



Original Article

Incidence of Parasitic Diseases among Noma Patients in Sokoto State Nigeria

Kiran Singh*, Zayyanu Muhammad

Department of Biological Sciences, Usmanu Danfodiyo University, Sokoto, PMB- 2346, Nigeria, West Africa.

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This study was conducted to determine the parasitic fauna among Noma patients attending Noma children hospital, Sokoto State. A total of 90 samples (30 samples for each in which 15 from males and 15 from females; for blood, urine and stool) were collected and examined for the presence of parasites. Blood samples were collected by pricking the thumb, urine and stool samples were collected in universal containers and analyzed using thick smear; standard filtration and thick faecal smear technique respectively. The results of this study showed an over all prevalence of 44.44%. The infection rate was higher among females with 60.00%, 40.00% and 53.33% than males (20.00%, 46.67% and 46.67%) respectively in their blood, urine and stool samples. Age related prevalence showed that age group 18-11 years had highest intestinal parasitic infection (71.42%); while, 10-06 years had the lowest infection of intestinal and blood parasites, (20.00% and 28.57% respectively) and no parasites found in urine; and 05-01 years had 50.00%, 55.56% and 50.00% occurrence of infection in stool, urine and blood, respectively. The study confirmed that Noma patients are moderately to severely infected with common type of parasitic diseases, which can make them more prone for other kind of infections.

Keywords: Noma disease, infectious diseases, risk factors for noma patients etc.

1. INTRODUCTION

Noma (from the greek word nomieen “to devour”) also known as *cancrumoris*¹ is a devastating infectious disease which destroys oral and hard tissues. It is an opportunistic infection that begins with ulcers in the mouth that is promoted by extreme poverty². Most sufferers are under six years of age with 70-90% of them dying and survivors being usually disfigured for life³.

Noma is considered to represent the “face of poverty” because factors connected with poverty, such as chronic malnutrition, poor oral hygiene, poor environmental sanitation, exposure to animal and human fecal materials,

Corresponding author *

Kiran Singh
Department of Biological Sciences, Usmanu Danfodiyo
University, Sokoto, PMB- 2346,
Nigeria, West Africa
E mail: ksinghi@gmail.com

and exposure to viral and bacterial infections, contribute to disease³.

Noma is a health problem in the developing countries, it is found mainly in Africa (even though none of the least developed countries of the world are excluded)⁴. There have been many epidemiological studies on *Cancrumoris* in Nigeria⁵. According to WHO about 500,000 individuals are affected every year, Bourgeois and Leqleris,⁶ worldwide, and estimated 140,000 new cases of noma emerged every year, mostly in sub-Sahar Africa⁵.

Noma is not a primary disease, but an opportunistic infection. There is no consensus regarding the causative microorganism, but studies showed that organisms like *Fusobacterium necrophorum* and *Prevotellaintermedia* may enter children's mouth through water and food contaminated with feces⁷. There are several predisposing factors which play a role in the emergence of the disease such as poverty, malnutrition, poor oral hygiene, lack of elusive breastfeeding and type of most recent illness suffered⁸.

Intestinal parasite infections are amongst the most common infections world wide it is estimated that about 3.5 billion individuals are affected and that 450 million are ill as a result of these infections majority being children. These infections are regarded as serious public health problem as they cause anemia, growth retardation in children and other physical and mental health problem⁹.

The parasitic infection can be spread in a number of ways through contaminated water, waste and fecal matter, through food that has been mishandled or undercooked, through sexual contact. Some infection acts as a vector or carrier of the host such as malaria host suffers symptoms such as nausea, vomiting, dehydration, muscle aches, people with compromise immune system or those who already have an illness are at risk of infection¹⁰.

The world health organization has reported alarming increase in the incidence of Noma over the past ten years, yet little is known about the initial stages and the progression of the disease because most patients with early-stage Noma are examined by primary health workers, who do not refer them to city hospitals until later in the course of the disease. The disease has a rapid clinical course and as a result many patients develop advanced Noma by the time they brought to the hospital.

Noma which is a devastating disease is seen associated with low immunity, malnutrition most recent illness suffered and poverty. Noma affects children and also adults and adolescent⁷. Several factors foster the breeding ground for both Noma and the parasites, therefore this study was carried out in Noma children hospital, Sokoto to identify the parasites associated with Noma condition. Being the first of its kind, it is hoped that findings from this study will help patients, physicians and control managers to formulate appropriate control measures against the disease.

2. MATERIALS AND METHODS

Study Area

Noma children hospital is located at RunjinSambo area of Sokoto state in the extreme northwest of Nigeria with an annual average temperature of 28.3°C, and rain fall of 500-1300mm.

Ethical clearance

Ethical clearance and approval of research was obtained from the Head of Department, Biological Sciences, and hospital authority (Noma children hospital) which was accepted by chief medical director (CMD) of the hospital. Consent was also taken from the subjects (patients) used for this study by bed to bed visit.

Sample collection

A total of 30 samples from both gender (15 males and 15 females) were collected from patients in Noma hospital, for their stool, urine and blood samples. Two clean plastic screw capped, 30 ml universal bottle and EDTA (ethylene di amine tetra acetate) bottle was provided to each person who agreed to participate in this study in order to collect their feces, urine and blood. The blood samples were collected with the help of nurse on duty using appropriate procedure. The urine and the stool samples were preserved with 10% formalin to maintain the morphology of the eggs. The collected samples were transported to parasitology laboratory of Biological sciences of Usmanu Danfodiyo University for analysis.

Samples Analysis

Urine analysis

Urine samples were analyzed according to Adeoye and Akabo¹¹ using standard filtration technique. A 5.5 cm Whatman's filter paper was inserted in the filtration unit. After shaking the urine sample, 10 ml of it was withdrawn with a syringe and injected into filtration unit. After filtration, the filter paper was carefully removed using a pair of forceps and placed on a clean sheet of paper and stained with one or two drops of iodine and 50% ninhydrin solution. The stained filter paper was allowed to dry for about 15 min after which it was placed on a clean glass slide and observed systematically under the microscope at $\times 10$ and $\times 40$ magnification. All the eggs were counted and the result was recorded and expressed as number of eggs per 10 ml of urine.

Stool Analysis

Stool analysis was carried out using the Kato-Katz thick faecal smear technique as described by Adeoye and Akabo¹¹. The stool samples were sieved using a plastic sieve of 0.75 mm pore size. A clean template was placed on a clean glass-slide with the help of a spatula; the sieved stool was filled in the hole on template. The template was then removed leaving a plug of stool (about 50 mg) on the glass-slide one or two drops of iodine and 50% ninhydrin solution was added on the plug of stool and covered by cover slip, the whole preparation on the slide was then observed at lower magnification of $\times 10$ and $\times 40$ the result was systematically

recorded and expressed as number of eggs per 50 mg of stool.

This technique is suitable for both protozoan and helminthes eggs¹².

Analysis of blood sample

Each blood sample was deposited on clean slide to make a circular patch (Thick blood film) then it was allowed to dry on a draining rack. 5ml of Giemsa stain was diluted with 45ml of buffered water and mixed gently. Each Dried thick blood film was stained by pouring 2-4ml of the diluted Giemsa stain and was allowed to act for 30 minutes, and then it was gently flushed with tap water and lastly placed on the slide rack to dry.

Each stained blood film was examined microscopically, a drop of oil immersion was placed on the stained blood film. X100 objective lens was lowered until it just touches the drop of oil immersion. Through x10 eyepiece lens the result was seen and recorded.

All the data obtained were analyzed using descriptive statistical method. The relationship between the prevalence of the disease and various parameters were obtained such as a gender and age of the people with the disease. The chi square test was used to compare differences, and P values less than 0.05 were considered significant (P<0.05).

3. RESULTS

It is clear from the result that patients admitted at Noma hospital had high prevalence of parasitic infections. Out of 90 samples analyzed (comprising of 30 each for blood, urine and stool), more parasites were encountered in stool accounting for 50.00%, followed by urine 43.33% and blood having the least prevalence with 40.00%(Table- 1). However Chi square analysis showed no significant difference among the specimens (blood, urine and stool).

Table 1: The overall prevalence of parasites among specimens collected from Noma patients

S/N	SPECIMEN	NO EXAMINED	NO. POSITIVE	PREVALENCE %
1.	Stool	30	15	50.00
2.	Urine	30	13	43.33
3.	Blood	30	12	40.00
	Total	90	40	44.44

X² = 0.2539; df = 2; p,<0.05

Table 2: Frequency of the parasites (recovered from stool, urine and blood) among Noma patients

Parasites species	In Stool	In urine	In Blood	Specific prevalence %
<i>A. lumbricoides</i>	12	-	-	80.00
<i>Strongyloides</i>	1	-	-	6.66
<i>S. mansoni</i>	-	1	-	7.69
<i>E. histolytica</i>	2	-	-	13.33
<i>S. haematobium</i>	-	12	-	92.30
<i>P. falciparum</i>	-	-	12	100
Total	15	13	12	
Total Prevalence	50.00	43.33	40.00	

X² = 82.072; df = 10; p,<0.05

The frequency of parasites (blood, urinary and intestinal parasite) encountered among three samples; stool samples had the highest occurrence with 15/30 presenting 50%

prevalence. Among the stool parasites recovered from samples the highest prevalent species was *A. lumbricoides* (80%), followed by protozoan *E. histolytica* (13.33%) and least prevalent *Strongyloides* (6.66%). Two types of urinary parasites were recorded, the highest prevalent was *S. haematobium* with 92.30% and *S. mansoni* which was 7.69% and presented lowest occurrence. Only *P. falciparum* was recorded from blood showing malaria prevalence. Chi square analysis showed significance difference among the blood urine and stool parasites. (Table -2).

Parasitic Prevalence in respect to gender of patients females, showed the highest prevalence in stool, urine and blood parasites with 53.33%, 40.00% and 60.00% respectively than males with 46.67%, 46.67% and 20.00% respectively, chi square analysis shows no significant difference between males and females. (Table-3).

Table 3: Prevalence of parasites among Noma patients with respect to their gender

S/N	Gender	STOOL		URINE		BLOOD	
		NO. EXAMINED	NO. + Ve	NO. + Ve	NO. + Ve	NO. + Ve	NO. + Ve
1.	Males	15	7	7	6	3	2
2.	Females	15	8	6	6	9	6
	Total	30	15	13	12	12	8

X² = 2.275; df = 2; p,<0.05

Pertaining to age of Noma patients, prevalence of parasites in the blood sample; the age group 1-5 years had the highest prevalence of in all the three samples, followed by 11-18 years with and 6-10 years had least rate of infection in both inteasinal and blood while none urine sample of found infected in this age group. (Table- 4).

Table 4: Prevalence of parasites among Noma patients in respect to age group

S/N	Age Group	Stool			Urine		Blood	
		NO. Examined	NO. + Ve	Prevalence %	NO. + Ve	Prevalence %	NO. + Ve	Prevalence %
		Stool	Urine	Blood				
1.	1-5	18	18	16	9	10	8	8
2.	6-10	5	5	7	1	0	2	2
3.	11-18	7	7	7	5	3	2	2
	Total	30	30	30	15	13	12	10

X² = 3.39; df = 4; p,<0.05

Based on species of parasites recovered from blood sample in respect to age group and gender among Noma patients, age 1-5 years of males showed the highest frequency of parasites (2 occurrence), which showed 33.33 % prevalence, followed by the age group 6-10 which showed all sample from this age group were negative for any parasites with a prevalence rate of 0.00 % and age group 11-15 had the prevalence (25.00%). In females the age group 11-18 showed highest rate of prevalence (66.66%), followed by age group 1-5 years (60.00%) and the least prevalence occurred in the age group 6-10 years (50.00%). *P. falciparum* was the only species present in the sampled patients. Chi square showed no significance differences between males and females (table-5)

Table 5: Prevalence of *Plasmodium falciparum* parasites recovered from blood samples from Noma patients with respect to gender and age

Age group	Males			Females		
	No. exam.	No. +	Prevalence	No. exam.	No. +	Prevalence
0-5	6	2	33.33	10	6	60.00
6-10	5	0	0.00	2	1	50.00
11-18	4	1	25.00	3	2	66.66

$\chi^2=2.42$; $df=2$; $p,<0.05$)

4. DISCUSSION

An overall prevalence of 44.44% of intestinal, urinary and blood parasites was observed in this study. This study clearly indicates that all the parasites recovered, are very common in this area [13; 14; 15] and there is no association of these particular parasites with noma condition.

Noma patients were observed to harbor various parasites ranging from *Schistosoma haematobium*, *Schistosoma mansoni*, *Entamoeba histolytica*, *Ascaris lumbricoides*, *Plasmodium falciparum* and *Strongyloides*. This is not surprising because Noma has been defined a serious infection that affects patients of any age group due to poverty, poor oral hygiene, malnutrition and depressed immunity; coupled with the depressed immunity and poor hygiene can cause other infections to survive in the patient's body. According to Enwonwu ¹, malnutrition coupled with infections, have been documented to lower the immune response, leaving room for any parasitic infection since the immunity is low.

Intestinal parasites were found highly prevalent in this study (50%), but the recovered species showed highest prevalent species was *A. lumbricoides* (80%) which is very common infection worldwide; and especially in this region where poor hygiene and malnutrition co-exist. The high number of *A. lumbricoides* eggs recovered from this study can be attributed to the enormous fecundity habit (200,000-230,000 eggs/day) of gravid female *Ascaris* ¹⁴.

Highest prevalence of intestinal parasites was recorded among age group 11-18 years (71.42%), which can be due to the fact that at this age children play football and also they help in the farming, in both situations they are exposed to faecally contaminated soil which contain eggs of *A. lumbricoides*. These eggs enter in their body either through food when they eat using their hand without washing or through their nose during breathing.

The 43.33% parasitic prevalence observed in urine samples and only *Schistosoma haematobium* and *mansoni* were recovered is due to the fact that children at this age group use to swim after helping their fathers in the farm and two of the rivers are infested with snails that harbor *Schistosoma haematobium* parasites. Our reporting is in conformity with the 47% prevalence reported by Ladanel *et al.*, ¹⁶ in selected villages near a dam site in Gusau local government area Zamfara state, but lower than our previous reporting ¹³. This difference can be attributed by the type of water used by the sampled people.

The 40% prevalence of blood parasites and only *Plasmodium falciparum* was observed in this study is in accordance with ¹⁰, this is the only species of malaria parasite found in Nigeria.

In case of malaria parasites, there were significant difference observed between gender and age of patients, which can be due to the fact that at age group 1-5 males are more protected, as once they are given meal, their mother keep them under mosquito net and they sleep peacefully, while females at this age use to stay with their mothers and are more exposed to mosquito bite. At age group 11-18 years, it is possible that some females can be pregnant, and pregnancy lowers their immunity to malaria.

The non significant difference observed between the sexes on this study may be an indication that both sexes are equal at risk of infection. This observation is in agreement to the work of ¹⁷, among preschool children in rural community near Abeokuta, Nigeria who also observed no significant difference between sexes.

The non significant difference between sexes in this study is the same as that reported by Anyawu and Okoro, ¹⁸ among preschool children in Jos with respect to *Schistosoma mansoni*. It's also in contrary to the work of Aribodoret *al.*, ¹⁹ who found males significantly infected than females this he attributed to be due to the outdoor contamination of a male during recreational activities such as hunting for grass cutter. The significant difference between age groups having accounted for the higher prevalence of intestinal parasite could be attributed to poor build up of immunity, frequent visit to stream and rivers with the quest to swim staying out at night to fishing and swimming before returning home.

In conclusion it can be said that factors such as extreme poverty, unawareness of the risk factors, inadequate or total lack of public health facilities and unsanitary conditions are responsible for such kind of parasitic infections and governmental and non-governmental agencies should take immediate action like mass de-worming of infected children.

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