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Full Length Research Paper

Prevalence of typhoid fever in referral hospitals in Umuahia and Aba, Abia State, Nigeria

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The prevalence of typhoid fever in referral hospitals in Umuahia and Aba, Abia State, Nigeria was studied using standard microbiological techniques. A total of 500 subjects within the age range of 1-70 years were enrolled. A total of 229 subjects were infected with a prevalence rate of 45.8%. The males had the highest prevalence rate of 50.9%, while females had a prevalence rate of 41.9%. In Aba, 125 (50.0%) subjects were positive, while 104 (41.6%) were recorded in Umuahia. The age group of 21-30 years had the highest rate of 63.3%. Traders were most affected (62.5%). The stool cultures from males had the highest prevalence of 24.8% in ABSUTH, Aba while females had the lowest of 16.0% in FMC, Umuahia. Hence, health care personnel should not totally depend on widal test alone for the diagnosis of enteric fever but should use other diagnostic methods to differentiate *Salmonella* infection from other related infections.

Key words: Widal test, stool culture, typhoid fever, *Salmonella typhi* and prevalence.

INTRODUCTION

Good health is therefore basic to human welfare and a fundamental objective of social and economic development, yet most Nigerians lag far behind other developing countries in the vital task of improving health. Abia state is inhabited mostly by the Igbo ethnic group who are predominantly Christians. The main occupations in Abia are trading, farming and civil service. The State has a population of 2.8 million people and is divided roughly equally between females and males (1.39 million and 1.43 million respectively). The ten common causes of morbidity and mortality in the state are: (1) Malaria; (2) Typhoid fever; (3) Measles and other vaccine preventable diseases; (4) Diarrhoea; (5) Respiratory tract infections; (6) Hypertension; (7) Complication of pregnancy and child birth; (8) Trauma/ RTA; (9) HIV/AIDS; (10) Tuberculosis (Abia State Ministry of Health, 2010).

Typhoid fever is a systemic disease caused by *Salmonella typhi* and is the major cause of morbidity and mortality worldwide (*Ramyil,* 2013*).* Human beings are the only reservoir for typhoid fever. Poor sanitation, overcrowding, lack of medical facilities, low standard of living and indiscriminate use of antibiotics lead to endemic of typhoid fever and multi-resistant strains of *Salmonella typhi* in developing countries (Baddam *et al*., 2012).

The WHO (2016) estimate about 20 million cases of typhoid fever with > 600,000 deaths annually in India, South and central America and Africa where they constitute serious source of morbidity and mortality with rapid population growth, increased urbanization, and limited water, health system and infrastructure.

The widal test, stool culture, blood culture and urine culture are the most reliable diagnostic means of confirming *Salmonella* infection. However, in many develop-

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ing countries, the widal test is the most widely use test in typhoid fever diagnosis because it is relatively cheaper, easy to perform and requires minimal training and equipment (Ley *et al*., 2010). This study investigated the prevalence of typhoid fever in referral hospitals in Umuahia and Aba, Abia State, Nigeria.

MATERIALS AND METHOD

Study area

This study was conducted in Aba and Umuahia, Abia State, Nigeria. Aba is a commercial focal point of the state. Predominant occupation is trading and other commercial activities. Umuahia is the state capital located in the central part of the state.

Ethical Clearance

Ethical clearance was obtained from the management of Federal Medical Centre, Umuahia, and Abia State University Teaching Hospital, Aba. Informed consent of volunteers and guardians were obtained, and in addition, confidentiality of the result was ensured.

Sample Collection

About 3-4 mls of blood specimen were collected from the 500 subjects through venipuncture and immediately dispensed into plan tubes and allowed to clot, the sera were used for widal test. Stool specimens were also collected from the same subjects in sterile universal disposable bottles with screw cap as proposed by Ekeleme (2017).

Widal test (slide agglutination method)

The widal test was performed using the venous sera obtain from the subjects using widal test kit produced by Ca-test diagnostic Inc, China. This was carried out in accordance to manufacturer's instructions. The reagents contained Salmonella typhi O and H, antigens C and Salmonella paratyphi A, B and C antigens. A titer of greater 1/80 indicated *Salmonella* infection (Ahmed *et al.,* 2009). The reagents and specimens were brought to room temperature and the antigens were shaken properly to mix well before dispensing. A drop of patient serum to be tested was place onto each of the required number of circles on the tile; one drop of widal antigen suspension was added to the reaction circles containing patient's serum using a capillary pipette. The contents in each circle were mixed using different mixing applicator sticks provide, the tile was rocked back and forth and observed for agglutination macroscopically for one minute (Cheesbrough, 2005).

Stool Culture

The already prepared Xylose Lysine Deoxycholate Agar (XLD) and Deoxycholate Citrate Agar (DCA) were incubated at 37^0C for 24hours. A piece of stool was collected from the universal bottle using a heat fixing wire loop and streaked on DCA and incubated at 37^0C for 24 hours; following a subsulture on XLD agar to obtain a specific isolate. However, Xylose Lysine Deoxycholate Agar enhanced the growth of the *Salmonella*, and the presence of *Salmonella* was indicated by pink-red colonies, whereas hydrogen sulphide (H_2S) produced red colonies with black centers (Cheesbrough, 2005).

Isolation, Characterization and Identification of *Salmonella*

Gram staining, Biochemical reaction (Indole test, Citrate test, Catalase test, Urase test and Mortility test) were performed to confirm and determine the ability of the organism to split indole from amino acid and tryptophan, to utilise citrate and production of gas bubbles in the presence of salmonella species (Ramyil *et al*., 2013).

RESULTS

A total of 500 subjects were enrolled into the study. This was made of 216 males and 284 females. The males had the highest prevalence rate of 50.9%, while females had 41.9% (Table 1).

Table 2 shows the age and gender distribution of typhoid infection. The age group of 21-30 years had the highest prevalence of 55.0% and 68.5%, respectively in referral hospitals (FMC, Umuahia and ABSUTH, Aba). The lowest prevalence of 25.0% was evidence among 61-70 years in FMC, Umuahia. Females (21.6% and 26.0%) were mostly affected than the males (20.0% and 24.0%) in the two referral hospitals.

Table 3 summarizes the occupational related prevalence of typhoid infection in the referral hospitals. Traders attending ABSUTH, Aba and FMC, Umuahia had the highest prevalence of 89.0% and 62.5%, respectively. There was a significant difference in typhoid infection among the traders attending the referral hospitals at $p > 0.05$.

Table 4 shows that the number of females whose blood specimens tested positive for widal test was 56(22.4%) in FMC, Umuahia and 65(26.0%) in ABSUTH, Aba. However, the males were less prevalent 48(19.2%) in FMC, Umuahia and 60(24.0%) in ABSUTH, Aba, respectively. Males stool cultures had the highest prevalence of 24.8% in ABSUTH, Aba.

DISCUSSION

In this study, a total 500 subjects aged 1- 70 years were

Table 1. Prevalence of Typhoid infection among the study population.

Gender	No examined	No. infected	Non infected	Prevalence rate (%)
Males	216	110	106	50.9
Females	284	119	165	41.9
Total	500	229	271	45.8

Table 2. Age and gender distribution of typhoid infection in referral hospitals (FMC, Umuahia and ABSUTH, Aba) in Abia State.

	FMC, Umuahia (n = 250)				ABSUTH Aba (n=250)			
Age Group (years)	Total no. of Subjects	Male + (%)	Female + (%)	Total + (%)	Total no. of subjects	Male + (%)	Females + (%)	Total (%)
1-10	20	5(25.0)	5(25.0)	10(50.0)	22	4(18.1)	2(9.1)	6(27.2)
11-20	56	16(28.5)	5(8.9)	21(37.5)	50	10(20.0)	15(30.0)	25(50.0)
21-30	60	15(25.0)	18(30.0)	33(55.0)	70	24(34.2)	24(34.2)	48(68.5)
31-40	32	7(21.6)	6(18.7)	13(40.6)	41	10(24.3)	11(26.8)	21(51.2)
41-50	35	3(8.5)	7(20.0)	10(28.5)	37	6(16.2)	6(16.2)	12(32.4)
51-60	27	2(7.4)	10(37.0)	12(44.4)	20	5(25.0)	4(20.0)	9(45.0)
61-70	20	2(10.0)	3(15.0)	5(25.0)	10	1(10.0)	3(30.0	4(40.0)
Total	250	50(20.0)	54(21.6)	104(41.6)	250	60(24.0)	65(26.0)	125(50.0)

Key: FMC = Federal Medical Centre; ABSUTH = Abia State University Teaching Hospital; + = Positive; - = Negative.

Table 3. Socio-demographic distribution of typhoid infection in referral hospitals (FMC, Umuahia and ABSUTH, Aba) in Abia State.

	FMC, Umuahia		**ABSUTH, Aba**	
Occupation	**Total No. Examined**	**No. Infected (%)**	**Total No. Examined**	**No. Infected (%)**
Students	80	26 (32.5)	88	30 (34.1)
Civil servants	75	41(54.6)	52	29 (55.7)
Unemployed	20	5 (25)	15	3 (20.0)
Farmers	35	8 (22.8)	39	12 (30.7)
Traders	40	25 (62.5)	56	50 (89.0)

enrolled. This was made of 250 each from the two referral hospitals selected (FMC, Umuahia and ABSUTH, Aba). The overall prevalence rate of typhoid infection in the two referral hospitals in Abia State was 45.8%. In a study by Ogwuebu *et al.* (2016), the prevalence rate of typhoid infection in Imo State was 19.6%. However, this study observed a higher prevalence of typhoid infection in Abia State; females were mostly affected (51.9%) than the males (48.0%). A similar study carried out in Northern part of Nigeria also noted that females were highly affected

Table 4. Gender based positive results of widal test and stool culture in the study population.

Gender	FMC, Umuahia (n = 250) Widal test (%)	Stool Culture (%)	ABSUTH Aba (n=250) Widal test (%)	Stool Culture (%)
Males	48(19.2)	58(23.2)	60(24.0)	62(24.8)
Females	56(22.4)	40(16.0)	65(26.0)	58(23.2)
Total	104(41.6)	98(39.2)	125(50.0)	120(48.0)

(81.2%) than the males (53.1%) as reported by *Ramyil et al.* (2013). Chalya *et al.* (2012) observed 8.7% typhoid fever cases in which males were affected twice more than the females (2.6:1). WHO (2006) also revealed that the male to female ratio of 1:1 has been reported on several occasions, but Udeze *et al*.(2010) recorded more significant titer in female than in male.

The largest number of typhoid patient (62.3%) was noted in the age group 21-30 years. The least was recorded in the age group 61-70 years. Otegbayo (2005), states that typhoid fever is a disease transmitted by the faecal-oral route and it's a public health problem especially in the developing countries. Makhanu *et al.* (2014) states that as humans are the only source of infection, and transmission of *S. Typhi* is by the faecal-oral route through contaminated water or food. According to Makhanu *et al.* (2014), it continues to be a public health problem in many developing countries in sub-Saharan Africa.

Male's stool culture were more positive than female's aged 1-70 years. In a study, females stool culture specimens were infected than males aged 20-72 years as reported by Luby *et al*. (2013). Age group 1-10 years had 40.0%, it can be as a result of the differences in food handling practices and hygiene in children, together with the quantity of food consumed, in the sense that children (mostly female children) could pick food directly from the floor and can also be their eating habit wherever they find themselves. But the fact remains that the disease occurs irrespective of the gender.

CONCLUSION

The findings of this study indicate reason for public health concern in the study towns of Abia State. This provides base line information for evidence-based planning and implementation of typhoid control activities in the state. In addition, widal test should be performed using O and H antigens.

Conflict of interest

Funding

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Competing interests: None

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