.1
	Female	20	4.9
Education Level	No formal education	112	27.2
	Primary	157	38.1
	Secondary & above	143	34.7
Employment Status	Unemployed	256	62.1
	Informal/Day labor	109	26.5
	Employed	47	11.4
Marital Status	Single	193	46.8
	Married	172	41.7
	Divorced/Widowed	47	11.4

A large majority of IDUs (86.4%) reported injecting drugs for more than a year, with 43% injecting for over five years—a factor strongly associated with cumulative HCV exposure. Alarmingly, 60.2% reported needle-sharing within the past month, a critical mode of HCV transmission. Only 18.7% accessed needles through outreach programs, while 44.2% obtained needles from informal sources (peers/sellers), indicating a major gap in harm reduction coverage. Nearly half had a history of imprisonment, an environment well-documented for inadequate infection control and high transmission risk (Table 2).

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Table 2: Injecting and Risk Behaviors of Participants

Variable	Category	Frequency (n)	Percentage (%)
Duration of Injecting Drug Use	<1 year	56	13.6
	1–5 years	179	43.4
	>5 years	177	43.0
Sharing Needles in Last Month	Yes	248	60.2
	No	164	39.8
Source of Needles	Pharmacy	153	37.1
	Peer/Seller	182	44.2
	Outreach Programs	77	18.7
History of Imprisonment	Yes	196	47.6
	No	216	52.4
History of Blood Transfusion	Yes	43	10.4
	No	369	89.6

Bivariate analysis confirmed strong associations between HCV positivity and key risk factors in Table 3. Longer duration of drug use (>5 years) was significantly associated with HCV infection ($p = 0.001$), indicating that prolonged exposure increases infection likelihood. Sharing needles had a strong association with HCV positivity ($p = 0.003$), consistent with the dominant transmission route of the virus. Those sourcing needles from peers or informal sellers had higher infection rates ($p = 0.017$), reflecting the risks of unsterile equipment. A history of imprisonment was also significantly associated ($p = 0.005$), supporting evidence that incarcerated populations face heightened transmission risks due to limited prevention tools.

Table 3: Bivariate Association of Risk Factors with HCV Positivity

Risk Factor	HCV Positive (%)	p-value
Duration of Use > 5 years	81.9%	0.001 **
Shared Needles	76.6%	0.003 **
Peer/Seller as Needle Source	74.2%	0.017 *
History of Imprisonment	78.1%	0.005 **
History of Blood Transfusion	72.1%	0.367

* $p < 0.05$; ** $p < 0.01$

Multivariate logistic regression confirmed these findings in Table 4. Duration of injecting drug use >5 years was the strongest predictor of HCV infection (AOR = 2.71, $p = 0.001$), confirming the role of long-term exposure. Needle sharing increased the odds of infection by over two times (AOR = 2.25, $p = 0.002$), reinforcing it as the central preventable risk factor. Using needles from peers or sellers was also a significant predictor (AOR = 1.68, $p = 0.035$), pointing to unsafe injection practices outside supervised programs. Imprisonment history had an adjusted odds ratio of 1.91 ($p = 0.009$), highlighting the need for targeted prison-based HCV interventions.

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Table 4: Multivariate Logistic Regression for Predictors of HCV Infection

Predictor Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Duration of Drug Use >5 years	2.71	1.59–4.62	0.001**
Shared Needle Use	2.25	1.34–3.77	0.001**
Source: Peer/Seller	1.68	1.04–2.71	0.030*
History of Imprisonment	1.91	1.18–3.09	0.004**

* $p < 0.05$; ** $p < 0.01$

DISCUSSION

This cross-sectional study aimed to assess the prevalence and transmission patterns of Hepatitis C Virus (HCV) among injecting drug users (IDUs) in Pakistan, a group recognized as being at exceptionally high risk for blood-borne infections. The results revealed a high HCV prevalence rate of 69.4%, consistent with prior studies conducted in Pakistan and neighboring South Asian countries, where prevalence among IDUs has ranged from 65% to 80% due to unsafe injection practices and lack of harm reduction services [12, 13]. Needle sharing, reported by 60.2% of participants, was significantly associated with HCV positivity, reinforcing it as the primary mode of transmission in this population [14, 15]. Needle sharing exposes individuals to direct blood-to-blood contact, and its continued prevalence in Pakistan suggests insufficient access to sterile injecting equipment, limited harm reduction education, and structural barriers to behavior change [15]. In line with global findings, duration of injecting drug use >5 years emerged as a strong independent predictor of HCV infection, likely due to cumulative exposure and increased frequency of risky behaviors over time [16, 17]. Another significant finding was the high proportion of individuals obtaining syringes from peers or informal sellers, which was linked with increased HCV risk. This indicates a critical gap in harm reduction outreach and availability of clean injecting supplies. International models show that needle and syringe exchange programs (NSPs) can reduce HCV incidence by 50% or more when properly implemented [18]. Importantly, a history of imprisonment was also associated with HCV infection, underscoring the vulnerability of incarcerated populations. Prisons often lack adequate screening, preventive education, and sterile injecting equipment, making them hotspots for transmission [19]. This finding highlights the need for prison-based harm reduction interventions, including testing, treatment, and education initiatives [20]. Despite the recognition of these transmission pathways, only 18.7% of participants reported obtaining clean syringes from outreach programs, illustrating a vast service gap. This is likely due to stigma, criminalization of drug use, and limited government support for harm reduction initiatives in Pakistan [21, 22]. Expanding these programs is essential to curb HCV spread among IDUs. Sociodemographic vulnerabilities such as unemployment, low education levels, and urban overcrowding further compound the problem, consistent with previous findings that link lower socioeconomic status with higher risk of HCV and other infectious diseases [23, 24]. This study has several limitations. Its cross-sectional design restricts causal inference, and reliance on self-reported data may introduce recall or social desirability bias. The non-probability sampling method may limit generalizability, especially to rural or underrepresented IDU populations. Female participants were notably underrepresented, constraining gender-based analysis. Additionally, key variables such as co-infections, type and frequency of drug use, and access to harm reduction services were not captured, which may influence transmission dynamics.

CONCLUSION

The study reveals a critically high burden of HCV among IDUs in Pakistan, driven by preventable behaviors such as needle sharing, prolonged injection practices, and systemic gaps in harm reduction services. Effective policy responses must include expansion of needle exchange programs, prison-based health services, and integration of HCV screening and treatment into community outreach. These findings emphasize the urgent need for comprehensive, stigma-free, and evidence-based public health strategies to address the growing HCV epidemic in this vulnerable population.

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AUTHOR CONTRIBUTION

Author	Contribution
Saima Bukhari	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Rabia Zulfiqar*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published

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