Original Research Article

Prevalence of *Helicobacter pylori*, *Mycobacterium tuberculosis*, Malaria Infections, and High Serum Prostate Specific Antigen Levels among Individuals at the Rivers State University: Findings of a Free Medical Outreach

Abstract

Background: Co-morbidity of infections and noninfectious diseases are becoming increasing in developing societies with little effort in identifying these trends. The study aimed to estimate the prevalence of *Helicobacter pylori*, *Mycobacterium tuberculosis*, malaria infections and high serum prostate-specific antigen levels among individuals and residents at Rivers State University, Port Harcourt, Nigeria.
Experimental Design: The study is a cross-sectional descriptive study, which consisted of 501 participants of a free medical outreach organized by the Association of Medical Laboratory Scientists of Nigeria, Rivers State University Chapter, Rivers State, Nigeria, in commemoration of the 2022 International Biomedical Day.The test subjects consist of males and females, who were students, staff and residents at the Rivers State University, Port Harcourt, Nigeria. The age range of the test subjects was 18-64 years.
Method: The cross-sectional descriptive study encompassed 501 adults (males and females) who gave consent for their blood screening during our free medical outreach. As a procedure, venous blood specimens were collected at the antecubital fossa from the attendees by venipuncture technique and were screened for *H. pylori* antibody, *Mycobacterium tuberculosis*, malaria parasite, and prostate-specific antigen with the use of Accu-Tell rapid diagnostic test kits. Each test was read within 10 minutes. Red lines on the test zone and control zones of the test kits were read and recorded as positive cases, while a red line on the control zone and the absence of a red line on the test zone of the test kit were read, and recorded as negative case, in line with the rapid diagnostic manufacturer's instructions.
Results: Out of a total of 501 participants, the prevalence of *H. pylori*, *M. tuberculosis*, *Plasmodium falciparum*, and prostate-specific antigen were 9 (1.79 %), 3 (0.6 %), 12 (2.40 %), 6 (4.65 %%) respectively. The sex-based comparison showed that males have the same prevalence for all infectious diseases (*H. pylori, M. tuberculosis* and *P. falciparum*) of 3 (2.32 %) and 6 (4.65 %) for a prostate-specific antigen. For the females, the prevalence of *H. pylori, M. tuberculosis* and *P. falciparum* were 6 (2.20 %), 0 (0.00 %) and 9 (2.42 %) respectively.
Conclusion:*M. tuberculosis* prevalence was observed to be greater in the males than in the females of the studied population. There was no observable difference in the prevalence of *H. pylori* between the male and female participants. So continuous screening of the public in order to monitor and prepare them against the insurgence of these diseases which are of public health concern is important.

Keywords: *H. pylori*, Malaria parasite, *Mycobacterium tuberculosis*, prostate specific antigen, Rivers State, Prevalence

1. INTRODUCTION

Peptic ulcer, malaria, tuberculosis and prostate cancer are co-morbidities in Nigeria and are of public health concern (Mac *et al.*, 2019). The causes of these various diseases vary, as do the signs and symptoms. Infections with *Helicobacter pylori* (*H. pylori*) occur when the bacteria infect the stomach

(Mayo Clinic, 2022). The majority of *H. pylori*-positive cases have no symptoms (de Brito *et al*., 2019). A prolonged infection, on the other hand, might induce stomach inflammation, which can lead to the formation of peptic ulcers. Chronic inflammation has also been linked to cancers such as gastric mucosa-associated lymphoid tissue lymphoma and other stomach cancers, oesophagus, colon, rectum, or tissues around the eye (termed extranodal marginal zone B-cell lymphoma) (Abbas *et al*., 2017; Noctune *et al*., 2019). The prevalence of *H. pylori* infection is higher in underdeveloped nations (Hooi *et al*., 2017). However, due to antibiotic eradication therapies, the prevalence of *H. pylori* colonization has decreased in various regions.

Despite the widespread use of many antibiotics and a live attenuated vaccine, tuberculosis (TB) still remains one of the deadliest infectious diseases and one of the oldest human ailments in the world especially sub-Saharan Africa (WHO, 2002). *Mycobacterium tuberculosis* (MTB) is the causative agent of tuberculosis, a communicable disease that primarily affects the lungs but can also affect the kidneys, spine, and brain (Barberis *et al.,* 2017). Active tuberculosis is commonly characterized by fever, chills, sweating at night, persistent coughing up blood-filled mucus and weight loss. According to reports, Nigeria accounts for almost 8% of the 4.3 million tuberculosis cases worldwide (Ugwu *et al*., 2021). Regrettably, a high prevalence of HIV/AIDS and the emergence and spread of drug-resistant TB have worsened the TB problem in Nigeria (WHO, 2018). Therefore, in order to lower the disease burden in the nation by 2030, the Federal Government, the World Health Organisation (WHO) and its partners must continuously implement targeted interventions (WHO, 2021).

A serious threat to public health is malaria (WHO, 2022). According to Gething *et al*. (2010), *P. falciparum* is thought to be the most harmful of all the malaria parasites, and it is most common in Africa. According to the WHO, 2014. Malaria is a disease that is widespread and causes a high rate of mortality and morbidity worldwide. Most hospitals in Nigeria and other countries where the disease is endemic see a higher proportion of their outpatient visits from malaria (WHO, 2010). Nigeria has made impressive progress in the fight against malaria by using integrated vector management and timely, efficient case treatments. Despite these advancements, malaria still poses a threat to 97% of Nigerians (Nwaneli *et al*., 2020). In 2021, the disease was expected to have affected 68 million people with 194,000 deaths (WHO, 2022). Environmental, socioeconomic, and interventional factors are risk factors that increase an individual's likelihood of contracting malaria (Breman, 2001).

According to Siegel *et al.* (2020), prostate cancer is the second most frequent disease in men worldwide and the most common cause of cancer-related deaths in men. As people age, their levels of prostate-specific antigen (PSA) rise (Collins and Ehimen, 2018). Since PSA testing became widely available in the early 1990s, there has been a 44% decrease in prostate cancer-specific mortality, according to data from the National Institute of Health (NIH) (Michael and Stephen, 2023). Presently, the most widely used screening test for prostate cancer is the serum prostate-specific antigen (PSA) test (Aisuodionoe-Shadrach *et al.,* 2022).

As these diseases are a burden to society, it is imperative for individuals to be regularly screened to curtail the dangers they can cause. Hence, this study aimed to assess the level of the burden of these diseases using a medical outreach programme.

2. Materials and Methods

2.1. Materials

Materials used in this study were vacutainer needles and tubes, EDTA bottles, cotton wool, 70% alcohol, pasteur pipette, centrifuge, Accu-Tell*H. pylori* IgG test cassettes, Accu-tell rapid malaria test cassettes, Accu-Tell TB rapid diagnostic test cassettes and Accu-Tell PSA Semi-quantitative cassettes.

2.2. Study Area

The study was carried out at Rivers State University in Port Harcourt, Nigeria. Rivers State University, Port Harcourt, Nigeria, is a public educational institution for Arts and Science majors. It was established in 1972 and gained independent status in 1980. The university is situated and occupies a large land mass in Nkpolu-Oroworukwo, Mile 3 Diobu, Port Harcourt.

2.3. Experimental Design

The study is a cross-sectional descriptive study, which consisted of 501 participants of a free medical outreach organized by the Association of Medical Laboratory Scientists of Nigeria, Rivers State University Chapter (AMLSN-RSU) Rivers State, Nigeria, in commemoration of the 2022 International Biomedical Day.The test subjects consist of males and females, who were students, staff and residents at the Rivers State University, Port Harcourt, Nigeria. The age range of the test subjects was 18-64 years.

2.4. Sample Collection

Venous blood specimens were collected from the attendees by venipuncture technique at the antecubital fossa into appropriately labeled ETDA bottles. The blood specimens were spun at 2500 rpm for 5 minutes. Plasma samples were collected into other appropriately labeled specimen containers.

2.5. Blood Testing /Screening of Participants

With the help of Pasteur pipette, 2 drops of plasma were transferred into the individual rapid diagnostic test kits: Accu-Tell *H. pylori* IgG test cassette, Accu-tell rapid malaria test cassette, Accu-Tell TB rapid diagnostic test cassette and Accu-Tell PSA Semi-quantitative cassette. The results were read in 10 minutes. Red lines on the test and control zones were read, recorded, and counted as positive cases, while a red line on the control zone and the absence of a red line on the test zone were read, recorded, and counted as negative cases, according to the manufacturers' instructions. All positive cases and negative cases were collated and expressed in percentages.

2.6. Statistical Analyses

Data were collated as using Microsoft Excel Sheets. The prevalence of positive cases and negative cases were expressed as percentage of each category (male, female and total).

3. RESULTS

3.1. Result of Positive and Negative cases of Screening Test amongst Male Participants

In the male category, the test results showed that out of the 129 male attendees, 3 males tested positive for *P. falciparium*, 3 males tested positive for *M. tuberculosis*, 3 males tested positive for *H. pylori* and 6 males tested positive for PSA.

Table 1. Prevalence of Disease Burden among Male Participants cases of Screening Test amongst Female Participants

Disease	Number of Samples	Positive cases n(%)	Negative cases n(%)
H. pylori	129	3 (2.32)	97.68
M. tuberculosis	129	3(2.32)	97.68
P. falciparum	129	3(2.32)	97.68
Prostate specific antigen	129	6(4.65)	95.35

3.2 Result of Positive and Negative

In the female category, out of the 372 female attendees tested, the test results showed 9 (2.42%) females, positive for *P. falciparum*, and 6 (2.20 %) females, positive for *H. pylori*. No *M. tuberculosis* was detected in the females.

Table 2.Prevalence of Disease Burden among Female Participants

Disease	Number of Samples	Positive cases n(%)	Negative cases n(%)
H. pylori	372	6 (2.20)	97.80
M. tuberculosis	372	0(0.00)	100.00
P. falciparum	372	9(2.42)	97.58

3.3. Result of Positive and Negative cases of Screening Test amongst Participants

In total, out of 501 attendees (both males and females) tested, 12 (2.40%) attendees tested positive for *P. falciparum,* 3 (0.6%) tested positive for *M. tuberculosis,* 9 (1.79%) attendees tested positive for *H. pylori,* and 6 (1.20%) tested positive for PSA.

Table 3.Prevalence of Disease Burden among in Participants

Disease	Number of Samples	Positive cases n(%)	Negative cases n(%)
H. pylori	501	9 (1.79)	98.21
M. tuberculosis	501	3 (0.60)	99.40
P. falciparum	501	12 (2.40)	97.60

4. Discussion

In attempts to monitor and control the prevalence or incidence of diseases that pose threats to society, a free medical outreach was organized at the Rivers State University, Port Harcourt, Nigeria to support the society in its awareness and fight against the spread of infectious diseases. The study gave the participants the opportunity to be screened for *H. pylori*, *M. tuberculosis*, and malaria and the plasma PSA Level in men was measured. Our results from the screening showed the prevalence of malaria among males, females and in the total participants as 2.32 %, 2.42 %, and 2.40 % respectively. Although lower prevalence rates of malaria had been reported in other studies across several parts of the country, the one reported by Abah &Udoidang (2019) was higher than that of our findings. This could be the difference in location and environmental hygiene. Our place of study, Rivers State University, has an advanced drainage system that prevents water stagnation for mosquito breeding and is distant from vegetation, hence, the reason for low prevalence compared to other studies in other locations in Port Harcourt. Furthermore, the difference in prevalence of malaria in the male (2.32 %), and female (2.42 %) participants was not significantly different. This finding aligned with the reports of Abah *et al.* (2017), and Abah &Udoidang (2019).

The prevalence of *M. tuberculosis* was observed to be 2.32 % among the males, 0 % among the females, and 0.6 % in the total participants. Previous studies done by Ogbo *et al.* (2018) reported a reduced incidence of tuberculosis. In this study, the prevalence of tuberculosis in the total participants (0.6 %) was less than the previous observations of Otokunefor *et al.* (2018), in Port Harcourt. The reduction in prevalence could be due to awareness and control measures practised, and the fight against HIV/AIDS infections over time. Also, we observed the ratio of male to female tuberculosis infections in Nigeria to be 2:1. This present study showed similarity to previous studies done by Obioma and Wokem (2018).

The prevalence of *H. Pylori* was observed to be 2.32 % among the males, 2.20 % among the females, and 1.79 % in the total participants. There was no observable difference in the prevalence of *H. pylori* between the male and female participants. We found our result similar to Ayodele *et al*. (2017) study but different from Ayodele *et al.* (2018) study. However, our result; of 1.79% of the total participants was less than Ayodele *et al*. (2018) prevalence (19.58%) study.

The prevalence of PSA was observed to be 4.65 % among the screened men. Our result was less than the findings of Maarten *et al.* (2021). Our findings were also less than 11.72% found in the Northern and 7.77 % found in the Southern parts of Nigeria as reported by Ntekim *et al*. (2023). To address these issues, more work needs to be done towards having a detailed analysis of the epidemiologic and other risk factors that can assist in understanding the prevalence of these diseases.

5. Conclusions

M. tuberculosis prevalence was observed to be greater in the males than in the females of the studied population. There was no observable difference in the prevalence of *H. pylori* between the male and female participants. So continuous screening of the public in order to monitor and prepare them against the insurgence of these diseases which are of public health concern is important.

Institutional Review Board Statement

In this section, kindly add the Institutional Review Board Statement and approval number, if applicable, to the study. One can exclude this part if not applicable or if the study did not require ethical approval or other kinds of approval. If approval is required, provide complete details, including the institution's name, protocol number, and date of approval.

Ethical Approval and Informed Consent

Ethical clearance was gieven by the Rivers State University's Ethical and research Committee. Informed consent was obtained from all subjects involved in the study.

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