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CONCOMITANT TYPHOID INFECTION IN URINARY SCHISTOSOMIASIS IN SOUTH EASTERN NIGERIA.

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ABSTRACT

Concomitant typhoid fever infections in Urinary Schistosomiasis was investigated using both stool culture and serological techniques (widal test). Of the 503 urinary schistosomiasis patients screened 233 (46.32%) were typhoid fever positive by culture method while 259 (51.49%) were positive with widal test. Controls only gave 10% positive results. Statistical analysis showed no significant difference in the diagnostic methods but significant typhoid prevalence among the schistosomiasis patients (X^2 = P = 0.05). There was no significant difference in the concomitant infection between the males and females but individuals between 10-20 and 20 – 30 years of age years of age were significantly more infected than those of other age groups.

INTRODUCTION

Schistosomiasis, caused by species of trematode Schistosoma, is a parastic disease of great soico-economic and public health importance, second only to malaria. (Roger, 1986, WHO, 1992, 1994). Several species are known but few have been implicated in human infections which include S haematobium, S japonicum, S mansoni, S. mansoni, S. mekongi, S matthcei and S. intercalatum (Arene *et al*, 1989, WHO, 1994). Several millions of people are infected in 74 to 82 countries with over 20 million being clinically morbid or disabled (Garfield, 1991, WHO, 1994). The disease is mainly chronic (Frandsen, 1979; Savioli and Mott, 1989).

Parasitic disease, though caused by various parasites (helminth, protozoa, nematodes, etc) are aggravated by concomitant microbial infections. Nduka *et al*, (1993) had reported the aggravation of paragonimiasis by concomitant or secondary bacterial infections especially during hemoptysis in parts of South Eastern Nigeria, Chessbrough (1984) and Cook (1990) reported the observation of Salmonella infection in Schistosomiasis of S. mansoni origin.

This work therefore sets out to investigate the prevalence of typhoid infection in the urinary schistosomiasis endemic area with regards to age and sex of the people. In addition, the use of serological test (Widal test) as a diagnostic procedure in such an area will also be examined.

MATERIALS AND METHODS

The study area was Umuchieze which lies at the Northern part of Abia State, Nigeria. All specimens were analyzed in Abia State University, Uturu Department of Microbiology Laboratory.

SAMPLE COLLECTION

Two clinical specimens were collected during this work. Stool specimens were obtained in sterile wide mouthed plastic containers with cover from 503 urinary Schistosomasis patients identified during the preliminary survey. The preliminary survey involved the microscopic examination of subjects urine for the characteristically terminally spined eggs of S. haematobium. The urine specimens with the eggs wee taken as positive, those without eggs were negative and taken as controls. Stool and blood collected by venepuncture, were also collected from 200 Schistosomiasis negative individuals as controls.

EXAMINATION OF SPECIMENS

The stool specimens were inoculated on prepared Deoxycholate Agar (DCA) and Salmonella Shigella Agar (SSA) plates and incubated at 37^{OC} for 24-48 hours in Gallenkamp ordinary incubator. Observed bacterial colonies (colonies which turned black after 24 hours on DCA) were sub-cultured for pure isolates and subjected to microscopy (after staining) and some biochemical test for characterization and identification. The biochemical tests carried out include Indole, Methyl Red Voges-Proskauer and Citrate Utilization tests. Others include Urease, Oxidase, Nitrate reduction, Hydrogen Sulphide production and sugar fermentation tests. The sugar tested were Glucose, Mannitoll Maltose, Xylose and Arabinose.

The blood specimens were allowed to stand at room temperature for 1 hour in order to clot. The serum obtained was subjected to Widal test analysis using Biomed kits. Typhoid positive serum was taken as that with visible agglutination at ≥ 1:160 dilution.

RESULTS

Five hundred and three urinary Schistosomiasis – positive patients and two hundred Schistosomiasis – negative individuals were screened for typhoid fever using both culture and serological test (Widal). Of the 503, 233 (46.32%) of the urinary Schistosomiasis patients were observed to be typhoid fever positive using culture method, while 259 (51.49% were observed positive based on Widal test technique. The control gave only 10% positive in each method used (Table 1). Statistical analysis showed a significant typhoid fever prevalence among the Schistosomiasis patients (X^2 = P. 05). The diagnostic technique used did not give any statistically different result (X^2 = P.05).

Of the 317 males and 186 females screened, 151 (47.63%) males and 82 (44.09%) females were infected using culture method. The Widal test results showed 167 (52.68%) of the 317 males and 92 (49.66%) of the females as positive for typhoid. There was no significant difference in the prevalence of typhoid fever between the males and females in the area.

Subjects between 10-20 and 21-30 years age groups were significantly more infected than those of other age groups (X2 = P.05) (Table 2). Similar trends were observed using both types of diagnostic (Serological and culture) procedures.

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TABLE 1: PREVALENCE OF TYPHOID INFECTION AMONG URINARY SCHISTOSOMIASIS PATIENTS IN THE STUDY AREA:

	TEST SPECIMENS					CONTROLS SPECIMENS		
	Males		Females					
Methods Diagnosis	NE	NI (%)	NE	NI (%)	Total	NI(%)	NE	N1(%)
culture (stool)	317	151(47.63)	186	82(44.09)	503	233(46.32)	200	20 (10)
Widal Test (Blood Serum)	317	167 (52.68)	186	92(49.46)	503	259(51.49)	200	20 (10)

KEY:
NE = Number Examined
N1 = Number Infected
% = Percentage of each group infected in bracket.

TABLE 2: PREVALENCE OF TYPHOID INFECTION AMONG URINARY SCHISTOSOMIASIS PATIENTS OF DIFFERENT AGE GROUPS IN QUARRY PITS SITE OF. DIAGNOSTIC TECHNIQUES

	CULTURE TECHNIQUE (STOOL)			WIDAL TEST (BLOOD SERUM)		
YEARS	NE	NI	%	NE	NI	%
0-10	50	24	42.1	50	24	48
11-20	210	98	46.67	210	112	53.33
21-30	164	76	40.34	164	84	51.22
31-40	56	26	46.43	56	27	48.22
41-50	15	6	40	15	8	53.33
51 and above	8	3	37.51	8	4	50.00
TOTAL	503	233	46.32	503	259	51.49

KEYS:
NE = Number of individuals examined in each group
NI = Number of individuals infected in each group
% = Percentage of individuals infected.

CONFIRMATION OF THE ISOLATES AS SALMONELLA SPECIES

The isolates were motile, gram negative rods which were indole negative, Mr positive, VP negative and Citrate negative. The other characteristics are shown in table 3.

CONFIRMATION OF THE SUBJECTS AS TYPHOID PATIENTS

A second set of specimens (stool and blood) were obtained from the urinary schistosomiasis positive and negative subjects and subjected to both culture and serological tests again for confirmation of the typhoid cases. The second set of specimens were collected four to five days after the first one. Those that remained positive in both sets of tests were regarded in this work as positive cases.

DISCUSSION

In this investigation, the culture of stool specimens from 503 urinary Schistosomiasis patients yielded 46.32% positive Salmonella species isolates. Screening using serological test (Widal) gave 51.43% positive typhoid infection. The results obtained from both diagnostic techniques suggest high typhoid prevalence among the urinary Schistosomiasis patients. This is more remarkable as only 10% of the 200 urinary Schitosomiasis negative individuals gave positive result.

Though the values observed in this work are high, they are still lower than 72% observed in Singapore by Pong and Puthuchery (1993) but higher than the 32% seen in [illegible] Cawden and Noah (1989). Singapore and Egypt are noted for mainly intestinal Schistosomiasis. Endemicity.

The high prevalence of typhoid fever observed in this work is due to several factors. According to Cook (1990) and Chessbrough (1984), typhoid is common intestinal Schistosomiasis endemic area and Schistosomiasis has been show to be endemic in Umuchieze, the study area (Nduka *et* al., 1995, Nwaugo 1998). Frequent outbreaks and endemicity of typhoid fever is a common feature of areas with low sanitary standard and poor hygiene (Rao *et al.*, 1980, Stephen *et al.*, 1984). Nduka *et al.*, (1993, 1995) and Nwaugo (1998) had reported this low hygiene level in the area.

It was observed that widal test gave slightly higher, though statistically insignificant values than culture method. The difference, though not significant shows some important features. Chew *et al* (1992) had observed similar occurrence in their study in Singapore. Cook (1990) and Chessbrough, (1984) have suggested that the higher values observed in Widal test method could be due to the production of the anti bodies by Schistosoma species which could cross react with the antigens produced by the Salmonella species. Chew *et al*

TABLE 3: CHARACTERISTICS OF THE *SALMONELLA* SPECIES ISOLATED FROM THE STOOL SPECIMEN EXAMINED.

Test	*Result Obtained*
Methyl Red Test	-
Vogues- Proskeur Test	+
Citrate Utilization test	-
Urease Test	-
Motility	-
Catalase test	+
Oxidase test	-
NO_3 reduction test	1
H_2S from TSI	+
Gelatin Hydrolysis	-
Gram Stain	Gram negative rods, mainly in singles
Super Fermentation	
- Glucose	-
- Arabinose	A
- Maltose	A
- Mannitol	A
- Xylose	-
- Sorbitol	-
- Lactoe	-

Key:
\+ = Positive
\- = Negative
A = Acid
NB: All tests were carried out as described by Chessbrough (1987).

(1992) Hernandez – Velardi *et al* (1980) and Levine *et al*) agree that there could be small differences between cultural and Serological evidences in typhoid. Pong and Puthucheny (1989) and Rao *et al* (1990) have also observed similar situations with, the minor differences between culture and serological diagnostic methods.

Results obtained in this work showed that the sex of the individual did not play any role in the concomitant infection of Schistosomiasis and typhoid infections. This implies that the only important factor was the presence of the Schistosomiasis disease, which predisposed the subjects to typhoid infection. However, this was not the same with age as subjects between 10-20 and 21-30 years age groups were significantly more infected (P= 0.05) than those of other age groups. Nduka et al (1993; 1995) had reported that subjects of 10-20 years generally are more adventurous than other age groups. In a similar vein, Ferrecio *et al* (1989) and Levine et al (1978) had stated that typhoid fever was more prevalent in adolescents and young adults than in older subjects.

In conclusion, this work agrees that high typhoid prevalence is common in Schistosomiasis endemic areas but not limited to intestinal Schistosomiasis, meaning that both urinary and intestinal Schistosomiasis can predispose one to typhoid fever infection. In addition, the study confirms that Widal test and cultures techniques are still reliable diagnostic tools in typhoid diagnosis.

REFERENCES

Arene, F. O. Ukpeibo, E.T. and Nwanze E. A., 1989. Studies on Schistosomiasis in the Niger Delta, S. Interalatum in the Urban City of Port Harcourt, Nigeria Public Health 103 (4): 295-301.

Chessbrough, M., 1984. Medical Laboratory Manual for Tropic Countries. 3rd Edition (ELBS) Tropical Health Technology and Butterworth London.

Chew, S. K. Cnizi, M. S. P., Irim, Y. S. and Monteiro, E. H., 1992. Diagnostic value of the Widal test for typhoid fever in Singapore. Journal Tropical Medicine and Hygiene. 95: 288: 291.

Cook, G. C., 1990. Parasitic disease in Clinical Practice. The Bloomsburg, Series in Clinical Services. Springer-Ver-Log London, Paris 340-365.

Cowden, J. M. and Naoh, N. D., 1989. Salmonella and eggs. Archeology of Disease in Childhood. 64: 1419-1420.

Ferreccio, C. Levine, M. M. and Materola, A., 1984. Benign bacteriemia caused by *Salmonella typhi* and *S. paratyphi* in children younger than 2 years. Journal of Pediatrics. 104: 899-901.

Frandson F. C., 1979. Studies of the relationship between *Schistosoma* and their intermediate hosts II. The Genus *Bulinus* and S. *Heamatobium* from Sudan Zaire and Zambia. Journal of Helminthology 49: 73-84.

Garfield, 1996. Schistosomiasis. The Scourge of the third world, part II. Diagnosis and treatment. Current Comments 10:3-8.

Hernandez-velardl, R., Sanchez-Castillo, J., Diaz-Condinez, M., Munoz-Hernandez, O., 1980. Detection of antibodies to *Salmonella* 'O' antigen in typhoid fever by counter immuno-electrophere. Arch. Investment in medicine 10:23-25

Igbozurike, M., 1986. The Isuikwuato Okigwe Region. Rato press, Owerri Nigeria,

Levine, M.M,, Grados D., Gilman, R.H., Woodward, W.E. Solisplaza, R, and Waldman, W., 1978. Diagnostic value of widal test in areas endemic for typhoid fever American Journal of Tropical Medicine and Hygiene 27: 795-800.

Nduka, F. O., Nwaugo, V. O and Nwachukwu, N. C., 1993a. Bacterial associated with paragonmiasis infection in Okigwe area of Imo State, Nigeria. Nigerian Journal of Biotechnology 11: 66-75

Nduka, F. O Ajaero, C.M.U. Nwoke, B.EB., 1995. Urinary Schistosomiasis among school children in an endemic community in South eastern Nigeria. Applied parasitilogy, *36*: 34-40

Nwaugo, V. O., 1998. Aspects of the epidemiology of Urinary Schistosomiasis and Bionomics of Bulinus species (Intermediate host of S haematobium) in Quarry pits of Umuchieze Abia State Nigeria. Ph.D Thesis Abia State University, Uturu Nigeria.

Pong .T and Puthucheary, S.D. (1989): False positive widal test in non-typhoid Salmonella infection. South East Asian Journal of Tropical Medicine and Public Health. 20:163-165.

Roa, R.S. Sundawaraj J. Paramasiva, C.N. 7 Sabrammuman, N. 1990. Widal test as a diagnostic aid- an appraisal. Indian journal of Microbiology 20: 11-13.

Roger, F., 1986. Advances in Parasitology Proceeding of International Congress of parasitilo gy (Howell, J. ed.). Australian Academy of Science 1:3.

Savioli I. and Mott, K.F., 1989. Urinary Schistosomiasis on Pemba Island, Low-cost diagnosis for control in Primary Health Care setting *Parasitilogy* Today 5(10): 333-337.

Stephen, A.K James, J.J., Fredesick, S.B. and Phillip C.C, 1984. Typhoid fever, An epidemic with remarkably few clinical signs and symptoms. Annals of Internal Medicine, 144: 533-537.

WHO, 1992. Schistsomiasis progress 1991-1992. 11th Programme Report UNDP World Bank WHO Special Programme for Research and training in Tropical Disease 29 36.

WHO, 1992. Schistsomiasis, 20 years of progress, Highlights, 1993-1994. TDR 12th Programme Report UNDP World Bank WHO Special Report for research (TDR) 77-86.