ORIGINAL RESEARCH

Frequency Distribution of Most Common Infectious Diseases among the Hospital Visited Patients of Peshawar, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Infectious agents cause serious diseases in humans worldwide and are responsible for the high rate of morbidity and mortality. With this background, the frequency distribution of infectious diseases in the hospital visited patients and their associated risk factors were studied in Peshawar. The data of 753 immune chromatographic technique (ICT) based infected patients were collected during the period of May 2015 to April 2016 from four clinical laboratories of Peshawar. The frequency and percentage of each infectious agent/disease were calculated. The study had approval from the institutional ethical committee. A list of the Top 5 medically most important infectious agents/ diseases were generated. The results showed that 354 (47.01%) patients were positive for Hepatitis B virus infection, 162 (21.51%) were positive for *Salmonella typhi* (causing Typhoid fever) infection, 108 (14.34%) were positive for Hepatitis C virus infection, 93 (12.35%) patients were infected with *Helicobacter pylori*, and 36 (4.78%) were positive for Plasmodium (causing malaria) infection. Among the 753 patients screened for infectious diseases, 378 (50.1%) were males and 375 (49.8%) were females. The prevalence was high in the age group 21-30 and high in married patients (76%). This study provides help in the estimation of the spread of the most common diseases, the calculation of their associated risk factors, and control of the diseases in Pakistan.

Keywords: Infectious agents, Prevalence, Epidemiology, Peshawar

INTRODUCTION

Microbiology deals with the study of microorganisms such as bacteria, fungi, viruses, and parasites. Millions of microscopic organisms live with us, in our environment and cause infections/ diseases in humans (1). Infectious diseases are responsible for the higher rate of morbidity and mortality in the human population worldwide. The global burden of disease study (GBDS) reported that 22% of all deaths and 27% of disabilities were caused by infectious disease during 2000 (2). Infectious diseases are classified based on the infectious agent into bacterial diseases, viral diseases, fungal diseases, and parasitic protozoan diseases, each having different cycles of infection (1).

The common human diseases caused by bacteria are typhoid fever, cholera, and tuberculosis, etc. The important species of bacteria that cause diseases in humans are *Helicobacter pylori*, *Salmonella typhi*, *Streptococcus pneumonia*, *Mycobacterium tuberculosis*, *Vibrio cholera*, *Brucella abortus*, and *Clostridium tetani* (3). Major agents of disease in humans are species of Trypanosomes (causing sleeping sickness or Chagas' disease), Leishmania (causing Kala-azar, oriental sore), Giardia, and Trichomonas. Plasmodium (causing malaria), Toxoplasma, and Cryptosporidium are the potential diseases causing agents. Entamoeba (causing amoebiasis), Naegleria (causing amoebic meningoencephalitis) and Acanthamoeba (causing amoebic encephalitis, keratitis of the cornea) are also pathogenic to humans (4).

Therefore, the aim of this investigation is to point out the frequency distribution of the most common infectious disease and their associated risk factors in hospital visited patients of Peshawar. This investigation provides help in estimation of the spread of most common diseases, the calculation of their associated risk factors, and control of the diseases in Pakistan.

MATERIAL AND METHODS

Data collection and experimental design

Prevalence study-related data of infectious agents were collected from hospitalized infected patients, who have been visited either of the four main clinical laboratories, Sina diagnostic center and laboratory (SDC&L) opposite Hayatabad medical complex Peshawar, Al-Hafiz medical laboratory (AHML) Dabgari garden Peshawar, International medical laboratory (IML) Dabgari garden Peshawar and Frontier medical laboratory (FML) Dabgari garden Peshawar. The data were collected with the proper approval of the authorities from infected patients in the period of May 2015 to April 2016. The data of 753 infected patients were traced and recorded. The infectious diseases were diagnosed by immune chromatographic techniques (ICT). Finally, calculate the infection agents/ diseases frequency and percentage.

Ethical Statement

The study was approved by the ethical committee of the University of Swat, Swat, KPK, Pakistan.

Analysis of data

The overall prevalence of infectious diseases, gender-wise infection/ diseases, month-wise infection/ diseases, infectious disease and patient marital status, and age-wise infection/ diseases were determined. Statistical package for social sciences (SPSS) software version 23 was used for the analysis of data. Each infectious agents/ disease number and the percentage were calculated in the present study. In tables and graphs, the data was arranged and presented.

RESULTS

Overall frequency distribution of infectious diseases

The hospital visited 753 infected patients were traced from May 2015 to April 2016 in the local population of District Peshawar to determine epidemiologically important infectious diseases. The results showed that 354 (47.01%) were positive for Hepatitis B virus infection, 162 (21.51%) were positive for *Salmonella typhi* (causing Typhoid fever) infection, 108 (14.34%) were positive for Hepatitis C virus infection, 93 (12.35%) patients were infected with *Helicobacter pylori* (*H. pylori*), and 36 (4.78%) were positive for Plasmodium (causing malaria) infection (Figure 1).

Gender wise infectious diseases

Out of 753 patients screened for infectious diseases, 378 (50.1%) were males and 375 (49.8%) were females. Thus, in general, both genders were almost equally infected (Figure 2). Among 93 infected patients of *H. pylori*, 48 (51.6%) were females and 45 (48.3%) were males. A total of 162 infected patients with Typhoid fever, 81 (50%) were females and 81 (50%) were males. Among 354 infected patients of Hepatitis B, 180 (58.8%) were males and 174 (49.1%) were females. Out of 108 infected patients of Hepatitis C, 57 (52.7%) were males and females were 51 (47.2%). Total infected patients of Malaria were 36 in which, 21 (58.3%) were females and 15 (41.6%) were males (Figure 2).
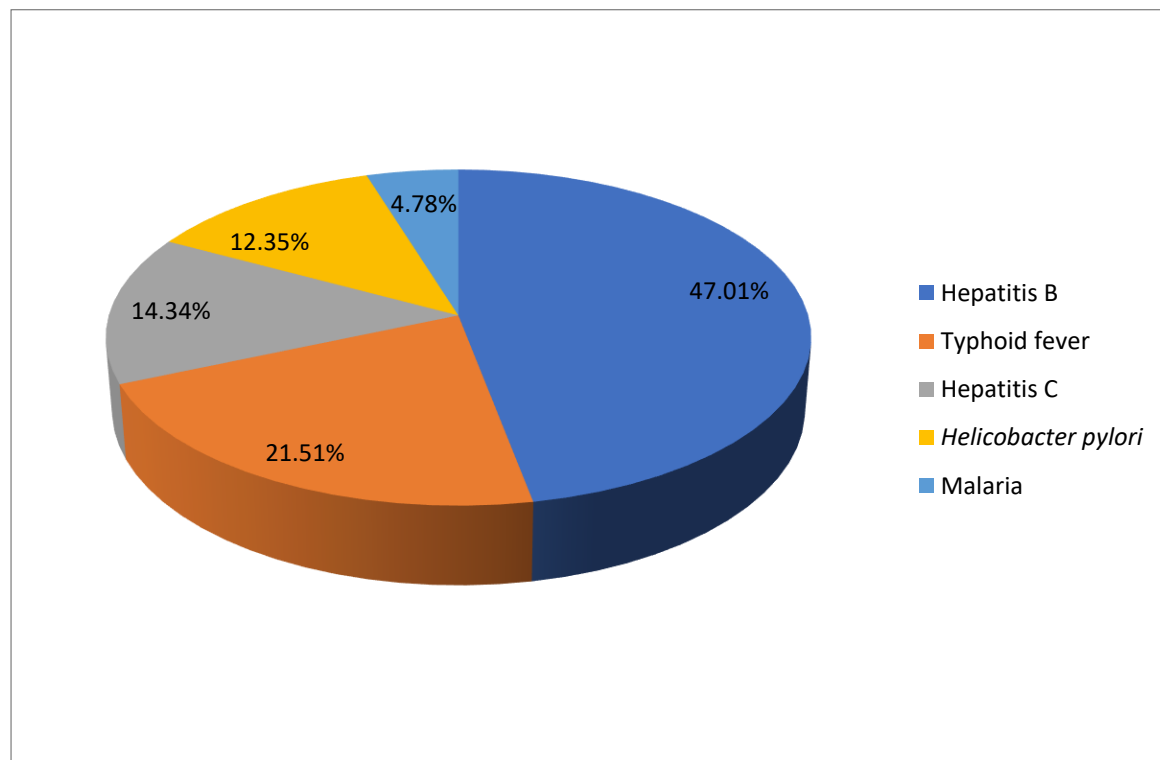

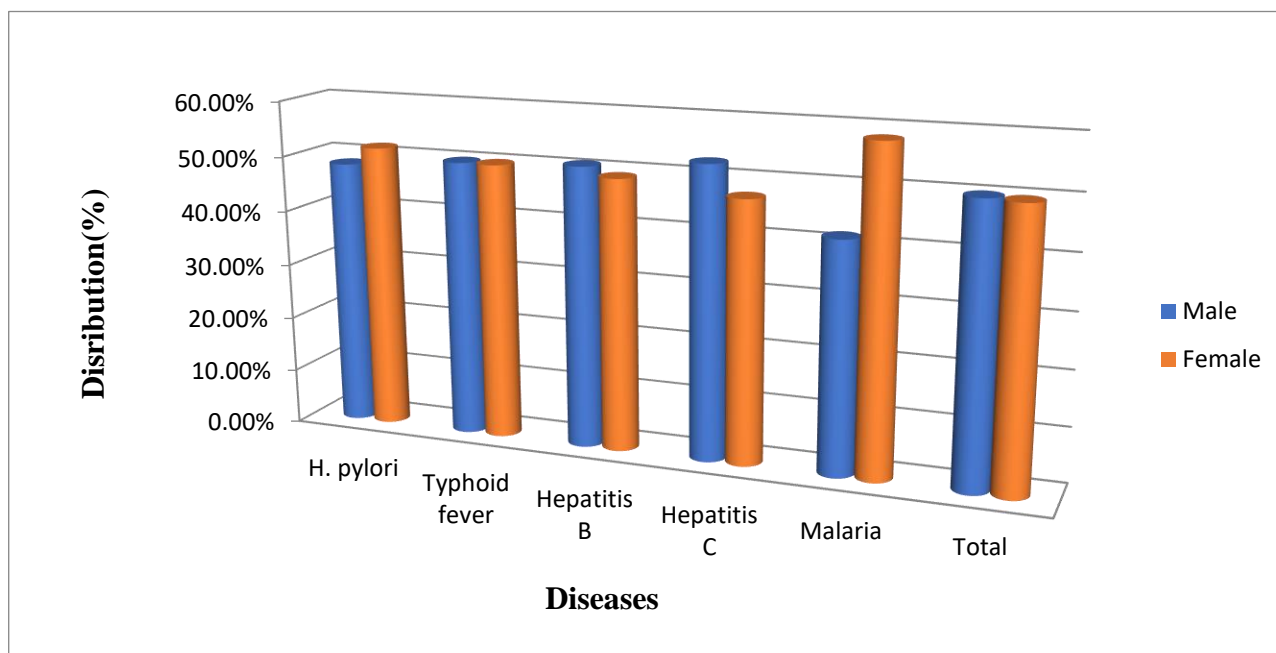**Figure-1: Overall frequency distribution of infectious diseases**

Figure-2: Gender wise frequency of infections/ diseases

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	3	3.2%	39	24%	70	19.7%	46	42.5%	9	25%
21 to 30	62	66.6%	70	43.2%	231	65.2%	9	8.3%	9	25%
31 to 40	15	16.1%	18	11.1%	42	11.8%	18	16.6%	6	16.6%
41 to 50	6	6.4%	12	7.4%	7	1.9%	21	19.4%	8	22.2%
51 to 60	4	4.3%	21	12.9%	3	0.8%	12	11.1%	1	2.7%
61 to 70	3	3.2%	2	1.2%	1	0.2%	2	1.8%	3	8.3%
Total	93	100%	162	100%	354	100%	108	100%	36	100%

Age-wise infectious diseases

In general, the prevalence of each infectious disease was highest in the age group of 21 to 30 years old patients (Table 1). The prevalence of Hepatitis B was high in the age group of 21-30 years (65.2%), followed by the age group 10-20 years (19.7%). The remaining groups show a rate of Hepatitis B in this order, 31-40 years (11.8%), 41-50 years (1.9%), 51-60 years (0.8%), while the age group 61-70 years shows a low prevalence rate (0.2%) for Hepatitis B. The prevalence of Typhoid fever was high in the age group of 21-30 years (43.2%), followed by 10-20 years (24%). The remaining age groups show a rate of Typhoid fever in this order, 51-60 years (12.9%), 31-40 years (11.1%), 41-50 years (7.4%), while the age group 61-70 years shows a low rate (1.2%) for Typhoid fever. The prevalence of Hepatitis C was high in the age group of 10-20 years (42.5%), followed by the age group 41-50 years (19.4%). The remaining age groups show a prevalence rate of 31-40 years (16.6%), 51-60 years (11.1%), 21-30 years (8.3%), while the age group 61-70 years shows a low rate (1.8%) for Hepatitis C. The prevalence of *H. pylori* was high in the age group of 21-30 years (66.6%), followed by the age group of 31-40 years (16.1%). The remaining age groups show a rate of *H. pylori* in this order, 41-50 years (6.4%), 51-60 years (4.3%), while the age group 10-20 years (3.2%) and 61-70 years (3.2%) show a low rate of *H. pylori*. The prevalence of Malaria was equally high in the age group of 10-20 years (25%) and 21-30 years (25%). The remaining age groups show a prevalence rate in this order: 41-50 years (22.2%), 31-40 years (16.6%), 61-70 years (8.3%), while the low prevalence rate (2.7%) for Malaria was in the age group 51-60 years (Table 1).

DISCUSSION

According to modern scientific belief factors such as gender, age and geography may play an important role in determining their response to antibiotics and other such treatments. In this study five, economically important diseases (Hepatitis B, Typhoid fever, Hepatitis C, *H. pylori,* and Malaria) were reported and highlighted. However, in the studied area and population, the prevalence of Hepatitis B was much high (47%). The prevalence of viral diseases (HBV and HCV) in the studies population/ area was collectively much higher than the diseases caused by other pathogens. The previous findings are inconsistency with these observations (5, 6), they reported HBV and HCV in the top 10 list (ranked first and second, respectively) most economically important virus diseases in Pakistan. The rate of Typhoid fever (21.5%) is higher than the previous finding (7), (8), where this rate was 10%. The frequency of *H. pylori* in the studied area/ population was comparatively less than in the other big cities of Pakistan. The ranges of *H. pylori* were 66% to 84% in the Pakistan northern and central parts (9). In Karachi, the reported prevalence of H. pylori has also been high (80%) (10).

The prevalence of *H. pylori*, Typhoid fever, and Hepatitis B in the present study was almost equivalent in both genders. The previous observations are in controversy with these observations (11), wherein the Swat region the bacterial infections showed the highest prevalence in females. The differences in environmental conditions and immunity of the populations make the difference in the frequency. The prevalence of Malaria in the current notion was higher in females as compared to males. These findings and prevalence in another region of Pakistan were the same (12). In females, however, the high prevalence of Malaria in Peshawar is unclear as compared to males. In contrast, the frequency of Hepatitis C was higher in males as compared to females. The present observations with the previous findings agree (5), where a high prevalence of Hepatitis C in males (78%) vs. females (22%) was reported.
Generally, in the 21 to 30 years age group the highest prevalence of each infectious disease was reported. The previous studies agree with these observations (13), (14), where they studied in Abbottabad the H. pylori and typhoid fever prevalence. However, in the age group 11-20 years the prevalence of Hepatitis C was dramatically high. This is in controversy with the previous findings (5), where the high prevalence was reported in middle-aged people.

CONCLUSION

Among the five most important infectious diseases, results showed that 47.01% were positive for Hepatitis B virus infection, 21.51% were positive for *Salmonella typhi* infection, 14.34% were positive for Hepatitis C virus infection, 12.35% patients were infected with *Helicobacter pylori*, and 4.78% were positive for Plasmodium infection.

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