AVICENNA JOURNAL OF MEDICAL SCIENCES

OPEN ACCESS

ORIGINAL ARTICLE

Incidence and Comparison of Typhoid Fever in Rural and Urban Areas of District Swat; A Cross-Sectional Study

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Abstract:
WHO estimates the global typhoid fever disease burden at 11-20 million cases annually, resulting in about 128 000–161 000 deaths per year. Typhoid risk is higher in populations that lack access to safe water and adequate sanitation. From November 2018 to April 2019, District Swat served as the site of the current study. This study intends to assess the prevalence and contrast of typhoid fever in District Swat's rural and urban areas. In this study, 600 samples were gathered from Tehsil Babozai and Kabal's rural and urban districts. The gender, age and demographic data were collected through questionnaire, and lab tests were also done. According to the findings, the prevalence rates were respectively 54.5% and 60% in urban and rural areas. The study also demonstrates that the prevalence of typhoid was higher in females than in males, and it was also higher in adults and people of younger ages than in those who were older. Consuming contaminated drinking water and food, unhygienic environment, poor sanitation were the main sources of typhoid. Typhoid needs proper interventions by awareness campaigns about risk factors of the disease and the seminars should be conducted at academic levels to spread awareness among adults. The disease can only be managed with the aforementioned tactics.

KEYWORDS: *Incidence, Prevalence, Typhoid Fever, Prevention.*

How to cite: *Ahmad N, Karimullah, Nazar MS, Saeed M, Mushtaq A, Junaid M, Memoona, Ahmad A, Hussain S. Incidence and* Comparison of Typhoid Fever in Rural and Urban Areas of District Swat; A Cross-Sectional Study. Avicenna J Med Sci 2023; 3 (2): 26-31

Introduction

With an anticipated annual loss rate of 500,000 and 600 million pieces of luggage worldwide (1). Due to a number of interconnected factors, including among others (2, 3), the erratic usefulness of available antibody arrangements, unintentional sprawl with the growth of peri urban population, the absence of benevolent water hoard and hygiene services, and the expanded territorial developments of a large number of travelers, this issue is particularly acute in developing nations (3, 4).

The human immunodeficiency virus (HIV) represents a real threat to public health. Although not specifically mentioned from other endemic regions, a Peruvian investigation has shown that typhoid illness was multiple times more common in HIV-positive individuals when compared to the general population (5). This is likely due to HIV-related impedance of the host's normal antibacterial movement in contrast to Salmonella typhi and unabated fecal-oral spread of Salmonella within the gay population (6). Untreated wastewater is used in many developing countries' peri-urban vegetable homestead water systems during the dry season. Regular use of the vegetables grown in these peri-urban homesteads (such as plates of mixed greens) has been linked to large typhoid disease outbreaks in urban areas (7).

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Received: August 07, 2023
Revised: August 29, 2023
Accepted: September 15 , 2023
DOI: https://doi.org/10.59119/ajms.2023(3).2.5

eISSN 2958-2741 | pISSN 2958-2733

After incorporation, Salmonella travels through the digestive tract to the small intestines, where it binds to the villi's surface (8), likely using the CFTR-receptor there, and also attacks the duodenal mucosa legitimately or replicates several times before attacking. These active beings then spread at the lamina propria and through the intestinal Peyer's patches of "M cells," which move into the mesenteric vessels. Microscopic organisms enter the biliary channel through the liver (9) typically before being caught by macrophages that coat the sinusoidal dividers of the spleen, liver, and bone marrow.

The re-emergence of microscopic organisms into the circulatory system signals the onset of the clinical sickness, and the individuals can reproduce in some regions (10). Typhoid bacteria are ejected from the blood by the liver through the biliary system for recontamination of the intestine after a generally prolonged bacteremia. In cases of recurrence, intestinal discharge and intestinal aperture, two of the most dreaded complications of typhoid fever, are progressing due to the amount of hyperplasia of recently formed PP, which has the power to affect mucosal rot. Macrophages and T lymphocytes are the predominant cell types driven by Salmonella typhi (9), which predominate in the PP design. This anticipated explains why PP at the lower end of the ileum are frequently linked to typhoid fever. Cytokines alone can mediate the progression of fever, intestinal breakdown, hepatic dysfunction (11), pneumonitis(12) and other diseases by acting locally at the location of their formation or by spreading via the circulatory system (11).

Despite the significant prevalence of typhoid fever, the illness has received less attention recently, in part due to the lack of practical symptomatic devices. Blood culture is the foundation of research facility determination for typhoid fever even though bone marrow culture has the greatest quality level (13). The majority of cases of typhoid fever occur in low-income countries where bacterial culture is not frequently monitore (14). Bone marrow culture continues to be remarkable in areas where culture is controlled because of the method's unique challenges. There is a reliance on elective forms of discoveries in that capacity. Since more than a century ago, the Widal test has been widely applied in developing countries. It recognizes antibodies to S in tolerant sera. O and H antigens from typhi.

The defensive adequacy of the antibody was 72% in field preliminary studies conducted in Nepal and South Africa, two countries with high rates of Typhoid, 1.5 years after immunization. Another Vi-conjugate antibody coupled to nontoxic recombinant *Pseudomonas aeruginosa* shows improved immunogenicity in adults and children aged 5 to 14 years, and dose escalation is advised every two years. The survivability of immunization in children aged 2 to 5 years after several months was recently assessed in Vietnam, and it was 91.2 percent. The possibility of this vaccination being immunogenic in newborn children under the age of two is a considerable advantage. 2 Now, phase one and two clinical trials for the typhoid fever DNA antibody are underway (15). The purpose of this study is to determine the prevalence of typhoid in the Tehsil of Kabal and Babozai. The factors include evaluating the effects of typhoid on persons of various ages and genders as well as comparing typhoid patients in urban and rural parts of the provided Tehsil.

Methodology

Study Design, Settings and Participants:

In order to determine the prevalence of typhoid fever in various areas of Tehsil Kabal and Babozai in the district of Swat, a cross-sectional survey was carried out. The exploration took place between early November 2018 and the end of April 2019. The participants were randomly selected from Tehsil Kabal and Tehsil Babozai and epidemiological assessment was executed by Questionnaire that involves various factors about individual's wellbeing, sex, sexual orientation and age. A total sample size of 600 was taken for this study. The 300 samples were collected from Tehsil Babozai and 300 samples from Tehsil Kabal. Both the samples were analyzed based on Age wise, Gender wise and Locality wise distribution for the prevalence of Typhoid.

Study Variables:

Independent variables include questionnaire about the demographics data and dependent variable are blood sampling.

Statistical Analysis

Data entered into Microsoft Excel and summarized using descriptive statistics (frequency, percentages, mean, median and standard deviation SD).

Results

Babozai Data:

Gender wise incidence:

Out of 300 samples, 158 samples belong to female patients and 142 samples belong to male patients. According to data broken down by gender, 52.7% of the female samples were positive (80 out of 78 were), while 78 were negative. Male samples had a positive proportion of 47.3% overall, with 74 being positive and 68 being negative. Table 1 displays the prevalence of typhoid in Babozai by gender.

Table 1: Gender wise prevalence of typhoid in Babozai.

Gender	Collected Samples	Typhoid Positive	Typhoid Negative	Percentage
Female	158	80	78	52.7%
Male	142	74	68	47.3%
Total	300	154	146	100%

Age wise incidence:

Six groups were created using the information about the age-specific incidence of typhoid illness. 75 samples were collected from children aged 1 to 10, of which 40 were positive and 35 were negative, for a rate of 53.3%. About 65 samples from people aged 11 to 20 were collected, of which 35 were positive and 30 were negative, for a positive-to-negative ratio of 53.8%. 48 instances were collected from the age of 21 to 30; 25 of them were positive and 23 were negative, for a 52% positive to negative ratio. A total of 46 samples were collected from people aged 31 to 40; 24 positive cases and 22 negative cases (or a percentage of 52.1% each) were found. A total of 37 cases were collected from people aged 41 to 50, of which 20 were positive and 17 were negative, representing a 54% positive/negative ratio. A total of 29 samples were collected from people aged 51 to 60, with 10 of those being positive and 19 being negative, for a rate of 34.4%. Table 2 displays the age-specific prevalence of typhoid fever.

Table 2: Age wise prevalence of typhoid in Babozai

Age (Year)	Typhoid (+ve)	Typhoid (-ve)	Percentage Typhoid (+ve)
1-10	40	35	53.3%
11-20	35	30	53.8%
21-30	25	23	52%
31-40	24	22	52.1%
41-50	20	17	54%
51-60	10	19	34.4%

Area wise incidence:

Samples for the Area-wise Incidence of Typhoid were taken from various Tehsil Babozai villages. Out of 117 samples taken from various locations, 60 samples tested positive and the remaining 57 tested negative, for a rate of 54.5%. In Amankot, where there are 30 positive cases and 25 negative cases, or a percentage of 54.5%, the 55 samples were gathered. The 55 samples from Shagai had a rate of 52.7%, with 29 positive and 26 negative cases. 38 samples were taken from Qambar, of which 20 tested positive and the remaining 18 tested negative, for a percentage of 52.6%. About 29 samples from panr were recently gathered, with 15 of those being positive instances and the remaining 14 being negative, for a ratio of 51.7%.

Locality	Positive cases	Negative cases	Percentage
Amankot	30	25	54.5%
Qambar	20	18	52.6%
Shagai	29	26	52.7%
Saidu	60	57	51.2%
Panr	15	14	51.7%

Table 3: locality wise incidence of typhoid in Babozai

Kabal data

Gender wise Incidence:

Out of a total of 300 samples taken from the tehsil Kabal for gender-specific data on typhoid fever, 110 samples from female patients tested positive for the disease, compared to 70 samples that tested negative, for a positive ratio of 56.6%. 79% of the 130 male patient samples tested positive, compared to 51% who tested negative, for a positive proportion of 43.3%.

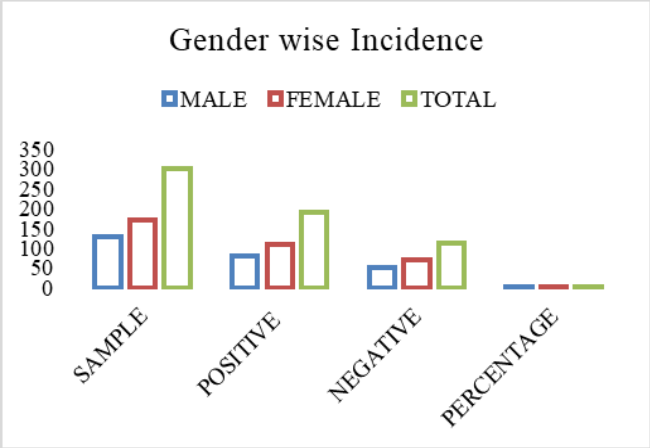


Figure 1. Gender wise prevalence of typhoid in kabal

Table 4: Gender Wise Incidence of Typhoid in Kabal

Gender	Samples	Positive	Negative	Percentage (%)
Male	130	79	51	43.3
Female	170	110	70	56.7
Total	300	189	111	100

Age wise Incidence:

The data were divided into 6 categories according to the age-specific incidence of typhoid fever. About 90 samples were taken from these 6 groups of children between the ages of 1 and 10, of which 50 were positive instances and 40 were negative, for a rate of 55.5%. Out of 70 samples taken from children aged 11 to 20, 40% of the cases were positive while only 30% were negative, representing a 57% success rate. Out of 50 instances between the ages of 21 and 30, 35 were positive and 15 were negative, a 70% success rate. Out of 41 samples taken from people aged 31 to 40, 29 had positive results and 12 had negative results, for a proportion of 70.7%. Twenty of the 28 cases—or 71%—of those between the ages of 41 and 50 were positive, while only eight were negative. With a proportion of 71.4%, 15 of the 21 samples from those aged 61 to 70 had positive cases of the disease whereas only 6 did not.

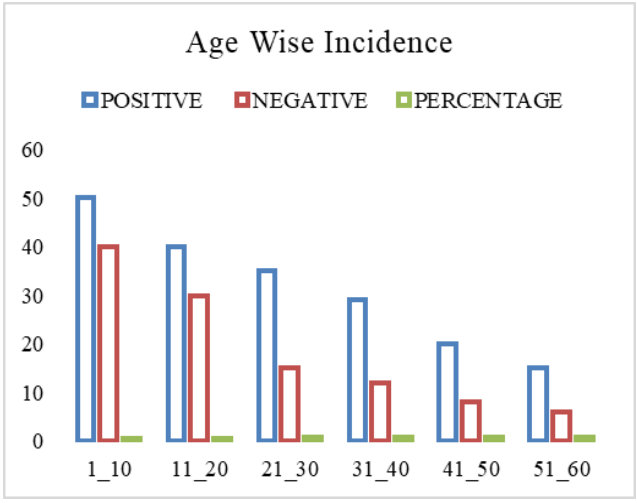
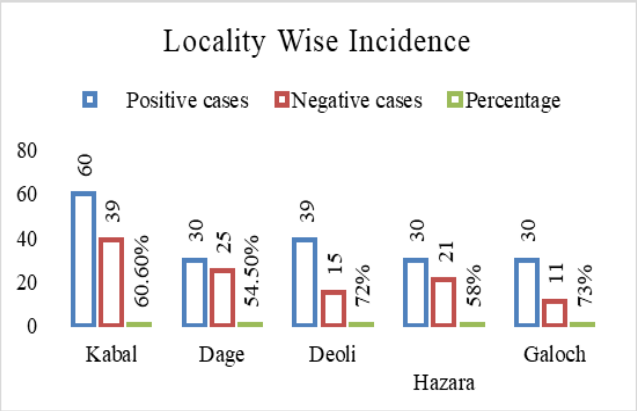


Figure 2: Age wise prevalence of typhoid in kabal

Area wise Incidence:

For area wise incidence of typhoid, the sample was collected from different villages of tehsil Kabal. Village Kabal has 60 positive instances and 39 negative cases, for a percentage of 60.6%, according to the graph below. 55 samples were taken from the village of Dage, and out of those, 30 were positive cases and 25 were negative, for a rate of 54.5%. 39 of the 54 samples from Deoli tested positive, compared to 15 that tested negatively, for a rate of 72%. 51 samples were taken from the Hazara, of which 30 were positive and 21 were negative, representing a 58% positive to negative ratio. A total of 41 samples were recently taken from Galoch, with 30 of those being positive instances and 11 being negative, for a ratio of 73%.

Figure 3: Area wise Incidence of typhoid in kabal



Discussion

One of the most serious diseases in South East Asian countries, including Pakistan, is typhoid fever, which is still common in the provinces and is brought on by contaminated food, unclean water, and unhygienic living conditions.), Pakistan, India, Egypt, Mexico, Indonesia, Peru, and Nepal are the countries most affected by typhoid fever globally (16).

This study compares and estimates the prevalence of typhoid fever in district swat's rural and urban districts. Our survey indicated that the incidence of typhoid fever was 54.5% in urban and 60% in rural regions, which is higher than the study by Abdul malik Tareen in district Quetta, Pakistan, which found that the incidence was 15.30% in rural and 13.45% in urban areas in 2011. Due to unsafe drinking water, poor sanitation, and a lack of funds for medical care, the value is reduced. similar to using raw fruits and vegetables, unsanitary conditions exist around them(17) .

According to our study, the prevalence is 52.7% for females and 47.3% for men in urban regions and 56.7% for females and 43.7 for males in rural areas, respectively. Our findings are comparable to those of Abioye Joshua's study from Bingham University in Nigeria, which found that males scored 62.90% higher than girls (87.3%) (18). The increased prevalence in women may be caused by the fact that most women do the majority of household tasks and gather water from contaminated water sources like wells and streams, rendering them particularly susceptible to infection.

The claim that girls are more likely to contract the sickness than males is consistent with the writings of A and O. The prevalence rates reported by udeze et al. in 2010, Nigeria and Uttah, E. C., et al. in 2013, General Hospital Etinan, Nigeria were 42.4% for females, 33.0% for males, and 68.2% for females, 58.0% for males, respectively (19). Our findings are in contrast to a survey by Fazal et al. in 2010, Khyber Pakhtunkhwa (20).

In contrast to our findings, a different study by Abul Malik Tareen in the Quetta district found that men were much more likely than women to contract typhoid fever (15.85% vs. 12.11%). Men may be more susceptible to contracting typhoid fever because of their increased outside activity, which increases their risk of consuming contaminated food. Female participants may have a lower prevalence since they prefer to stay indoors and act quickly to uphold basic standards of cleanliness.

Typhoid fever was shown to be more common in school-age children than in adults or elderly persons in our study, which included participants from both urban and rural locations. Typhoid fever is more common in the age range of 1 to 10 years.11-20, 21-30 in the district of Swat's urban and rural areas. Our findings are analogous to a study by Dr. Jitendra Sharma et al., who conducted a survey in several rural and urban regions of the Lakhimpur District of Assam and found that typhoid fever is more common in children aged 1 to 10, 11 to 20, and 21 to 30 (17), the lack of high-quality food and water from outside sources may be the cause of this reduction.

Conclusion

It was determined that District Swat's residents are experiencing the most difficulty as a result of the greatest incidence of typhoid cases. Females and people under the age of twenty were found to be more affected. The infection incidence was highest in the metropolitan areas of this region, necessitating the correct interventions, increasing risk factor awareness campaigns, and bringing up the topic in academic seminars for control measures as well as immunization. The disease can only be managed with the aforementioned tactics**..**

Author's contributions

NA and KU were involved in the execution of the project. MSN supervised the study. MS and AN helped in organization of data and did the statistical analysis. MJ and M helped in the editing. AA and SH helped in editing. All named authors have read and approved the final version of the manuscript.

Conflict of Interest:
The author states that they have no conflict of interest.

Funding Source:
No funding was received from any agency for this study.

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