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To Investigate The Prevalence Of The Hepatitis C Virus In Specific Targeted Groups, Such As Patients From Government And Private Hospitals, And High-Risk Groups Of The Healthy Population Of The Peshawar Division

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ABSTRACT
To estimate the prevalence of hepatitis C in various public and private hospitals of Peshawar Division among different groups, a total of 1150 individuals were tested to assess the hospital-based prevalence of HCV, and out of these, 256 individuals produced positive results for Hepatitis-C virus infection. The current study revealed that the highest prevalence was estimated in Dialysis patients (48.21%), followed by General Aged Patients > 14 years (20.99%). It was further observed that the least affected group was the Early Aged Patients ≤ 14 years (5.84%). Furthermore, the results of the estimated prevalence of Hepatitis C virus infection in high-risk groups from the population in and around Peshawar revealed that the highest prevalence was estimated in patients having viral co-infections (42.85%) followed by drug abuses (20.81%), transport drivers (17.85%), prison inmates (13.79%), proximate and households contact cases (9.58%), beauty salons and barbers (8.57%) and blood transfusions (7.96%). It was also found that the least affected groups were health care provider staff and other health care workers (7.46%) and teachers' community (6.15%) while doctors/ dental surgeons were least affected (1.61%) among the high-risk groups.

INTRODUCTION
Hepatitis C virus (HCV) infection is a significant global health problem, with an estimated 58 million people being chronically infected and about 1.5 million new infections happening every year, as estimated by the World Health Organization (WHO). It is a blood-borne virus that predominantly infects the liver and is spread through contact with infected blood. Chronic infection with HCV over time is known to result in serious complications of the liver, which include cirrhosis, liver failure, and hepatocellular carcinoma. Because of its usually asymptomatic nature in the early course, most remain undiagnosed until extensive liver injury has taken place. This highlights the necessity of early diagnosis and focused screening programs, especially in high-risk transmission and poor access areas to healthcare [1-4].

In Pakistan, HCV is a very dire situation. The nation has a high rate of HCV in the world and estimates of national prevalence are as high as 4.5% to 8%, varying by region and population analyzed. Among the contributing factors to such a high prevalence are unsafe medical procedures, poor sterilization of medical devices, unscreened blood use for transfusion, and poor public health education. Also, poverty, lack of literacy, and overstrained healthcare systems compound the transmission of the virus [3, 5]. vThe Khyber Pakhtunkhwa province, and indeed the Peshawar Division, is an area of significant epidemiological interest with regard to its population diversity and intricate healthcare dynamics. Peshawar, the provincial capital and focal center for medical services, receives a tremendous number of patients not just from the nearby districts but also from contiguous tribal regions and Afghanistan. This surge puts considerable pressure on both public and private healthcare centers, which can lead to gaps in infection control measures. In addition, having a large IDPs, refugee, and low-income population lends itself to a special constellation of social and public health issues that can contribute to HCV transmission [6-8]. Though there have been various studies on the national prevalence of hepatitis C, the issue of region-specific data and particularly within sub-populations in Peshawar remains a crucial gap. Knowing the prevalence of HCV among focused populations such as patients undergoing treatment in public versus private hospitals, and people who are from high-risk segments of the apparently healthy population, is necessary for establishing localized control plans for prevention, diagnosis, and treatment. These may include intravenous drug users, those who are on repeated blood transfusions (e.g.,

thalassemia patients), medical and dental personnel, barbers, and those undergoing uncontrolled medical or dental procedures. People who indulge in unsafe sex or who have histories of incarceration are also at increased risk [9-11].

This research aims to bridge these gaps by exploring the prevalence of hepatitis C in three particular target groups of the Peshawar Division: (1) patients undergoing treatment in government hospitals, (2) private healthcare patients, and (3) high-risk individuals from the general healthy public. Through comparing these groups' prevalence rates, this research hopes to identify patterns of transmission and risk which could be easily missed in large-scale national surveys [12].

In addition, the difference between public and private healthcare facilities is also significant in Pakistan, where differences in resource allocation, staff, patient workload, and infection control practices could result in variances of transmission risk. Government hospitals tend to be overcrowded, underfunded, and short-staffed with trained personnel, whereas private facilities—although usually better resourced—tend to serve a more limited socioeconomic bracket and might not always have stringent infection control practices in place because they are not subjected to as much monitoring. Comparing both institutions gives a more complete picture of the healthcare landscape of Peshawar and how it is contributing to HCV spread [4, 13, 14]. The results of this research will play an important role in informing regional health policy, especially concerning the structure and delivery of focused screening programs and public awareness campaigns. The identification of individual groups with high HCV prevalence enables resource optimization and the establishment of targeted public health interventions. In addition, the findings can be used as a basis for future studies and part of the overall national and global struggle against hepatitis C as a public health issue by 2030, according to WHO's Global Health Sector Strategy[15-17].

Overall, this study seeks to bridge an important knowledge gap by presenting in-depth, group-specific information regarding the prevalence of HCV in Peshawar Division. Through the targeting of patients from both public and private health centers and from high-risk groups of the general population, this study shall lend important strength to current disease surveillance, prevention, and control initiatives.

METHODS

1 Hospital-Based Prevalence of HCV in Peshawar

1.1 Sampling Procedures

The study focused on patients attending Outpatient Departments (OPDs) in private and government health institutions in the Peshawar Division. The sampling frame comprised all patients in these hospitals needing medical attention. The study population to estimate HCV infection and its epidemiology through the hospital-based Prevalence approach consisted of **1150** individuals. For Calculating Prevalence, follow: (infected/sampled X 100). Identified shows to explain a detailed understanding of the Hepatitis C prevalence in the region, which can guide the development of future public health policies [18].

The inclusion of hepatitis C virus (HCV) hospital prevalence estimation in the Peshawar division was based on outpatients attending various government and private hospitals. Government hospitals were Hayatabad Medical Complex (HMC), Khyber Teaching Hospital (KTH), and Lady Reading Hospital (LRH) in Peshawar. Moreover, three private hospitals, i.e., Rehman Medical Institute, North West General Hospital, and Peshawar General Hospital, have a representative sample. Based on the OPD visits, patients were divided into four groups: Early Aged Patients (≤ 14 years), General Aged Patients (> 14 years), Dialysis Patients, and Dentistry Patients. **Table 1** and **Figure 1** explain how sample sizes are distributed among patients in Peshawar's government hospitals.

Table 1: Sample Size Distribution to Patient Groups from Government and Private Hospitals of Peshawar

Hospital-Based High-Risk Patient Groups Attending Government and Private Hospitals in Peshawar			
Sr. No.			**Sample Size**
1	**Hospital-Based Prevalence**	Early Aged Patients ≤ 14 years	171
2		General Aged Patients > 14 years	743
3		Dialysis patients	168
4		Dentistry	68
Total			**1150**

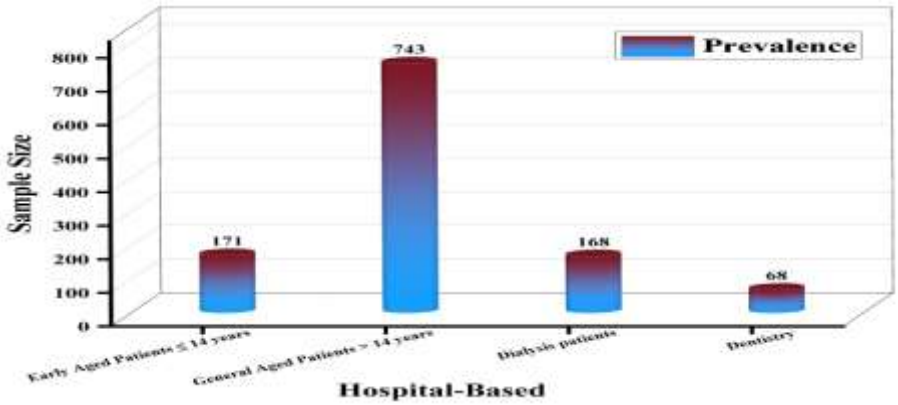

Figure 3.1: Sample Size Distribution to Patient Groups from Government and Private Hospitals of Peshawar

1.2 Sampling Technique

As detailed in **Table 2 and Figure 2**, four government and two private hospitals were included in each category, approximately equally to ensure the sample group size targets were met; however, some adjustments had to be made to the Sampling Procedures.

Hepatitis C Virus (HCV) prevalence was assessed using a simple random sampling technique to select patients from the Outpatient Departments of various government and private hospitals in Peshawar. A pre-tested questionnaire was completed to explore further study of demographic and risk factors contributing to the transmission of HCV infection. Blood samples were gathered daily from a single hospital throughout the study.

The samples were analyzed for anti-HCV antibodies using ELISA. Confirmed HCV cases, identified through laboratory testing, were provided with treatment either upon hospital admission or, if not admitted, under the guidance of a physician at home. The study used patients at risk of HCV infection as the denominator population, with the numerator consisting of confirmed HCV cases. Additionally, anti-HCV positive serum samples were stored for RT-PCR for further studies to measure viral load and investigate HCV genotypes. These positive samples were further processed for Complete Blood Count (CBC) and Liver Function Tests to study the effects of different HCV genotypes. HCV patients undergoing therapy were included in further studies.

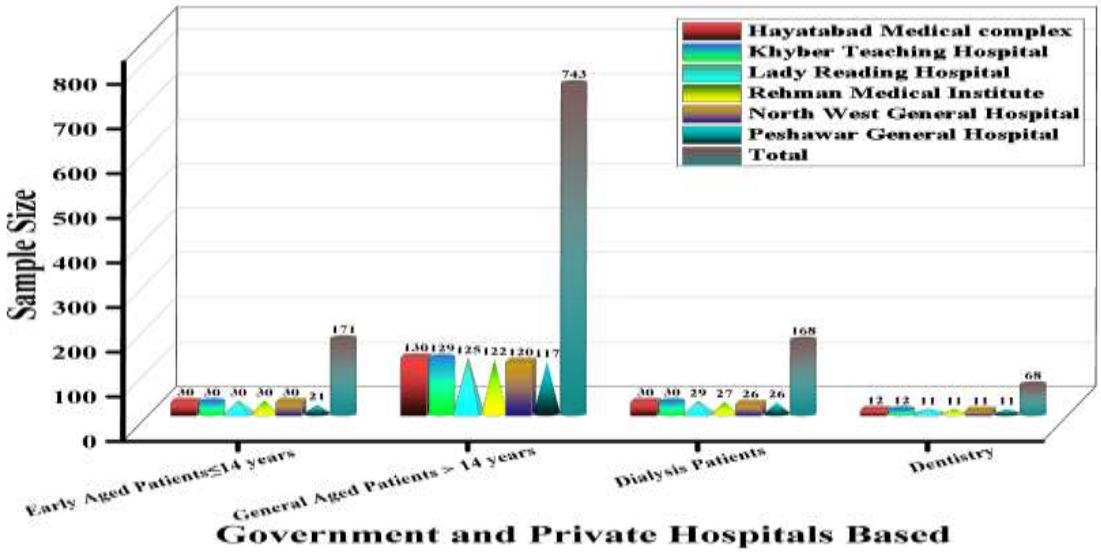

Figure 2: Distribution of Sample Size Across Government and Private Hospitals in Peshawar

List of Government and Private Hospitals								
Sr No	**Groups of Patients**	**Hayatabad Medical complex**	**Khyber Teaching Hospital**	**Lady Reading Hospital**	**Rehman Medical Institute**	**North West General Hospital**	**Peshawar General Hospital**	**Total**
1	Early Age Patients≤14 years	30	30	30	30	30	21	171
2	General Aged Patients > 14 years	130	129	125	122	120	117	743
3	Dialysis Patients	30	30	29	27	26	26	168
4	Dentistry	12	12	11	11	11	11	68
Total		202	201	195	190	187	175	1150

Table 2: Sample Size Distribution to Patient Groups from Government and Private Hospitals of Peshawar

2. The Prevalence of HCV High-risk Groups among the Healthy Population of Peshawar Division

The purpose of this study is to determine the frequency of infection with the Hepatitis C Virus (HCV) among those who are at higher risk in the Peshawar Division. It particularly stresses individuals like blood transfusion and drug abuse patients as well as professionals such as doctors, dental surgeons, and other medical personnel, household members of HCV patients, teachers, prisoners, vehicle operators, employees of beauty and barber shops, and viral co-infection individuals as shown in **Table 3** and **Figure 3**. This descriptive epidemiological study targeted the Khyber Pakhtunkhwa population with a sample size of **826** from the high-risk groups presented in Table 3.3. The ten groups of this study questionnaire were completed from these groups, in which occupational stratification was considered. Risk factors were explained and tested through a questionnaire (to investigate the risk factors related to HCV infection in demographics and risk factors). Blood samples were also taken from the study's participants. Among the groups, which included participants who were working in beauty salons

and barbershops or were drug users and transfusion recipients, purposive sampling was used since they faced issues with accessibility and participant refusal. Meanwhile, random samplings were done on prisoners, health workers, dentists, and doctors.

Figure 3 Allocation of a sample size to a higher-risk group from healthy individuals in the Vicinity of Peshawar

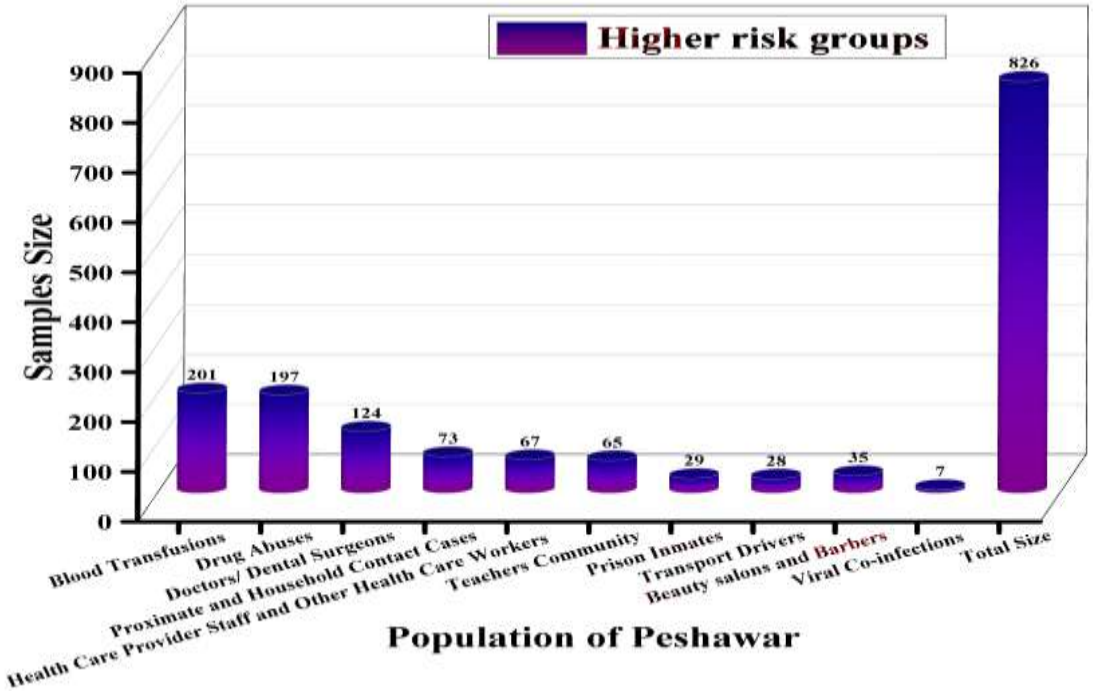

Table 3: Allocation of a sample size to a higher-risk group from healthy individuals in the Vicinity of Peshawar

S. No.		Groups at increased risk from the general population of Peshawar	Samples
1	Population of Peshawar	Blood Transfusions	201
2		Drug Abuses	197
3		Doctors/ Dental Surgeons	124
4		Proximate and Household Contact Cases	73
5		Health Care Provider Staff and Other Health Care Workers	67
6		Teachers Community	65
7		Prison Inmates	29
8		Transport Drivers	28
9		Beauty salons and Barbers	35
10		Viral Co-infections	7
	Total Size		**826**

Additionally, the serum samples positive for anti-HCV antibodies were stored for RT-PCR examination to determine the viral load. For the testing of the conceivable influence of the different Hepatitis-C virus genotypes, the positive samples were subjected to complete blood Counts and Liver Function Tests, as well as employed for further studies.

RESULTS

1.1 Hospital-Based Prevalence of HCV in Peshawar

The hospital-based prevalence of Hepatitis C (HCV) in different government and private hospitals within the Peshawar division is summarized in **Table 4**. From the entire population of note **1, 150** valid tests were conducted on **256** subjects, with an aggregate percentage of results being 22.26%. Most of them were dialysis patients, who turned out to be **48.21** percent; next in line were general patients aged above 14 years, **20.99** percent, and lastly, dentistry patients, with a ratio of **13.23** percent. At **5.84** percent, patients less than 14 years of age demonstrated the lowest ratio. The prevalence in patients ≤ 14 years was highest at Khyber Teaching Hospital, Lady Reading Hospital at 10%, and North West General Hospital at 6.67%. 3.3% co-operativity was determined for Hayatabad Medical Complex and Rehman Medical Institute, while Peshawar General Hospital had no diagnosis. The remaining aspects were for general patients aged more than fourteen years of age and for them, Lady Reading Hospital had the most significant possibility of being HCV positive at 25.60%, trailed by Hayatabad Medical Complex

at 25.38%, North West General Hospital at 22.50%, Rehman Medical Institute 20.49% Khyber Teaching Hospital, 18.60 percent, and Peshawar General Hospital 12.82 as shown in **Figure 4 and Figure 5**. The prevalence of dialysis patients was highest at Lady Reading Hospital (65.52%), followed by North West General Hospital (63.64%), Khyber Teaching Hospital (60%), Rehman Medical Institute (59.26%), Hayatabad Medical Complex (43.33%), and Peshawar General Hospital (30.77%). In a group of dentistry, the highest prevalence was estimated in Peshawar General Hospital (27.27%), followed by Lady Reading Hospital (18.18%), Hayatabad Medical Complex (16.67%), Khyber Teaching Hospital (8.33%), North West General Hospital (3.85%) and Rehman Medical Institute had zero positive cases at the same time.

Table 4: Hospital-Based Prevalence of HCV in Peshawar Government and Private Hospitals

Groups of Patients	Hayatabad Medical Complex			Khyber Teaching Hospital			Lady Reading Hospital			Rehman Medical Institute			North West General Hospital			Peshawar General Hospital			Total		
	S	P	%	S	P	%	S	P	%	S	P	%	S	P	%	S	P	%	S	P	%
Early Aged Patients ≤ 14 years	30	1	3.33	30	3	10	30	3	10	30	1	3.33	30	2	6.67	21	0	0	171	10	5.84
General Patients Aged > 14 years	130	33	25.38	129	24	18.6	125	32	25.60	122	25	20.49	120	27	22.50	117	15	12.82	743	156	20.99
Dialysis patients	30	13	43.33	30	18	60	29	19	65.52	27	16	59.26	26	7	63.64	26	8	30.77	168	81	48.21
Dentistry	12	2	16.67	12	1	8.33	11	2	18.18	11	0	0	11	1	3.85	11	3	27.27	68	9	13.23
Total	**202**	49	24.26	**201**	46	22.88	**195**	56	28.72	**190**	42	22.11	**187**	37	19.79	**175**	26	14.86	**1150**	256	22.26

T= Samples, P=Positive, %=Percentage

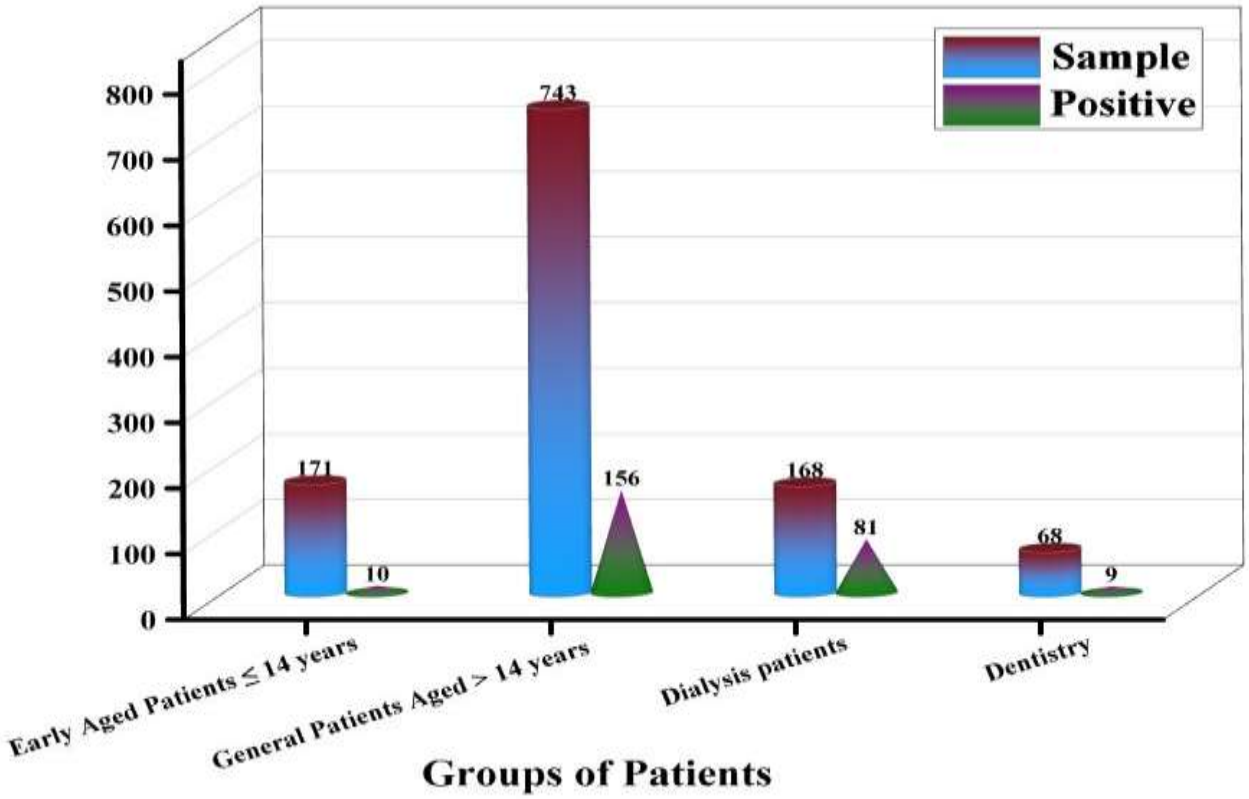

Figure 4: Percentage Graph of Hospital-Based Prevalence of HCV in Peshawar

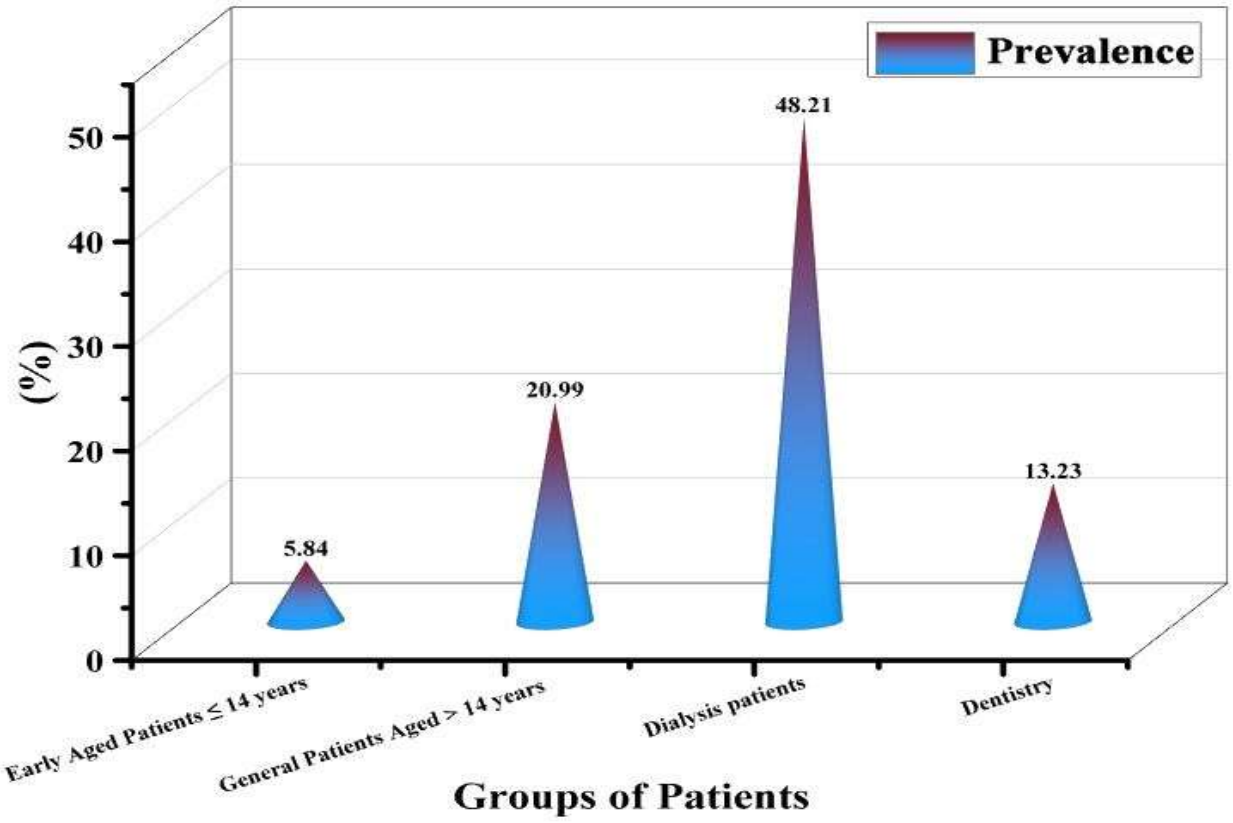

Figure 5: Percentage Graph of Hospital-Based Prevalence of HCV in Peshawar

1.2. The Prevalence of HCV high-risk groups among the healthy population of Peshawar Division

Table 5 presents the findings of the predicted prevalence of HCV infection in high-risk groups among populations living around or within Peshawar. The study discovered that those with viral co-infections had the highest prevalence (42.85%), followed by injecting drug users (20.81%), transport drivers (17.85%), prison inmates (13.79%), close and household contacts cases (9.58%) and beauty salons and barbers (8.57%). Furthermore, healthcare provider staff and other healthcare workers were affected less by the Hepatitis C Virus, i.e., 7.46 %, while the teaching community was only slightly affected, at 6.15 %. Among the high-risk groups, doctors and dental surgeons had the lowest number of victims recorded at approximately 1.32%. **Figures 6 and 7 show** the lowest number of victims.

Table 5: The Prevalence of Hepatitis C High-risk Groups among the Healthy Population of Peshawar Division

Sr.No.	Groups	Samples	Positive	Percentage (%)
1	**Blood Transfusions**	201	16	7.96
2	**Drug Abuses**	197	41	20.81
3	**Doctors/ Dental Surgeons**	124	2	1.61
4	**Proximate and Household Contact Cases**	73	7	9.58
5	**Health Care Provider Staff and Other Health Care Workers**	67	5	7.46
6	**Teachers Community**	65	4	6.15
7	**Prison Inmates**	29	4	13.79
8	**Transport Drivers**	28	5	17.85
9	**Beauty salons and Barbers**	35	3	8.57
10	**Viral Co-infections**	7	3	42.85
Total		**826**	**90**	**10.89**

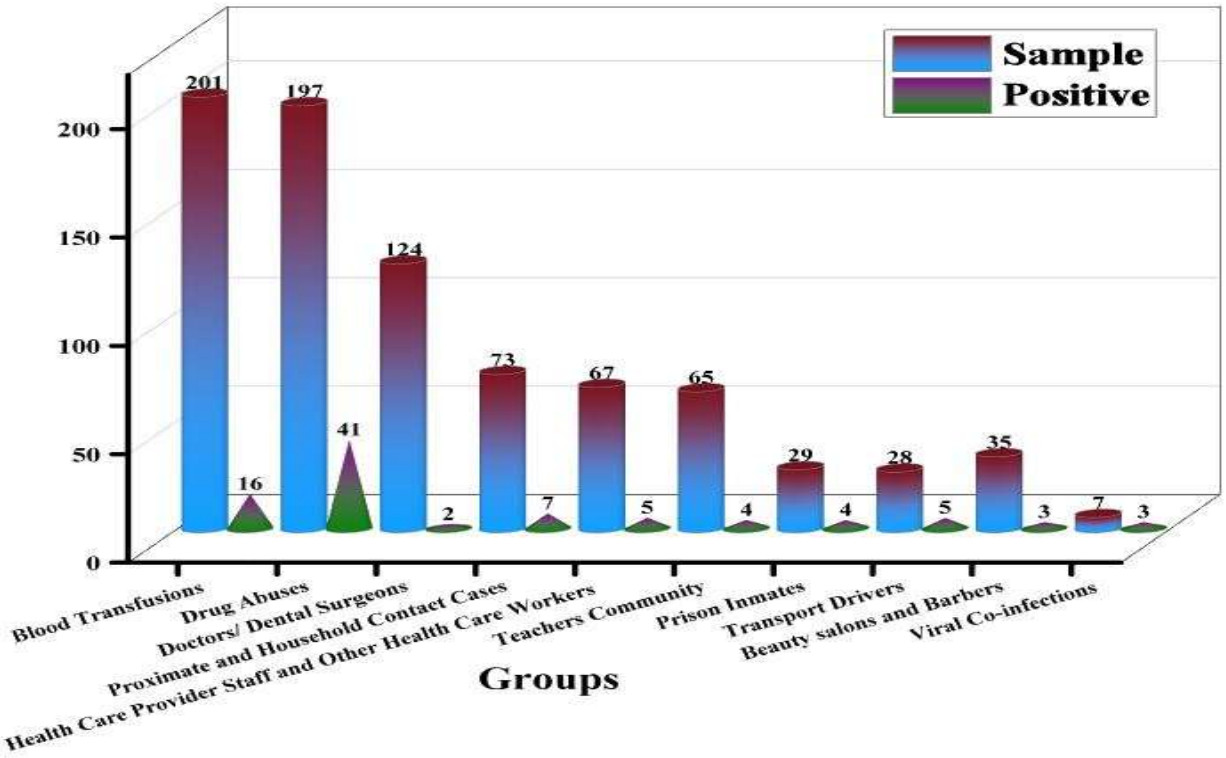

Figure 6: Estimation of HCV prevalence in a healthy population from Peshawar

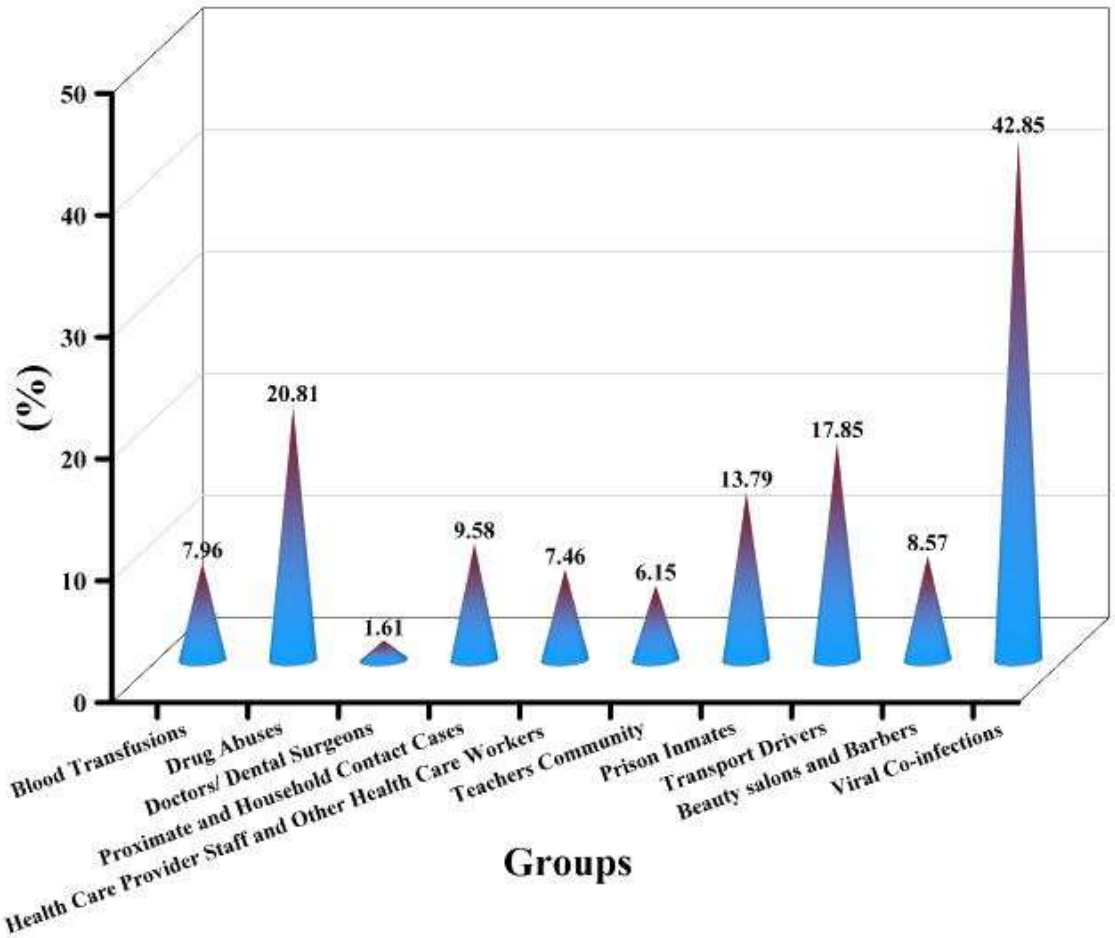

Figure 7: Percentage Assessment of Hepatitis C Virus Prevalence in High-Risk Groups from healthy populations in Peshawar and Surrounding areas

606 To investigate the prevalence of the Hepatitis C virus in specific targeted groups, such as patients from government and private hospitals, and high-risk groups of the healthy population of the Peshawar Division

DISCUSSION

The study indicated that this rate is higher in thalassemia patients who have received blood products. The prevalence of HCV is found to be 10-20% in children undergoing hemodialysis, facing malignancy, having cardiac surgery, or related to ESMO [19]. A study in the UK to assess the prevalence of HCV infection among children determined that 2.9% of their population had a maternally acquired infection. Their findings are commensurable with our study because the infecting mothers did not practice injection therapy, nor did the children undergo any surgical procedures [20]. In the USA, a 0.4% prevalence of HCV infection was found among children. Their report suggests a drop in the incidence of newly diagnosed cases in adults. However, there was a rise in new incidents of infection in children, which indicates that these are most likely perinatally infected. The rate of prevalence of HCV reported in our study is higher than that of [5], but they may have an identical source of transmission of HCV in children [5].

The prevalence of HCV in general patients, with no placement criteria, contradicts the present study's findings. This contrast in percentage estimation can be attributed to a lack of education, health awareness, and financial limitations preventing access to adequate healthcare programs. Additionally, the reuse of syringes, unsterilized surgical procedures, and a lack of consultation with registered practitioners using proper medical equipment could contribute to the higher prevalence observed in this study [21].

An international monitoring study on dialysis was conducted in 2002 to ascertain the prevalence of HCV. They found out that the general prevalence of the Hepatitis C Virus among people on hemodialysis is 7.8% [22]. We randomly chose 168 patients undergoing dialysis for this analysis. From this cohort, we could determine that the HCV prevalence was **48.21%**. The prevalence of HCV infection among patients undergoing dialysis is 13%, which aligns with our findings to some extent [23].

The study in Peshawar was conducted to analyze the prevalence of HCV among dental patients at private and government hospitals. The results of the study showed that patients seeking dental treatment in government hospitals exhibited a greater prevalence of HCV compared to those treated at private institutions[24]. Several elements explain this difference, including insufficient sterilization facilities, higher patient turnover, and less compliance with infection control standards at government health facilities. Private clinics, by contrast, demonstrated lower HCV patient disease prevalence and greater compliance with sterilization procedures. This is consistent with findings indicating that infection control measures during dental manipulations can lower HCV infection prevalence [25]. Out of 68, **8** were tested HCV-positive. It was discovered that patients who underwent these procedures in public hospitals were prone to getting such higher risks of HCV due to a lack of sterilization of instruments as well as equipment cross-contamination [26].

Contemporary society has implemented some protocols that decrease the likelihood of having an HCV infection, such as screening blood and blood components, performing laboratory examinations for liver disorders, interviewing blood donors on the risk of acquiring HIV, conducting anti-HCV tests, and HCV RNA tests [27]. Healthy blood donors who participate in this research are believed to play a significant role in the spread of HCV. During our study, 16 **(7.96%)** of blood donors among the **201** who claimed to be in good health were found positive for the anti-HCV ELISA. In our study, we tried to compare with the studies done by Ryas et al. (2001), Rehman et al. (2002), Asif et al. (2004), and Farooqi et al. (2007**)** reported hepatitis C infection rates of 4.7%, 4.1%, 5.14%, and 3.21%, respectively. The variations in these prevalence rates could be attributed to the different diagnostic methods employed. The studies above utilized the Immuno-Chromatographic Test (ICT), while this study implemented third-generation ELISA [28].

The documented research in Japan showed that the prevalence rate of HCV infection among physicians, such as orthodontists, general physicians, and oral surgeons, is 1 to 2 percent. Anti-HCV antibodies were reported to have been present in 1.7% of physicians, radiologists, and physical therapists; the proportion of HCV infection rates among nurses and acupuncturists was 1-3% and 2.2%, respectively. Overall, the combined prevalence of HCV infection among medical staff was 4.3%, with rates of 2.2% specifically for nurses and 5.5% for acupuncturists, among acupuncture specialists [29].

The prevalence of HCV among injection drug users (IDUs) is reported to be greater than in other drug abuse groups[30]. In Baltimore, USA, young IDUs were studied with a reported prevalence of 37.6%, which aligns exactly with the current study's findings of the prevalence, which was **20.81%**. Other studies show a lower prevalence rate than this study. Such differences might stem from the temporal and spatial differences of the study or the lifestyles and cultural differences between Americans and Pakistanis [28].

In today's case studies, the drop-in rate is attributed to much better access to information regarding the wearing impact of drugs, both electronically and via newspapers. Not only this, but the rise of education in Pakistan has significantly impacted the use of drugs among people. These factors combined could explain the depletion rates. Even more interesting is that around 17% of people have adopted much safer ways to dispose of syringes and cotton swabs, which could argue the drop rates of HCV. The contribution of NGOs towards lowering HCV prevalence among IDUs through rehabilitation is significant. Nevertheless, the difference in methods and techniques of sampling may also account for the discrepancies observed in prevalence, even in the same region and populations [31].

According to our study, the prevalence of hepatitis C virus (HCV) among household contacts was **9.58%**. Eskandar et al. estimated the prevalence rate further down to 1.33%, utilizing a study of the household contacts of index cases positive for HCV. This is far lower than the previous studies showed, which ranged between 16% and 20% (Pasha, 1999; Akhtar, 2002). Our results vary because of certain limitations, particularly discrepancies in sample size, duration, and intensity of potential interaction with adult patients, low HCV infectivity in blood, and genetics.[28].

Nurses work with patients daily, and the risk of them contracting infections is high. In our involuntary infection study, we found a prevalence of **7.46%** for HCV, a notable figure compared to Gazer et al. (2002) and Zuckerman et al. (1994) reported

1.2%, and Sanchez et al. (2006) noted 0.23%. Mihaly et al. (1996) and Jindal et al. (2006) both found figures around 4%. In the USA, the reported rate was 1.4%, while in Turkey, it was 0.17% (Gerberding, 1994; Pasha et al., 1999) **[32]**.

A recent inquiry by the group sought to determine the prevalence of HCV among various occupational groups in the Peshawar Division, which included a sample of teachers from private and government primary and secondary schools. From the research, it was evident that the occurrence of HCV among teachers was considerably high, especially in government schools, with a cumulative average of infection estimated at 6.5 percent. This finding draws attention to the fact that, in as much as teaching is an economically stable profession with constant recurrent healthcare services that the HCV teacher population is exposed to, there exists an out-of-control risk factors continuum such as poor medical practices, blood transfusion, needle stick injury, and other unsafe conditions from the environment and within the community, that makes the teacher population at risk for HCV [33]. In our study, 65 samples were taken from government and private educational institutions, of which 4 **(6.15%)** tested HCV positive.

The overall HCV prevalence rate in prison inmates was found to be **13.79%,** which is on the higher side when compared with Zulfikar (2010)**,** who reported 12.8%. Prison inmates have a very high prevalence of HCV. In the United States County jail system, the prevalence of HCV infection in adults was higher, while only a few of the juveniles imprisoned carried the infection [34]. There is a very high HCV prevalence of 11% to 40% among the developed countries' prison inmates. However, variations have been reported (5–42%) amongst new entrants in prison [35].

A study on long-route truck drivers showed that HCV prevalence was around 43%. Such results differ from our findings and are notably higher than ours, and this difference may be because our study subjects have no history of extramarital relationships. Another study by Gibney on truck drivers reported that HCV prevalence is around 1%. In our study, out of the 28 truck drivers surveyed, **17.85%** tested positive for HCV, which is lower than Singh's results but higher than Gibney's**.** The principal reason for the low levels of HCV was that most truck drivers in their sample had never received injections. In contrast, the sample for our study had most of the truck drivers receiving injections due to drug dependency [36].

Previous work found that the HCV infection rate for barbers and beauticians was **8.57%,** which is related to their low literacy level. These results support the findings of Khan et al. (2004), which were noted to be 6.95%. An investigation was conducted, which revealed a comparatively higher infected HCV population among barbers and clients in rural areas compared to urban regions [37]. Earlier studies on the general population have suggested higher figures in rural areas due to schistosomiasis having been endemic there and the use of glass syringes for parenteral therapy several decades ago. Furthermore, these studies recorded the HCV seroprevalence rate to be much higher in the villages for different reasons. HCV prevalence among barbers and beauticians' users, and this increase in prevalence reported, can be understood in the fact that he carried out the study [38].

Our study documented the greater prevalence of HCV compared to the Japanese study, while their seroprevalence is at par with the reported prevalence of HCV among HIV/AIDS-infected individuals in other regions of the world. A decrease in new cases of infection with HIV among IDUs has been reported in Brazil and many different areas of the world [39].

The current research presents an in-depth hospital-based evaluation of Hepatitis C Virus (HCV) prevalence in various patient populations within six large hospitals in Peshawar, both government and private sector healthcare facilities. Overall, HCV prevalence among the 1150 patients screened was **22.26%**, highlighting a heavy infection burden in this area. The prevalence was highly variable by patient population and healthcare facility.

Among the various categories of patients, dialysis patients had the most prevalent rate of HCV at **48.21%**, with unusually high rates being recorded at Khyber Teaching Hospital (60%) and Lady Reading Hospital (65.52%). This conforms with international trends, whereby hemodialysis patients are seen to be at greater risk of HCV owing to factors like repeated exposure to blood, reuse of medical equipment, and longer healthcare contacts. This highlights the pressing demand for improved infection control measures, regular screening for HCV, and strict sterilization protocols in dialysis departments.

The overall patient population over 14 years had the second-highest prevalence of **20.99%**, indicating a significant amount of endemicity among adults. The range across hospitals, from 12.82% at Peshawar General Hospital to 25.60% at Lady Reading Hospital, could be due to differences in patient demographics, awareness level, socioeconomic status, or screening. These rates are in accord with existing research studies in Pakistan reporting a high prevalence of HCV among the general population due to unsafe medical procedures, reuse of unsterilized equipment, and lack of public awareness.

Conversely, patients who were early-aged (≤14 years) had a significantly lower incidence of **5.84%**, indicating a lower but still significant rate of transmission in this group. Although this might indicate lower cumulative risk factor exposure, the detection of HCV in children might indicate vertical transmission or early iatrogenic exposure. Interestingly, Khyber Teaching Hospital and Lady Reading Hospital each observed a 10% prevalence among this group, and this points toward targeted preventive interventions, maternal screening, and safe pediatric services.

The group of dentists reported an HCV prevalence of **13.23%**, and the highest prevalence was observed among Peshawar General Hospital (27.27%) and Lady Reading Hospital (18.18%). While this group included a smaller number of subjects, the results are important and imply the existence of possible shortcomings in sterilization and infection control measures during dental procedures. This result is in line with available literature that reports dental clinics as potential high-risk settings for the transmission of HCV if stringent sterilization criteria are not implemented.

At a hospital level, Lady Reading Hospital has the highest prevalence at 28.72%, followed by Hayatabad Medical Complex (24.26%), while Peshawar General Hospital has the lowest, at 14.86%. The gap between public and private facilities was not as high as anticipated, which means HCV control strategies should be applied uniformly to all sectors of healthcare based on ownership or funding mechanism.

This research explored the epidemiology of Hepatitis C Virus (HCV) in certain high-risk segments of the otherwise healthy populace of Peshawar Division. Overall prevalence was determined to be **10.89%,** a number significantly greater than

estimated general population figures seen in much of Pakistan and elsewhere in the world, highlighting the unseen but perhaps underestimated HCV burden among high-risk but otherwise healthy populations.

Among the groups studied, drug abusers reported the highest prevalence of HCV at **20.81%**, which is an indication of the established link between intravenous drug use and bloodborne pathogens like HCV. The result is consistent with national and international data that routinely pinpoint drug users as a key transmission vector through sharing needles and risky injection practices. Targeted harm reduction interventions, such as needle exchange programs and treatment access, are fundamental in managing this risk group.

Transport drivers also had a high prevalence of **17.85%**, which may be related to long-term mobility, poor access to healthcare, and unsafe practices like unprotected sex or unsafe medical procedures while traveling. Likewise, prison inmates had a prevalence of **13.79%**, indicative of intra-institutional transmission dynamics, perhaps fueled by crowding, absence of medical supervision, and substance use. These populations need to be targeted for intervention both within institutions and through outreach.

Proximate and household contact cases—presumably those with intimate contact with HCV-positive patients—had a prevalence of **9.58%**, suggesting that non-sexual, intrafamilial transmission can be an underestimated mode of spread, particularly where there are shared razors, toothbrushes, or minor cuts. This highlights the importance of heightened awareness and precautionary education among infected individuals' households.

In particular, recipients of blood transfusion had a prevalence of **7.96%**, which, although less than some other categories, is still noteworthy. It indicates persistent gaps in blood screening activities despite the national policies requiring safe transfusions. These findings confirm the importance of strict enforcement of blood safety measures.

Beauty salon and barber patrons **(8.57%)** and healthcare workers **(7.46%)** also had non-trivial rates of HCV positivity. These data imply that inadequate instrument sterilization and breaks in infection control practices can lead to HCV transmission in the community and clinical environments. Continuous training and licensing for salon workers and improved occupational health protocols for medical personnel are imperative.

Notably, co-infected persons (n=7) had the highest group-specific prevalence at **42.85%**, presumably being persons already diagnosed with other bloodborne viruses (e.g., HIV or HBV). Although on a limited sample, this finding supports the importance of integrated screening methods for co-infections, especially among immunocompromised individuals.

By way of contrast, the lowest rate was amongst doctors and dental surgeons **(1.61%)** and the educational community **(6.15%)**. The lower rates amongst medical staff can be explained by improved awareness, availability of protective strategies, and improved clinical safety. But even these percentages are so small as to show that no group is completely safe from exposure, and continuous vigil is necessary.

These results identify important gaps in infection control and prevention, patient screening, and health practices that enable HCV transmission. The evidence requires a multi-pronged response, ranging from public health education, regular screening, particularly among high-risk populations, staff training, and policy-level intervention to ensure strict adherence to infection control practices.

CONCLUSION

The research offers a critical overview of the burden of Hepatitis C virus (HCV) in intended groups within the Peshawar Division, and it reveals important inequalities within both hospital-based patients and high-risk parts of the general population. Among hospitalized patients, the highest rate of infection was found among dialysis patients, and this shows the need for enhanced infection control practices among dialysis units. On the contrary, the lowest rate of prevalence was reported from early-aged patients, indicating lower exposure or susceptibility in such a group. Among high-risk groups of populations, drug users and those with viral co-infections were most affected, whereas health care workers—especially physicians and dental surgeons—had the lowest rates of infection, probably due to increased awareness and prevention. These observations highlight the imperative requirement for specific public health interventions, increased screening, and education campaigns, in particular among vulnerable and high-risk groups, to manage HCV spread effectively in the region.

Limitation of the Study

Although this study has several limitations, they also provide useful guidance for future studies. The targeted sample of hospital inpatients and enumerated high-risk groups, even if only partially representative of the general population, permitted a close look at the most vulnerable groups. The cross-sectional design of the study provided a clear picture of HCV prevalence at a single point in time, paving the way for future longitudinal studies. Even though comprehensive demographic information were not provided, there is potential for more nuanced, specialized analyses in future follow-up studies. The identification of less-represented or less-affected groups also provides areas for preventive awareness and outreach to be addressed proactively.

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