Original Research Article

ASSESSMENT Of RISK FACTORS AND OUTCOME OF CO-INFECTION OF SOIL TRANSMITTED HELMINTHS AND H. PYLORI AMONG SCHOOL AGE CHILDREN LIVING IN RIVERINE SLUM SETTLEMENTS IN PORT HARCOURT,NIGERIA.

Abstract

Soil transmitted helminths and *Helicobacter pylori* are well-known for their high prevalence worldwide. In developing countries, Soil-transmitted helminths (STHs) and *H. pylori* infectionis highly prevalent especially in human populations with low socioeconomic status and personal hygiene which promote the spread of these infections. Thus, the objective of this study was to assess risk factors and co-infection of soil transmitted helminths and *H. pylori* among school age children living in Riverine slum settlements in Port Harcourt, Nigeria.

Methods:A community-based study was conducted among 300 school age children fromDecember 2018 to May 2019. Stool and venous blood sampleswere collected for analysis of STHsand *H. pylori* infection using standard methods, respectively after due ethical approval was obtained. Data was analyzed using SPSS version 16. A $p \leq 0.05$ was considered as statistically significant.

Results: STHs and *H. pylori* IgG were detected in 36(12.0%) and 35(11.7%) of participants, respectively. The Prevalence was insignificant ($p \geq 0.05$) . Prevalence of *H. pylori* and STHs was not statistically associated with settlement location, age group or sex of the study. Poor handwashing practice and irregular deworming exercise are the major risk factors affecting the transmission of infection in the study populations. Conclusions:Though,prevalence is insignificant, we advocate that preventive measures must be put in place which include: regular monitoring, provision of clean water, deworming and awareness campaigns to prevent a spike in level of infection in the study population.

KEY WORDS: Soil transmitted helminthes, Prevalence, H.pylori, School aged children, Risk factors

Introduction

Among the most common diseases in the world are soil transmitted helminths; an estimated 3.5 billion people are affected, and 450 million people are infected[1]. These infections are considered a serious public health problem as they cause anaemia with iron deficiency, retardation of growth in children, and other physical and mental health problems [2,3,4]. Examples of pathogenic intestinal protozoans that infects the small and/or large intestine are *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis,* and Hookworms, which affect people in tropical countries[5]. These intestinal protozoan may cause acute diarrheal diseases in children [6,7].Health impacts differ with age: the small intestinal protozoa *Giardia lamblia* and *Cryptosporidium* spp. have a serious impact on children[8.], while the large intestine pathogen *Entamoeba histolytica* has a higher morbidity among adults of all ages[9]. Some protozoa, in particular, Cryptosporidium and *Isospora belli,* cause significant morbidity in individuals with immunodeficiency[10].

H. pylori is the most common chronic human bacterial infection, infecting 70-90% of the population of developing countries and 25-50% of the people of developed countries [11]. *H. pylori* colonizes the stomach's mucus layer and induces chronic active gastritis inflammation[12]. It is a major cause of peptic ulcers and a risk factor for gastric malignancies[13]. *H. pylori* has similar mode of transmission with STH and strong co-relation to socio economic levels [14] .

There are few studies, which investigated co-infection between *H. pylori* and certain protozoa (*G. intestinalis, E. histolytica,* and *Blastocystis* spp.)[15,16,17,18,19,20]. The primary objective of the present study was to evaluate *H. pylori* prevalence and its co-existence with intestinal parasites among school aged children living in riverine slum settlements of Port Harcourt. we estimate in addition we also estimated the risk factors, which are thought to influence the prevalence of this coinfection..

Materials and methods.

Study area: the study was carried out in Eleme Local Government Area (latitude 5°04'60.00"N and longitude 6°38'59.99"E) Rivers State.

Study design: The study was a Cross-sectional randomized study

Sample size: Study participants (300) aged between 1 - 18years were enrolled from April - december 2019. Participants were categorized based on sex and age

Ethical approval and consent to participate Research: Ethical approval was sought and obtained from the Rivers State Health Management Board. Written/oral informed consents were obtained from all participants (from parents for participants <18years).

Sample collection: Data collection Questionnaires were used to obtain information on socio-demographic factors and personal hygiene and lifestyle from participants that consented to the study

Laboratory Diagnosis

About 5 ml of venous blood was collected from each participant and serum was separated for serological testing. Thereafter, each participant was given a pre-labeled clean and dry plastic container to collect fresh stool specimen so as to check for intestinal parasites. The blood samples were examined serologically for *H. pylori* immunoglobulin G (IgG) antibodies using immune-chromatographic rapid test kits (*H. pylori* test kit, LabAcon, China), which is nationally approved and used for serological diagnosis of *H. pylori* infection. The manufacturers' instruction was strictly followed for diagnosis of *H. pylori* infection

The Ritchie sedimentation technique was performed by emulsifying about 2 g of stool in 10-15 ml of 10% formol saline. The suspension was allowed to stand for 30 minutes, and then strained through two layers of gauze into a 15 ml conical centrifuge tube and centrifuged at 2000 rpm for 5 minutes. When needed, the washing step was repeated until supernatant becomes clear. The sediment was resuspended with 10 ml of 10% formal saline and allowed to stand for 5-10 minutes. A total of 3 ml of diethyl ether was added, and then the tube was shaken vigorously for 30 seconds and centrifuged at 2000 rpm for 5 minutes. After centrifugation, the applicable diagnostic stages were sedimented in the bottom of the tube. The fecal debris was separated in a layer between the diethyl ether and the 10% formol-saline layers. A fecal debris layer was loosened by wooden stick and the tube rapidly inverted to discard the top three layers while the sediment remained at the bottom. One to two drops of iodine were added to the sediment and mixed well. Then, part of the sediment was transferred to a microscope slide, covered with a cover glass and scanned microscopically under low and high objective lenses [3].

Results

An overall prevalence of 35(11.6) and 36(12.0) respectively was recorded for H.Pylori and STH (Table 1). In this study, only three species of STH (Ascaris lumbricoides, Hookworm and Trichuris trichiura) were observed; Trichuris trichiura Hookworm had the highest and least prevalence of 18(50.0%) and 07(19.4%) respectively (P = .05) According to age, children in age groups 7 – 12years had the highest prevalence for STH while age group 1- 6 years had the highest prevalence fo H.pylori. According to sex, males and females had prevalence values of 18(15.7)& 20(17.4) and 17(9.2)& 16(8.6)respectively and 52.9% (36 out of 68) respectively (Table 1). Table 2. Overall prevalence of geohelminths in study are

Sociodemographic results In the sample of 300 children for which there were blood and stool samples available, 38.3% (115) were male and 61.7% (185) were females . There were 28.3%(85) who were between 0 and 6 years of age,followed by 43.1% aged 7 to 12 (187), and 7.8% between 13-18 years old (95). Most of the children, 98.2% (426) had a history of some prior vaccination and 72.1% had been dewormed in the past six months (313). There were 58.3% of mothers (253) who had formal education and 31.8% who had breastfed their children (138). Most families had 5 to 7 people in the home (49.1%), with 56.2% of children having 1 to 4 older siblings. Within the home, 50.2% of walls were made of wood or mud (218), 94.7% used electricity in some capacity sometimes or every day (411), and 76.5% of families cooked inside the house (332).

Table 1: **PREVALENCE BASED ON SOCIO DERMOGRAPHIC FACTORS AMONG THE STUDY POPULATION**

FACTOR /PARAMETER	NUMBER EXAMINED	NUMBER POSITIVE (%)				
		H *pylori*	STH	AL	TT	HW
OVERALL	300	35(11.7)	37(12.3)	11(3.6)	18(6.0)	8(2.7)

AGE GROUP						
1-5	85(28.3)	12(34.3)	11(29.7)	3(27.2)	5(27.8)	2(25.0)
6 -10	65(21.7)	8 (22.9)	7(19.0)	2(18.2)	3(16.7)	3(37.5)
11-15	55(18.3)	6(17.1)	11(29.7)	4(36.4)	6(33.3)	1(12.5)
16-18	95(31.7)	9(25.7)	8(21.6)	2(18.2)	4(22.2)	2(25.0)
SEX						
MALE	115	18(51.4)	21(56.8)	6(54.5)	11(61.1)	3(42.9)
FEMALE	185	17(48.6)	16(43.2)	5(45.5)	7(38.9)	4(57.1)

Legends: STH: Soil-transmitted helminths;; STH; AL: *Ascaris lumbricoides*; TT: *Trichuris trichiura*; HW: Hookworm; $p>0.05$

TABLE 2 **PREVALENCE BASED ON ASSOCIATED RISK FACTORS IN STUDY POPULATION**

	Number	*Helicobacterpylori*	STH	Chi-Square (χ^2)	p-value

	Examined				
Wash hands with soap after toilet					
Yes	80 (100)	10 (12.5)	9 (11.3)	0.33	0.5657
No	220 (100)	25 (11.4)	28 (12.7)		
Wash hands with soap after playing/touching soil					
Yes	65 (100)	18 (27.7)	8 (12.3)	6.77	0.0093*
No	235 (100)	17 (7.2)	29 (12.3)		
Wash fruits and vegetables before eating					
Yes	35 (100)	9 (25.7)	10 (28.6)	0.06	0.8065
No	265 (100)	26 (9.8)	27 (10.2)		
Deworm in the last three months					
Yes	100 (100)	17 (17.0)	6 (6.0)	7.85	0.0051*
No	200 (100)	18 (9.0)	31 (15.5)		
Wears footwear outside the house					
Yes	45 (100)	20 (44.4)	19 (42.2)	0.24	0.6242
No	255 (100)	15 (5.9)	18 (7.1)		

Legends: STH: Soil-transmitted helminths; *: $p<0.05$

Discussions

Soil transmitted helminths and H. pylori are considered the most common infectious agents affecting human beings in developing countries [25]. In our study, soil transmitted helminths and H. pylori were detected in 36(12.0%) and 35(11.7%) of the 300 school aged children tested. This indicates a relatively low prevalence rate in the study population .some scholars in similar studies reported comparable results.38.3% prevalence rate was reported by abduraheem et al 2018 [21]. A similar study conducted in among school age children in Ethiopia reported a prevalence rate of 23.3% coinfection rate[22].However higher prevalence rate was published in a similar work in mexico with STH infection 44.3% and 48.3 for H. pylori infection. These variations may be due to environmental distinctiveness, life style of the study population and the endemicity of the infectious agents in the different study populations

In this study we recorded an insignificant relationship between sex and prevalence of STH and H.pylori. This observation was made in similar studies carried out were prevalence rates based on sex were statistically not different.[.23]. However a similar study reported a significant association between prevalence and gender were males had a higher infection rate than females[21].

The risk factors for both H. pylori and STH have similarities in terms of factors associated with hygiene, environmental contaminations and socioeconomic status. While an exact transmission mechanism of H. pylori is unknown, it is postulated to be transmitted via person to person or oral-fecal routes similar to many intestinal parasites [24,25,26]. In this study, practicing proper and regular hand washing practice and regular deworming exercise were the risk factors observed to significantly influence the rate of transmission among school age children. similar findings were reported in related studies were poor hygiene as it relates hand washing, living in rural setting and drinking contaminated water were reported to significantly contribute to transmission of infection. [22,27,28].

Conclusion: The results of this study should be interpreted within the context of the limitations which include the cross-sectional design and sampling method. There is temporal ambiguity in the assessment of when infections occur relative to the exposure or multiple risk factors that were assessed by the questionnaire. As the sample was collected conveniently, there is a possibility that the sample over or under-represents certain social or demographic factors, leading towards a biased understanding of the odds ratio calculations. Furthermore, the study is limited by only using a single stool sample to determine intestinal parasite infection, which may underestimate the true prevalence. However, we used multiple diagnostic approaches (i.e., direct microscopy and formolether concentration technique) as recommended by the literature to increase the sensitivity of parasite detection.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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