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EPIDEMIOLOGICAL ANALYSIS OF MOST PREVALENT INFECTIOUS DISEASES AMONG HOSPITALIZED PATIENTS IN KHYBER PAKHTUNKHWA, PAKISTAN

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Abstract

Background: Infectious diseases remain a major cause of morbidity and mortality worldwide. Understanding their prevalence and associated risk factors is critical for effective public health interventions. This study aimed to investigate the most prevalent infectious diseases among hospitalized patients in Khyber Pakhtunkhwa (KPK), Pakistan. Methods: A total of 740 patients were enrolled between May 2025 and March 2026 from four clinical laboratories across KPK. Samples were analyzed using immune chromatographic methods. The prevalence and frequency of major infectious agents were determined, and the study was conducted following approval from the institutional ethical committee. The top five infectious diseases were identified based on their frequency among the sampled population. Results: Among the tested patients, 285 (38.51%) were infected with Hepatitis B virus, 155 (20.94%) with Salmonella typhi (Typhoid fever), 120 (16.21%) with Hepatitis C virus, and 109 (12.26%) with Helicobacter pylori. The study population included 443 males (52.73%) and 397 females (47.26%). The majority of cases were observed in patients aged 21–30 years and among married individuals (52.19%). Conclusion: Hepatitis B virus, Salmonella typhi, Hepatitis C virus, and Helicobacter pylori were the most prevalent infectious agents among hospitalized patients in KPK. These findings highlight the need for targeted prevention and management strategies, especially for young adults and married populations in the region.

Introduction

Microbiology is concerned with scientifically understanding bacteria, fungi, viruses and parasites. A great number of microscopic living things are found near us and they can infect humans and cause different diseases. The reason for raised morbidity and mortality in people across the world is largely due to infectious diseases. GBDS found that infectious disease caused 22% of all deaths and 27% of all disabilities in 2000. Bacterial, viral, fungal and parasitic protozoan diseases are different types of infectious diseases (Schlossberg & Samuel, 2017).

Bacteria are responsible for typhoid fever, cholera, tuberculosis and other typical human diseases. Of the many species of bacteria that lead to diseases in people, *Helicobacter pylori*, *Salmonella typhi*, *Streptococcus pneumonia*, *Mycobacterium tuberculosis*, *Vibrio cholera*, *Brucella abortus* and *Clostridium tetani* are especially important. Among the agents of disease in humans are *Trypanosomes* (leading to sleeping sickness or Chagas' disease), *Leishmania* (linked to Kala-azar and oriental sore), *Giardia* and *Trichomonas*. The agents that may cause these diseases are *Plasmodium* (malaria), *Toxoplasma* and *Cryptosporidium*. Humans can also be sickened by *Entamoeba* (amoebiasis), *Naegleria* (amoebic meningoencephalitis) and *Acanthamoeba* (amoebic encephalitis and keratitis of the cornea) (Patoli, Patoli, & Mehraj, 2010).

Because Pakistan is in the sub-tropics, tropical and subtropical diseases frequently affect it, piling on a heavy burden of infectious disease every year. In addition, factors favoring diseases in Pakistan like poverty, poor hygiene, countless places at risk for more mosquitoes, limited access to food and people not getting (or avoiding) vaccines. Moreover, it means that cholera occurs when poverty and poor personal hygiene are present. All the same, since the state is at risk for infectious illnesses, it does not yet have a reliable surveillance system that handles ID (Naeem et al., 2022; Preim & Lawonn, 2020). As a result, it discusses how both private and public health care have not done enough to manage the spread of IDs. Apart from carelessness, unclear guidelines being ignored, limited healthcare staff lacking training for emerging outbreaks like COVID-19, make it worse for controlling outbreaks in the country(Preim & Lawonn, 2020).

Co-infection is the leading cause why diseases and infections are more common in developing countries. Those who are poorest tend to suffer the greatest from infectious diseases. A lack of resources for integration and prevention is most severe among these people tools intended for medical use and medications. WHO has listed Pakistan as eighth among the top 22 countries carrying the highest burdens of TB. In 2007, researchers suggest that about 297,108 people in Pakistan (the majority being in their productive years) were diagnosed with TB. Additionally, TB infections and HIV coinfections, together with MDR TB, are becoming worrying trends. Baluchistan became a pilot site in Pakistan when DOTS, an internationally recommended way to control TB, was put into use by the Ministry of Health in 1995. There have been a lot of improvements over the past five years. From 13 percent in 2002, Pakistan's ability to identify cases reached 67 percent by 2007, very near to WHO's target of 70 percent. Based on findings, the proportion of DOTS coverage went up in Pakistan from 44 percent to 99 percent in the years 2002 to 2007. The large jump in detected TB cases reported annually since 2000 is due to both countrywide efforts to include private doctors and community volunteers in the search, as well as to the active support of the public. Since 2001, when

the Government made TB a national emergency, efforts have advanced with the help of USAID and the Global Fund to Fight AIDS, Tuberculosis and Malaria (Naeem et al., 2022).

Therefore, this research will be conducted to emphasize the frequency of most prevalent infectious diseases among patients in Larkana and the factors associated with these infections. These kinds of investigations assist in the predictability of the commonest diseases, evaluation of the risks and the attempts to control the prevalence of such diseases in Pakistan.

Material & Methods

Data collection and experimental design

We gathered information regarding the prevalence of infections among the four major laboratories in K.P.K among the sample of hospitalized individuals who were positive in the past with infectious agents. The data was only acquired with the necessary authorization of the authorities to the infected patients in the year of May 2025 to March 2026. Cases of 753 infected cases were followed and were written down. Immune chromatographic techniques (ICT) were used to diagnose the infectious diseases. After that, find out the infection agents'/diseases frequency and percentage.

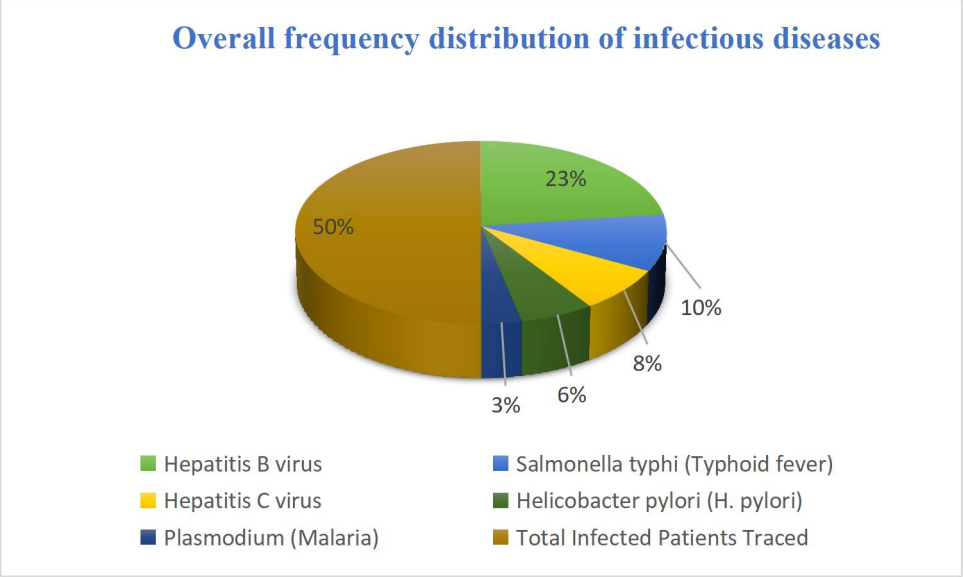
Analysis of data

General rates of infectious diseases, gender-specific amounts of infections, monthly trends, correlations with patient marital status and age and gender-specific, as well as age-specific, rates of infections and disease were measured. The SPSS version 23 was used to analyze the data. In the given paper, the number of every infectious agent/ disease and percentage were calculated. The information was presented and tabulated and graphed.

Results

The frequency of the infected patients in District D. I. Khan in May 2025-March 2026 was studied to trace 740 cases of infected patients and to determine the most important infectious diseases of epidemiological interest. Hepatitis B virus was found in 285 cases (83.51), Salmonella typhi (causing Typhoid fever) in 155 cases (20.94), Hepatitis C virus in 120 people and the Helicobacter in 109 people (Figure 1).

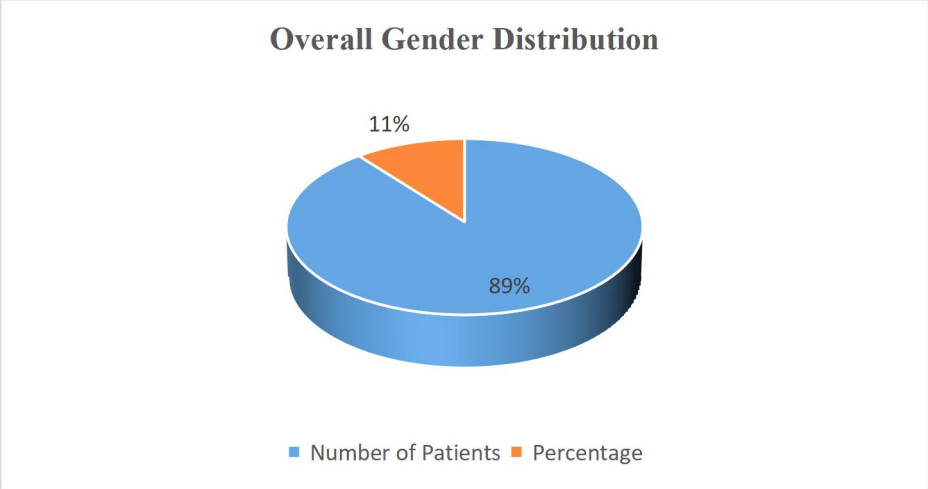
Figure 1: Overall Frequency distribution of Infectious diseases



Gender Wise Infectious Diseases

Of the patients assessed for infectious diseases, 393 were male and 347 were female. All in all, male and female cases were very like at risk for infections (Figure 2). Out of 105 patients with *H. pylori*, 52 were female (49.52%) and 53 were male (52.38%). We saw that 49.14% of the 175 cases of Typhoid fever were female, while 52% were male. In 285 Hepatitis B cases, 152 (53.33%) were males and 133 (46.66%) were females. From all the 120 cases of Hepatitis C, there were 69 males (57.5%) and 51 females (42.5%). There were 26 males (46.42%) and 24 females (42.85%) among the 56 people infected with Malaria (Figure 2).

Overall Gender Distribution (Total Patients: 840)



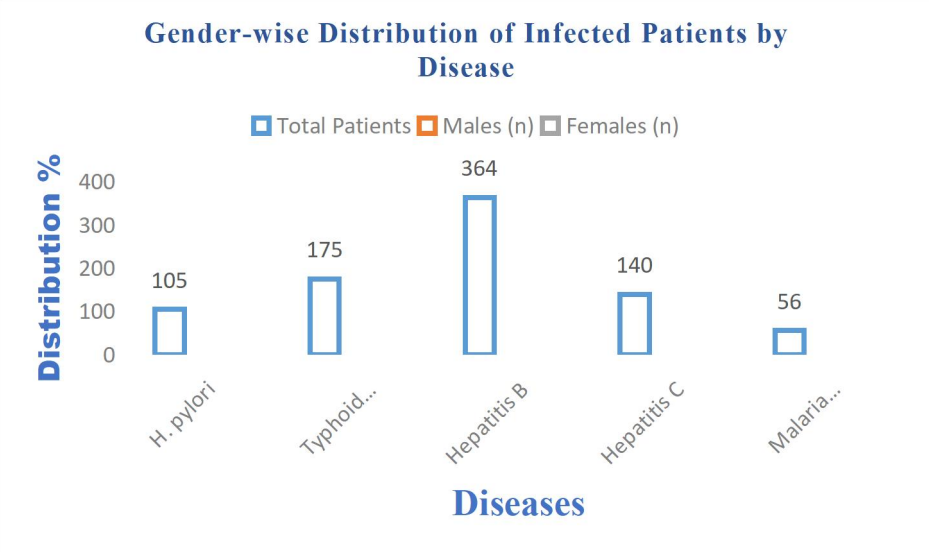


Table-1: *Age-wise frequency of infections/ diseases*

Age Group	H. pylori		Typhoid fever		Hepatitis B		Hepatitis C		Malaria	
	Count	%	Count	%	Count	%	Count	%	Count	%
10 to 20	6	5.7%	59	33.71 %	72	19.78	58	38.57%	14	25 %
21 to	54	51.42 %	70	40 %	190	52.19 %	13	9. 28 %	14	25 %

30											
31	to	18	17.14 %	18	10.28 %	47	12.91 %	22	15.71 %	10	17.85 %
40											
41	to	13	12.38 %	12	6.85 %	23	6.31 %	28	20 %	9	16.07 %
50											
51	to	9	8.57 %	10	5.71 %	14	3.84 %	11	7.85 %	7	12.5 %
60											
61	to	5	4.76 %	4	2.28 %	18	4.94 %	8	5.71 %	2	3.5 %
70											
Total		105	100%	175	100%	364	100%	140	100%	56	100 %

Age-Wise Infectious Diseases

The highest incidence of infectious diseases was observed in 21-30-year-olds (see Table 1). The highest rate (52.19) was observed in the age groups 21-30 years and the second highest rate (19.78) was in the age groups 10-20 years. Alaska Natives between 31 and 40 years old received 12.91% of Hepatitis B tests; those aged 41 to 50 years had 6.31% of the cases; those aged 51 to 60 saw 3.84% of the cases and 61 to 70 years had only 4.94%. Forty percent of people diagnosed with Typhoid fever were 21-30 years old and 33.71% were 10-20 years old. For the years 2015 to 2019, those age 51-60 had the next highest rate of Typhoid fever at 5.7%, followed by 31-40 years at 10.28%, then 41-50 years at 6.85%. The number of cases is lowest in the 61-70 age group with the rate of 2.28. Out of all patients the highest prevalence of Hepatitis C was found among those (10-20 years) who had Hepatitis C at a rate of 38.57% and then the prevalence decreased among those aged 41-50 (20%). Hepatitis C infections in adults are highest among 31 to 40-year-olds (15.71%), followed by 51 to 60-year-olds (7.85%), then 21 to 30-year olds (9.28%). The prevalence of H. pylori was highest in adults in the 21 to 30 years (49.52) followed by the 31 to 40 years (17.14) age group. The lowest H. pylori infection is seen in the age group of 10-20 (5.7%), followed by 61-70 (4.76%), 41-50 (12.38%) and 51-60 (8.57%) years. In both the 10-20 age group (25%) and the 21-30 age group (25%), Malaria was common. For other age groups, Malaria was found in: 41-50 years (16.07%), 31-40 years (17.85%), 51-60 years (12.5%) and 61-70 years (3.5%) showed the lowest rate (Table 1).

DISCUSSION

Many lives are lost every year in the developing countries, including Pakistan, due to microbial infections. Thus, active efforts are needed to check the worldwide increase in death rates, paying special attention to emerging countries, to protect them from these diseases. Data on laboratory was collected in a number of hospitals in KpK to test infectious diseases and epidemiological outcomes. In this case we introduce information about the spread of infectious diseases, the associated risks, their prevention and control in Pakistan among the chosen population. Subsequent researchers will be able to later compare the observations they make with our findings and data which will assist them to better comprehend infectious diseases in Khyber-Pakhtunkhwa. There is a new scientific opinion, according to which gender, age, place of residence is some of the factors that may influence the reaction of patients to antibiotics and any drug that can cure an infection. In this research, researchers focused on the five diseases which have a significant economic impact (Hepatitis B, Typhoid fever, Hepatitis C, *H. pylori* and Malaria). However, the Hepatitis B prevalence was

significantly higher than predicted in the region and group of people (52.19%). In every one of these studies, a greater number of individuals were infected with viral diseases (HBV and HCV) than any other disease.

Both infection response and use of therapy are closely associated with gender, age and geographic location. Five important diseases (Typhoid, Helicobacter pylori, Malaria, Hepatitis C, Hepatitis B) are examined in this study. The percentage of infectious diseases diagnosed in the selected population was 59.78 per cent, which is against 22.24 per cent of the people treated in the study that were treated with any disease (Naeem et al., 2022). Sharma and Malakar (2012) state that typhoid had a visitation rate of about 26 percent of the total visits; this is quite close to the current rates in the Buner District. The region studied found that the rate of *H. pylori* was (31.74%). The *H. pylori* prevalence rate in the center and north of Pakistan was estimated to be 66-84%. As a result, there was less *H. pylori* infection reported. Malarial infection was present in 3.7% of the cases in the present study, but the frequency of viral infections in the individuals researched in the given area was not very high. The cases under analysis had hepatitis C and Hepatitis B (3.17% and 1.58) (Naeem et al., 2022).

What we observe here is not in line with what was previously reported which mentioned that HBV and HCV were the country's top two economically important viral diseases. The present finding that Typhoid fever has a high prevalence (21.5%) is higher than the prevalence in the previous research (Ullah et al., 2020). which found 10%. The prevalence of H. pylori was also lower in the study population than in most of the other major Pakistani cities. The H. pylori prevalence was approximately 66 per cent and 84 per cent in the Pakistan northern and central regions. The prevalence of H. pylori is believed to be about 80% in Karachi (Khan, Akbar, & Shah, 2022).

CONCLUSION

The research demonstrates that students' physical health is determined by how hygienic they are. They are supposed to lead the students in cultivating some of the key habits associated with healthy lifestyle such as washing hands prior to eating, not eating contaminated food or consuming poorly prepared food. The teachers are urged to convince the children to choose fresh vegetables, to take milk frequently and add dietary fibers to their diets in case the doctor suggests so. Regular examinations must be administered and this will reveal diseases like abdominal pain, diarrhea, constipation, nausea, rash and stomach pain. Every now and then, the School Medical Officer may check a student's physical health and hygiene to detect infections early and prevent them from being complicated.

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