

Study of Socio-Demographic Factors Affecting the Prevalence of Typhoid

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Abstract

Objective: Typhoid fever is caused by the bacterium named *Salmonella typhi*, having reservoir in contaminated food and water. It affects considerable number of populations of the world but regions of Southeast Asia are most commonly affected. The objective of this study was to find the prevalence of typhoid fever with respect to age groups, genders, and areas of Karachi, Pakistan. **Methodology:** This is a cross-sectional observational study conducted at Dr. Essa laboratory & Diagnostic Centre, Karachi, from March to August 2017. Those presenting with complains of fever and abdominal pain underwent Typhidot test for the diagnosis of typhoid fever. **Result:** Total 1175 tests were performed, out of which 207 came out to be positive. Out of these positive tests, 20.58% were males and 14.33% were females. When authors observed the relation to months (in the six months involved), the prevalence was highest in the month of April (29.34%). The prevalence was more in infancy and school going kids. **Conclusion:** The prevalence of typhoid fever is higher in males, mostly of school going age. The incidence increases as the temperature rises. Moreover, poor hygienic conditions directly influence the rate of typhoid fever prevalence.

Keywords: Typhoid fever; Widal test; Typhidot; *Salmonella*; Age dependent differences; Enteric fever

Introduction

Typhoid fever is caused by the bacteria *Salmonella typhi* (*S. typhi*).^[1-4] This bacterium invades many organs and gives rise to symptoms on entering the blood stream. It reaches the intestinal tract and is excreted in the feces of infected person and thus, stool cultures are used for its diagnoses. It takes one to two weeks for symptoms to develop and remains threatening for four to six weeks with headache, fever, splenomegaly, abdominal pain, relative bradycardia, and leucopenia. Patient can also experience generalized body aches, constipation, diarrhea, poor appetite and if left untreated, can cause intestinal perforation or bleeding. Blood culture is still used as a gold standard test for typhoid fever.^[5] Another diagnostic test for typhoid fever is Typhidot. It is used for the qualitative detection of specific IgM and IgG antibodies against *S. typhi* antigens. It is not the sole determinant for diagnosis of typhoid fever but can be a speedy, simple, and early to diagnose test.^[6] Previously, Widal test was the sole determinant but due to its non-specificity, time consumption, and inaccuracy it is not used anymore.^[6]

The existing estimate of the global burden of typhoid fever is 16 million illnesses and 600,000 deaths annually.^[7] Typhoid fever poses a considerable burden to the 5.5 billion people living in low and middle income countries.^[8] In 2000, it was estimated that over 2.6 million episodes of typhoid fever occurred worldwide resulting in 216,000 deaths and among them Asians were the major sufferers, with 90% of morbidity and mortality.^[1,2,9]

Typhoid fever is endemic in the subcontinent, Southeast Asia, Middle East and South and Central America, with hyperendemicity reported in Pakistan.^[10] The accurate incidence and prevalence of typhoid fever is not available in Pakistan, but it ranks second in the prevalence in Southeast Asia. The main threat in Pakistan especially Karachi is poor

hygienic values, unclean water supply, and underlying socioeconomic conditions.^[1-4] Contaminated water and food are the main reservoirs for *S. typhi* and patients get infected by typhoid fever via ingestion.^[11,12]

As per literature review, there is no accurate data on incidence and prevalence of typhoid fever in Karachi. The aim of current research is to find the relation between typhoid fever and other factors such as different months of presentation, age groups, genders, and other socioeconomic variations.

Materials and Methods

Study design and setting

This is a cross-sectional observational study conducted at Dr Essa Laboratory & Diagnostic Centre from March to August 2017.

Sample size

The study was conducted for a limited period of six months in which 1175 patients were selected coming with complains of fever and abdominal pain. Only those giving informed consent were included in the study.

Data collection procedure

The data was collected from different branches of well reputed

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Table 1: Gender related survey.

Gender	Total number of tests performed	Positive tests		p-value
		Frequency	Percentage	
Male	617	127	20.58%	0.04
Female	558	80	14.33%	
Total	1175	207	17.61%	

Table 2: Monthly analysis.

Month	Total number of tests performed	Positive tests		p-value
		Frequency	Percentage	
March	203	43	21.18%	0.07
April	184	54	29.34%	
May	200	18	9%	
June	184	17	9.24%	
July	200	34	17%	
August	203	41	20.19%	
Total	1175	207	17.61%	

Table 3: Monthly analysis for males.

Month	Total number of tests performed	Positive tests		p-value
		Frequency	Percentage	
March	102	21	20.58%	0.1
April	100	29	29.0	
May	108	6	5.55%	
June	99	12	12.12%	
July	104	14	13.46%	
August	104	25	24.03%	
Total	617	127	20.58%	

Table 4: Monthly analysis for females.

Month	Total number of tests performed	Positive tests		p-value
		Frequency	Percentage	
March	101	22	21.78%	0.1
April	84	25	29.76%	
May	92	12	13.04%	
June	85	5	5.88%	
July	96	20	20.83%	
August	99	16	16.16%	
Total	558	80	14.33%	

Table 5: Age wise analysis.

Gender	Total number of tests performed	Positive tests		p-value
		Frequency	Percentage	
<15 years	530	117	22.01%	0.04
16-45 years	486	80	16.46%	
>46 years	159	10	6.21%	
Total	1175	207	17.61%	

Table 6: Area wise analysis.

Area name	Total no of tests performed	No of positive tests	
		Frequency	Percentage
Gulshan-E-Iqbal	47	8	17.01
Gulistan-E-Jouhar	174	33	18.90
Zain Medical Complex	28	4	14.20
Nadeem Medical Centre	5	0	-
Civil Hospital	109	15	13.76
Clifton	16	4	25
Main Safoora	45	6	13.33
Ayesha Manzil	57	12	21.05
Abdul Hasan Isphani	68	14	20.58
North Nazimabad	308	67	21.75
Karachi Institute of Heart Diseases	53	2	3.77
Shah Faisal Colony	183	41	22.41
Total	1175	207	17.61

diagnostic lab of Karachi, Dr. Essa lab. Branches are located in different socioeconomic areas which include branches of Gulshan-e-Iqbal, Gulistan-e-Jouhar, Zain Medical complex, Nadeem medical centre, Civil Hospital, Clifton, Safoora, Ayesha Manzil, Abdul hasan isphani, Karachi institute of Heart diseases, Shah Faisal Colony, and the main branch located in North Nazimabad. Data was collected to compare prevalence of typhoid fever between different socio-economic factors. All the patients coming with complains of abdominal pain and fever were registered which made a figure of 1175. A short questionnaire was developed according to previous studies and was tested by conducting a pilot study. Variables like age, gender, and residential area were included in the questionnaire and participants' blood samples were taken to conduct Typhidot test. Data was cleaned and the collection procedure was supervised by the principle investigator.

Data analysis plan

Data was entered in Excel 2010 then analyzed in software of IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows, Version 21.0. (IBM Corp., Armonk, NY). Frequency and percentages were reported for the variables and Chi square analyses was conducted to determine association of typhoid positivity with all the variables. P-Value < 0.05 was considered as statistically significant.

Ethical consideration

This research work was approved by the ethical review committee of Essa Laboratory (IERB No: 2017/Feb/01) with permission of the head of institution. Participants were described briefly for the study objectives and procedure. Informed consent was taken and interviews were conducted in privacy. Participants were assured that no sharing of information to anyone other than research purpose would occur and that their confidentiality will be maintained. Counseling was done after interview; participants were given no additional benefits and were free to withdraw from the survey at any point.

Results

During the period of six months, total 1175 typhidot tests were performed out of which 207 (17.61%) tests were positive. As shown in Table 1, prevalence of typhoid fever was found more in males than in females with significant difference ($p = 0.04$) [Table 1]. According to Tables 2-4, in the months from March –August, huge but non-significant difference was found in the monthly detection of infection. On the whole, number of positive results was found more in March, April and August.

In this study, participants were grouped into different groups according to age. Typhoid was mostly detected in participants of age group of less than 15 years ($p = 0.03$) [Table 5].

In this study, different areas of Karachi were focused since the branches of selected laboratory are located in many areas of the city. The difference of results is presented in Table 6 giving the impression that Gulistan-e-Jauhar, Main centre and Shah Faisal branch has the highest appearance of positive typhoid patients which is attributed to poor hygiene conditions.

Discussion

Gender wise, males were found to be more prominently affected than females which might be due to the fact that males are the earning members of the family spending most of the time out of home, and so making him liable to eat outside home. In a study conducted in Karachi, it was reported that about 9.1% of food handlers were positive for *Salmonella*.^[13]

Month of March, April, and August are season changing months in Karachi during which typhoid organism grows with boost, because

these conditions are favorable for organism growth. This might be the reason why positive test results were more during this month in this study. A study was conducted in Bangladesh that shows the prevalence of typhoid fever increases with the rise of temperature and as the temperature is high during the month of April the prevalence of typhoid fever is also high.^[14] However, further studies need to be conducted to check the prevalence throughout the year.

According to this study, children are more frequently affected, as they have weak immunity and low resistance power and are easily attacked by typhoid. A study conducted in Bangladesh concluded that in the subcontinent, the prevalence of typhoid fever is highest in school going children.^[15]

Areas of Shah Faisal and Gulistan-e-Jauhar are low socio-economic areas and their hygienic conditions are very poor, predisposing to high typhoid fever prevalence. A study conducted in India, concluded that poor hygienic conditions are associated with high prevalence of typhoid fever.^[14]

This study generated the data on prevalence of typhoid fever among patients having fever and abdominal pain. This study focused on different factors including gender, age, months, and area variation. By this study, population at risk and month of maximum cases were identified. The number of typhoid fever cases can be reduced by targeting affected population during the most vulnerable time of the year.

Conclusion

From the above result authors concluded that among genders, males are predominantly affected from typhoid fever. It commonly affects children under the age of 15 years and is most prevalent during the month of April (in March-August). The areas of Karachi that are mostly affected are Gulistan-e-Jouhar, North Nazimabad and Shah Faisal Colony.

Conflict of Interest

The authors disclose that they have no conflicts of interest.

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