

Prevalence of Typhoid fever and *Helicobacter pylori* infection in local population of Faisalabad, Pakistan

Ali Raza Ishaq (✉ alirazaattari476@gmail.com)

Hubei University

Research Article

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Abstract

Background

Typhoid fever and *Helicobacter pylori* infection increases the secretion of gastric acid that leads to gastric carcinoma. In this research, we have tried to investigate the prevalence of typhoid and *H. pylori* in Faisalabad, Pakistan.

Method

In the present study, we collected the laboratory reports from different hospital of Faisalabad, Punjab, Pakistan. Statistical Package for Social Sciences (SPSS) (Chicago, IL), version 25 was used for data processing.

Result

Our results demonstrated that *H. pylori* was most frequent in male at the age of 41–50-year-old and typhoid in female having 21-30 age.

Conclusion

Conclusively, mostly female in typhoid and male in *H. pylori* were infected. People having 21-30 age were greatly infected by typhoid. The patients owing the 41-50 age were more susceptible for *H. pylori* infections. By comparing the co-infection rate, we found that typhoid is most common in over all age group than *H. pylori*.

Introduction

Typhoid fever is a major health issue in developing countries such as Pakistan [1]. According to WHO, the global burden of typhoid fever is about 21 million cases per year, with rate of mortality 1-4% 30170987. In Asia, the morbidity of typhoid fever is with 93% of global episodes occurring in this region. It is estimated that the incidence rate in Southeast Asia about 110 cases/100,000 population [2]. The sources of infections is certain foods such as ice, unbranded ice cream, chilled food, and contaminated water [1, 3]. However, typhoid fever has been detected in the months of September, October and after monsoon rains in July to August [2].

Salmonella enterica serotype typhi is a rod shaped, flagellated, gram-negative bacterium that causes typhoid fever. In 1829, Pierre Louis was the first scientist that identified the lesions in the abdominal lymph nodes of gastric fever patient and coin the term “typhoid fever”. The term “typhus” is a Greek word which meant “smoky” that is used to narrate the delirium that patient would exhibit with the disease[4].

In 2000, it has been estimated that there were about 21.7 million cases of typhoid fever and 216,000 death rates globally [5]. Typhoid fever is more commonly present in children as well as in young adults

and associated with low-income countries in which poor sanitation is prevalent [6–8]. In 2010, International Vaccine Institute estimated about 11.9 million cases and 129,000 death cases of typhoid fever in middle-income countries [9]. In USA, about 200 to 300 cases of *Salmonella enterica* serotype typhi a gram-negative bacterium, are reported every year, and about 80% cases are from travelers returning from endemic areas [10, 11].

In the pre-antibiotic period, it has been estimated that the mortality rate was 15% or more. Hence, mortality rates have been decreases to less than 1% via introduction of antibiotics[7, 12]. Many other complications have been occurred in 10–15% of the patients that were infected from typhoid fever. Although, many complications have been investigated in the literature, but the most common complications comprise intestinal perforation, relapse, typhoid encephalopathy, and gastrointestinal hemorrhage[6, 7].

Chloramphenicol is the first antibiotic that has been used to treat the infections cause by *Salmonella enterica* serotype typhi is a gram-negative bacterium [7]. After 2 years later, resistant form of typhi bacterium were discovered in the community[7]. Recently, ciprofloxacin or ofloxacin antibiotics have become the mainstay of treatment [6, 7, 13]. Instead of significant efforts in medical and research field, typhoid fever is still a major, globally, public health concern.

Helicobacter pylori is also a gram-negative spiral bacterium that is the major cause of chronic human gastritis. *H. pylori* infection is also associated with many other diseases such as gastric cancer and peptic ulcer [14]. In 1994, the international Agency for Research on Cancer categorized *H. Pylori* infection as a group I carcinogen. Hence, the incident rate of gastric cancer is decreases and it remain the 4th common cancer and 2nd leading cause of cancer related deaths worldwide[15].

H. Pylori is linked to various other gastroduodenal diseases; hence, about 20% of infected individual develop sever diseases[16]. Prevalence of *H. pylori* antibiotic resistance is upsurge globally and is the main aspect affecting potential of current therapeutic regimens[17].

Additionally, environmental, dietary factors, contamination, another possible factor for the varying outcomes of *H. pylori* infection relates to differences in the virulence of *H. pylori* strains. Various virulence factors of *H. pylori* including *cagA*, *vacA*, *oipA*, *babA*, *homA/B* and *hopQ* have been explored to be predictors of gastric atrophy, intestinal metaplasia, and various other clinical outcomes[18–20].

Our aim of study to review the recent data on *H. Pylori* and *Salmonella enterica* resistance towards prevalence rate at different age group of individuals in district Faisalabad, Punjab, Pakistan.

Material And Method

Study Area:

Faisalabad, Pakistan's third largest city, is situated between latitudes 31.41°N and 73.11°E and has a population of more than 2.6 million, is recognized an industrial engine of Pakistan. This study was

conducted in the private laboratories of district Faisalabad, Pakistan.

Data Collection for typhoid and H-Pylori:

Data collection was based on sex, age, and test result. For this study, 323 samples (n=323) were collected from suspected subjects of typhoid from both male (n= 129) and female (n=194) comprises of eight age group ranges viz >01-10 (n=8), 11-20 (n=58), 21-30(n=93), 31-40 (n=78), 41-50 (n=40), 51-60 (n=27), 61-70 (n=17) and above ≥ 70 (n=2) years old during 1st , April to 30th , June 2021 at various private laborites of Faisalabad-Pakistan.

Just like the above mentioned basis for typhoid, 296 samples (n=296) were collected from suspected subjects of *H. pylori* from both male (n= 168) and female (n=128) comprises of eight age group ranges viz >01-10 (n=4), 11-20 (n=16), 21-30(n=80), 31-40 (n=68), 41-50 (n=60), 51-60 (n=38), 61-70 (n=24) and above ≥ 70 (n=6) years old during 1st , April to 30th , June 2021 at various private laborites of Faisalabad-Pakistan.

Statistical Analysis:

Statistical Package for Social Sciences (SPSS) (Chicago, IL), version 25 was used for data entry, processing, and statistical analysis. p value was calculated by χ^2 test was used for categorical variables. A 2-tailed $p \leq 0.05$ was statistically significant.

Results

Table 1: represents the prevalence of typhoid in different age groups. It was proved that highest prevalence observed between 21-30 age group. Our study revealed that *Salmonella enterica* serotype typhi infected the 67.2% people. It was also noticed that there was no effect of gender in the incidence of typhoid infection because our chi-square value (0.872) was greater than 0.05.

Table:01 Prevalence of Typhoid Infection in different age groups.

Age * Typhoid Crosstabulation					
			Typhoid		Total
			Negative	Positive	
Age	1 to 10	Count	4	4	8
		% of Total	1.2%	1.2%	2.5%
	11 to 20	Count	29	29	58
		% of Total	9.0%	9.0%	18.0%
	21 to 30	Count	30	63	93
		% of Total	9.3%	19.5%	28.8%
	31 to 40	Count	17	61	78
		% of Total	5.3%	18.9%	24.1%
	41 to 50	Count	14	26	40
		% of Total	4.3%	8.0%	12.4%
	51 to 60	Count	7	20	27
		% of Total	2.2%	6.2%	8.4%
	61 to 70	Count	3	14	17
		% of Total	0.9%	4.3%	5.3%
	Above \geq 70	Count	2	0	2
		% of Total	0.6%	0.0%	0.6%
Total		Count	106	217	323
		% of Total	32.8%	67.2%	100.0%

Table:02 proved the relationship of age-typhoid infection. If p-value is less than 0.05 then results are significant. The young age people (21–30-year-old) were more susceptible for typhoid because they used the fast-foods, soft drinks, foods with high flavor content like garlic, onion, aged cheese, mushrooms, kimchi, seafood, seaweed, and Spicy and acetic acid foods like green chili, red chili, spicy sauces, vinegar, readymade salad dressings, mayonnaise, liquid mustard.

Table:02 Chi-Square test for Typhoid

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.687 ^a	7	.006
Likelihood Ratio	20.053	7	.005
Linear-by-Linear Association	5.261	1	.022
N of Valid Cases	323		
a. 3 cells (18.8%) have expected count less than 5. The minimum expected count is .66.			

Table:03 represent the mortality of H. pylori in population. The overall mortality rate is 48.6% but the patient of 41-50 age groups has high prevalence rate with respect to other (12.8%).

Table:3 Prevalence of H Pylori Infection in different age groups.

Age * <i>H Pylori</i> Infected Crosstabulation					
			H Pylori Infected		Total
			Negative	Positive	
Age	1 to 10	Count	0	4	4
		% of Total	0.0%	1.4%	1.4%
	11 to 20	Count	8	8	16
		% of Total	2.7%	2.7%	5.4%
	21 to 30	Count	52	28	80
		% of Total	17.6%	9.5%	27.0%
	31 to 40	Count	38	30	68
		% of Total	12.8%	10.1%	23.0%
	41 to 50	Count	22	38	60
		% of Total	7.4%	12.8%	20.3%
	51 to 60	Count	18	20	38
		% of Total	6.1%	6.8%	12.8%
	61 to 70	Count	14	10	24
		% of Total	4.7%	3.4%	8.1%
	Above \geq 70	Count	0	6	6
		% of Total	0.0%	2.0%	2.0%
Total		Count	152	144	296
		% of Total	51.4%	48.6%	100.0%

Table:04 shown the confirmation of our result with respect to age. Our chi-square test proved that the patients belong to the 41-50 age group, more susceptible to *H. pylori*.

Table:04 Chi-Square test for H. pylori

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.980 ^a	7	.002
Likelihood Ratio	26.996	7	.000
Linear-by-Linear Association	3.304	1	.069
N of Valid Cases	296		

a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is 1.95.

Discussion

Our study demonstrates the prevalence of Typhoid fever and *H. pylori* infection in a local population of Faisalabad. This was a cross-sectional study conducted in the private laboratories of Faisalabad, Pakistan, including several males and females of different age groups. Pakistan has already performed studies on the epidemiology of typhoid and *H. pylori* infection and estimated that about 21 million people contract typhoid annually, and 50-90% people contract *H. pylori* annually.

Studies have showed that the major risk factors for endemic typhoid are unhygienic environment, not washing hands before and after eating, ice-creams and flavored ice [21]. The low socioeconomic status has been a major reported effect on *H. pylori* infection in a major population [22, 23]. The association of virulent factors such as *cagA*, *cagB*, *homaA/B* etc., with gastritis, duodenal ulcer has also been reported.

The findings of this study explain that people from age 21-30 are more suspected of typhoid and *H. pylori* infection (41-50). Mostly are females in the case of typhoid and males in the point of *H. pylori* [18]. Typhoid cases are more positive, and *H. pylori* cases are primarily negative, indicating that typhoid is more common than *H. pylori* infection.

The data were analyzed statistically using the software "Statistical Package for Social Sciences (SPSS) (Chicago, IL), version 25". A Chi-square test was performed, and results were obtained.

The p-value of typhoid fever and *H. pylori* infection is .006 and .002, respectively, less than 0.05. If the p-value is less than 0.05, it is statistically significant and indicates strong evidence against the null hypothesis as there is less than a 5% probability the null is correct. So, we reject the null hypothesis and accept the alternative idea.

Conclusion

Typhoid is most common infection than *Helicobacter pylori* in the population Faisalabad due to industrialization. We found that *Helicobacter pylori* and typhoid was common at the age of 41-50, 21-30

respectively. We must adopt systematic preventive measure for curing disease.

Declarations

Statement of Human and Animal Rights:

All experimental procedures involving human were conducted in accordance with Invitro Gensis Research center Samundri Faisalabad, Punjab, Pakistan.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIAL

Not applicable.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

ARI: Design the conceptualizing, writing main draft, editing, MR: Data collection, TY: Review and editing the draft, RB: contribution in writing, R: Statistical Analysis and OU: contribution in writing

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