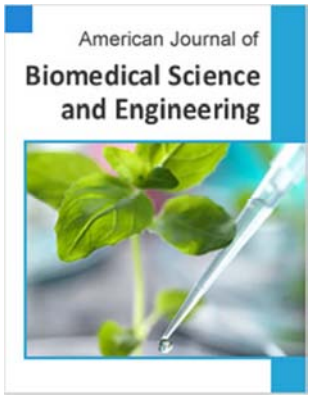
American Journal of Biomedical Science and Engineering
2017; 3(2): 15-19
http://www.aascit.org/journal/ajbse
ISSN: 2381-103X (Print); ISSN: 2381-1048 (Online)

American Association for Science and Technology



Keywords
Schistosomiasis,
Bacteriuria,
Antimicrobial,
Urine,
Enwan,
Edo State

Received: March 31, 2017
Accepted: May 8, 2017
Published: June 13, 2017

Antimicrobial Profile of Bacteria Associated with Urinary Schistosomiasis in Enwan Community, Edo State, Nigeria

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Citation
Imarenezor Edobor Peter Kenneth, Brown Samuel Tamunoiyowuna Cockeye, Babatope Isaac Olaniyi. Antimicrobial Profile of Bacteria Associated with Urinary Schistosomiasis in Enwan Community, Edo State, Nigeria. *American Journal of Biomedical Science and Engineering*. Vol. 3, No. 2, 2017, pp. 15-19.

Abstract
Urinary schistosomiasis and bacteriuria was investigated in Enwan community in order to determine the various bacteria associated with the infection and there antibiogram. A total of 300 Positive individuals for *Schistosoma haematobium*, comprising of 193 (64.3%) males and 107 (35.7%) females had their urine samples collected, examined and cultured using standard bacteriological techniques. The bacteria isolated include: *Escherichia coli* 30 (30.6%), *Klebsiella aerogenes* 22 (22.5%), *Pseudomonas aeruginosa* 12 (12.2%), *Proteus rettgeri* 24 (24.5%) and *Staphylococcus aureus* 10 (10.2%) in the decreasing order of isolate. The antimicrobial sxusceptibility pattern of these bacteria revealed varying susceptibilies by all isolates to Gentamycin and Erythromycin but was resistant to Amoxicillin. *Klebsiella aerogenes* was sensitive to all except Septrin, Ampiclox and Amoxicillin. *Escherichia coli* were sensitive to all and resistant to Sephrin, Pefloxacin, Ampiclox, Amoxicillin and Rocephin. *Pseudomonas aeruginosa* was resistant to Sephrin, Ampiclox, zinnacef and Amoxicillin but sensitive to other antibiotic used. *Proteus rettgeri was* resistant to Streptomycin, Ampiclox, Amoxicillin, Rocephin and Ceprofloxacin and sensitive to others. *Staphylococcus aureus* was sensitive to all the antimicrobial agents used but were resistant to Sephrin, Pefloxacin, Amoxicillin and Rocephin. This study clearly illustrates that bacteriuria is a major difficulty encountered in the management of urinary schistosomiasis. Therefore, there is also need to incorporate antibacterial therapy to the integrated morbidity control approach of diagnosis, drugs treatment, snail control in mass schistosomicidal treatment programmes along with other public health interventions such as access to safe water, improved sanitation, health education, health communication and appropriate case management.

1. Introduction
Urinary schistosomiasis caused by fluke worm *Schistosoma haematobium* is one of the

most common tropical diseases which poses serious health hazard due to its associated morbidities [1]. It was first discovered in soldiers of Napoleon stationed in Egypt between 1779 and 1891 who suffered severe haematuria [2]. In Nigeria, urinary schistosomiasis is known to have existed from time immemorial and might have been brought to the country by the migrating Fulani people when they traveled westwards from the Nile Basin [3-4]. Globally, over 153 million are infected with this parasitic infection [5]. In Nigeria, pocket of foci of infections have been documented in various part of country [6]. In developing nations, the true epidemiological picture appears difficulty because of inadequate researchers in this direction despite its relevance in planning it control in any locality [7]. This problem is compounded by the poor habits of people in developing countries like Nigeria in visiting hospitals for treatment [8]. Also self-medication is still practiced as manifested by antihelminathics abuse [9]. This act is worsened by presence of inadequate health facilities [10]. One of the consequences of the self-medication and antihelminathics abuse includes the suppression of the egg laying capacity of the worms [11]. The net effect is erroneous diagnosis using oval in urine in any locality [12]. This may also become evidence in sub clinical cases and period of immaturity of the worms when they are yet to commence egg laying [13]. Another obvious difficulty occurs during very low grade infections [14]. Although the uses of serological diagnosis are available, poverty poses a major serious impediment to the applications of serology in the epidemiological work in these countries [14]. To this end, this paper tends to evaluate the prevalence rate urinary schistosomiasis in an endemic community like Enwan which will broaden the existing epidemiological picture of this parasitic infection in this part of the globe and has a direct consequence on planning adequate control programme.

2. Materials and Methods

2.1. Study Area/Collection Samples

The study area is Enwan in Akoko Edo local government area of Edo state, Nigeria. It lies 70N and longitude 60E. The community has a functional health centre which was used for the collection of samples. The community has estimated population size of 2000 inhabitants. Farming and hunting is their predominant activities while few of them (villagers) mostly women are traders. There are streams which the inhabitants use as their source of water for domestic purpose and for recreational activities.

2.2. Study Population (Individuals)

A total of 300 volunteers were recruited for this study. Their ages range between 11-30 years old. History and general body examination were taken to exclude individuals with allergy and skin infections. Also appropriate parasitological and bacteriological investigations/diagnosis was carried out to exclude other parasitic infections such as malaria, hookworm, urinary tract infection etc. the history of self-medication and their contract with the water bodies in the locality which are infected with snail intermediate hosts were taken. The individuals were enlightened on the relevance of the study especially the public health significance. After the community mobilization, the mid-stream urine of individuals was collected after physical exercises of about 20 to 30 minutes. These urine samples were transported to research laboratory of department of Microbiology, Ambrose Alli University, Ekpoma for further procession.

2.3. Parasitological Investigation

Urine samples were properly mixed and centrifuged at 1000rpm for 5 minutes. The supernatant were discarded and the urine sediments were remixed aseptically. One drop of the well mixed sediment was transferred unto a clean grease-free microscopic glass slide and covered with a cover slip, then examined microscopically.

The ova were graded as light infection (≤50 oval/10ml of urine) and heavy infection (≥50 oval/10ml of urine).

2.4. Bacteriological Investigation

Standard bacteriological methods were used for the isolation of the various bacteria. Media used were Nutrient agar, MacConkey agar.

3. Results

In this study, a total number of three hundred (300) samples were collected from individuals with age range 11 and 30 years, 107 samples were collected from females and 193 samples from males. Table 1 shows Frequency and percentage of bacteria isolates in urinary schistosomiasis. Table 2 shows colonial morphology and biochemical characteristics of isolates. Figure 1 is a bar chart showing the incidence of bacteria isolates and Table 3 shows antimicrobial sensitivity profile of various bacterial isolates. The antimicrobial susceptibility patterns of these bacteria isolated revealed that *Klebsiella aerogenes* was sensitive to streptomycin, zinnacef, rocephin and ciprofloxacin, *Escherichia coli* was streptomycin, erythromycin, gentamycin, zinnacef and ciprofloxacin sensitive, *Pseudomonas aeruginosa* was streptomycin, erythromycin, gentamycin, zinnacef and ciprofloxacin sensitive, *Proteus rettgerii* was septrin, erythromycin gentamycin and zinnacef sensitive while *Staphylococcus aureus* was streptomycin, erythromycin, gentamycin, amplicox, zinnacef and ciprofloxacin sensitive. Nevertheless, all isolates were sensitive to gentamycin and erythromycin.

Table 1. *Frequency and percentage of bacteria isolates in urinary schistosomiasis.*

Bacteria isolates	Number isolated	Percentage occurrence
Klebsiella aerogenes	22	22.5%
Escherichia coli	30	30.6%
Pseudomonas aeruginosa	12	12.2%
Proteus rettgerii	24	24.5%
Staphylococcus aureus	10	10.2%
Total	98	100

Table 2. *Colonial morphology and biochemical characterization of bacterial isolates.*

Colonial morphology	Gram reaction	Biochemical test					Sugar fermentation test					No of Isolates	organisms
		Cat	Cog	IN	UR	OX	Lac	Mal	Suc	Man	Glu		
Grey white mucoid colonies	-	+	-	-	+	-	+	+	+	+	AG	22	*Klebsiella aerogenes*
Large convex shape mucoid pinkish colour	-	+	-	+	-	-	+	+	+	+	AG	30	*Escherichia coli*
Blue-green pigment and distinct fruity colour	-	+	-	-	-	+	-	-	-	-	A	12	*Pseudomonas aeruginosa*
Fishy colour black colonies swarming over the surface	-	+	-	+	+	-	+	+	+	+	AG	24	*Proteus rettgerii*
Round, smooth, raised and glistening	+	+	+	-	-	-	-	+	+	+	A	10	*Staphylococcus aureus*

KEY
+ Positive
- Negative A Acid
OX Oxidase AG Acid and Gas
Cat Catalase IN Indole
Cog Coagulase Lac Lactose
UR Urease Suc Sucrose
Mal Maltose Glu Glucose
Man Mannitol

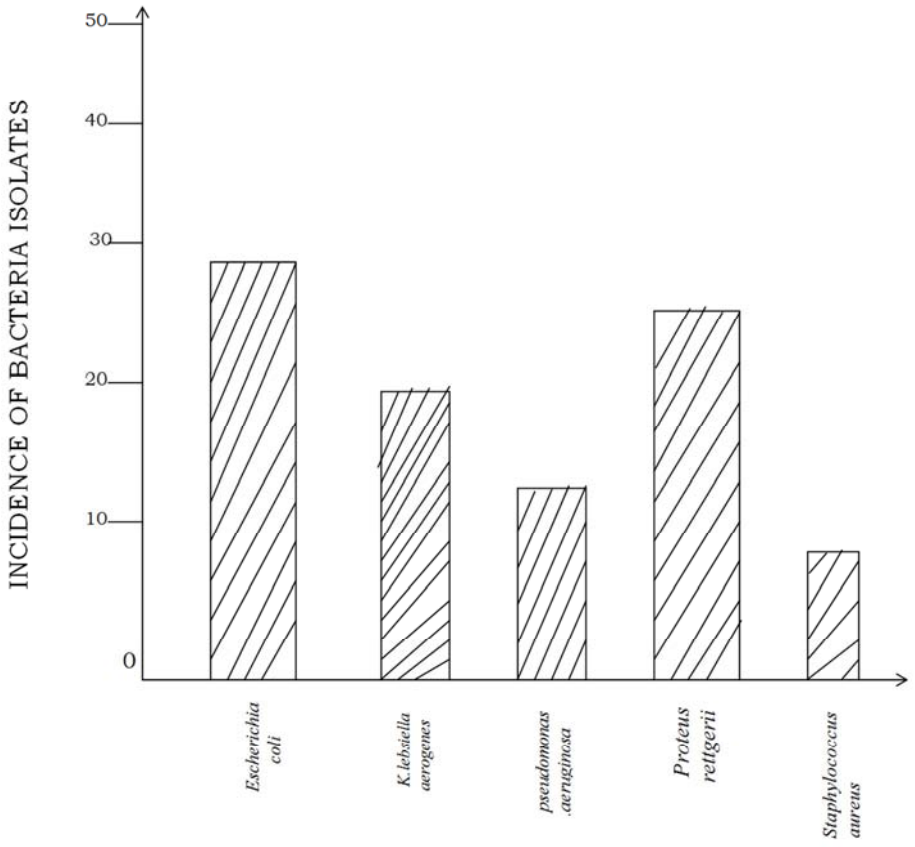

Figure 1. *A bar chart showing the incidence of bacteria isolates.*

Table 3. *Antimicrobial sensitivity profile of various bacterial isolates.*

	ANTIBIOTIC DISC									
ORGANSIMS	**SC**	**SXT**	**E**	**PEF**	**GN**	**APX**	**Z**	**AM**	**RN**	**CPX**
Klebsiella aerogenes	S	R	S	S	S	R	S	R	S	S
Escherichia coli	S	R	S	R	S	R	S	R	R	S
Pseudomonas aeruginosa	S	R	S	S	S	R	R	R	S	S
Proteus rettgerii	R	S	S	S	S	R	S	R	R	R
Staphylococcus aureus	S	R	S	R	S	S	S	R	R	S

KEY:
S - Sensitive
R - Resistant
SC - Streptomycin
SXT - Septrin
E - Erthromycin
PEF - Pefloxacin
GN - Gentamycin
APX - Ampiclox
Z - Zinnacef
AM - Amoxicillin
RN - Rocephin
CPX - Ceprofloxacin

4. Discussion

The bacteriuria of positive urine samples with *S. haematobium* from individuals showed *Escherichia coli* 30(30.6%), *Proteus rettgeri* 24 (24.5%), *Klebsiella aerogenes* 22 (22.5%), *Pseudomonas aeruginosa*, 12 (12.2%) and *Staphylococcuss aureus* 10 (10.2%). In their descending order of percentages, the results are similar to the finding of other studies [15]. However, a few studies have infections and higher infections with *Proteus rettgeri* and *Klebsiella* species [4]. Some studies indicated a lower percentage of *Escherichia coli* on the other hand and some have given a higher percentage of *Escherichia coli* as compared to other organisms. This could be explained on the basis of sampling technique and the gender differences in different studies. [16]. *Pseudomonas aeruginosa* and *Staphylococcus aureus* (12.2% and 10.2 respectively) remain the least isolated bacteria. These results are consistent with other studies. The commonest bacterium isolated in this study which was *Escherichia coli* was also a common occurrence in some related studies [17]. However in a research work carried out by [18], the reverse was true as *Staphylococcus aureus* was the most common bacteria isolated [8]. *Escherichia coli* is a very common bacterium some are harmless while others cause serious illness [19]. Non-pathogenic strains of *Escherichia coli* those that do not cause disease are normal inhabitants of the intestinal tract in humans but certain strains of *Escherichia coli* can cause severe diarrhea and infect the genital and urinary tracts (where they cause bladder or kidney infections) [20]. The antimicrobial susceptibility patterns of all isolates revealed varying percentage of susceptibilities by all isolates. There was a high rate of resistance of all isolates to amoxicillin [21]. This finding agrees with the previous study carried out by [22]. However, *Klebsiella aerogenes* showed a high level of resistance to septrin, amplicox and amoxicillin. *Proteus rettgeri* was however sensitive to septrin, pefloxacin, zinnacef, erythromycin and gentamycin. This result is consistent to the result of other studies [12]. *Staphylococcus aureus* and *Escherichia coli* showed a high level of resistance to rocephin among all other bacteria isolated [23]. Notwithstanding this fact, all bacteria isolates were sensitive to gentamycin and erythromycin [24].

5. Conclusion

In conclusion, it is pertinent to state that since schistosomiasis remains a burden in Africa and major health problem in developing countries especially in rural communities. Further studies are urgently required using a more sophisticated molecular and immunological tools to eliminate this problem. There is also need to incorporate antibacterial therapy to the integrated morbidity control approach of diagnosis, drugs treatment, snail control in mass schistosomicidal treatment programmes along with other public health interventions such as access to safe water, improved sanitation, health education, health communication and appropriate case management. These strategies will improve the health of individuals particularly in endemic areas.

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