SHORT COMMUNICATION

Zoonotic helminths in fresh water snail (*Melanoides tuberculata*) from Uruan wetland communities of Niger Delta, Nigeria Ebenso, I. E.¹ and Ekpenyong, L. C.²¹Department of Animal Science, University of Uyo, Nigeria²Centre for Wetlands and Waste Management Studies, University of Uyo, Nigeria

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Abstract

We investigated 3 study sites of rural wetland communities of Ikpa, Ibikpe and Ikot Udo for helminth parasites using water snail *Melanoides tuberculata* fresh specimens. Parasitological gut examination were significant ($p < 0.05$), and revealed that Ikpa community with 90.90% was hyper-endemic for schistosomiasis, while all study communities recorded ($< 50.00\%$) endemic prevalence infection for diphyllbothriasis respectively. Egg parasitic loads were above WHO standards of < 1.00 helminth egg/L. Helminths co-infection as outlined is a neglected emerging zoonosis, as these could increase livestock and public health disease burden in wetland communities.

Keywords: Helminth parasites, zoonosis, water snail, public health, wetland communities

Introduction

Helminths are parasitic worms. Parasitic worms are among the most common causes of chronic infections in humans in developing countries (Adewole *et al.*, 2014). Helminths are of considerable medical and veterinary importance in tropical and sub-tropical regions (Webster, 2013). It is estimated that 75% of emerging human pathogens are zoonotic (Woolhouse, 2002; Ebenso *et al.*, 2013). Intestinal parasites affect human health in many parts of the world. *Melanoides tuberculata* is an intermediate host for some parasitic worms which has been found to infect both man and livestock. Snails are sources of animal protein in human diets. The increased demand for animal proteins in developing countries will lead to an intensification of the snail production systems in which the risk of zoonotic infections need to be reassessed (Dorny *et al.*, 2009). The non-market damage by snails to human health and ecosystems are high (Ebenso, 2003).

According to Olayemi (2011), as promising as micro-livestock integration sounds,

helminthosis will threaten the practicability of production and marketability of meat to the generality of populace.

This investigation aimed at providing data on the occurrence of emerging zoonotic helminth parasites within rural wetlands of Uruan communities in Niger Delta, Nigeria using the water snail *M. tuberculata* as test animal and its implications in transmission and public health consequences.

Materials and methods

Three natural communities were studied because humans and their livestock frequent the same streams namely: Ikpa, Ibikpe and Ikot Udo wetland communities respectively, within Uruan Local Government Area of Akwa Ibom State, Niger Delta, Nigeria. Study areas were characterized by a humid tropical rain forest, between latitude $5^{\circ}2'16''N$ and longitude $7^{\circ}55'16''E$, with temperature range of $26-28^{\circ}C$, annual precipitation range of 2000-3000 mm, relative humidity of 70-80% and photoperiod of 12 hr light: 12 hr darkness (Udosen, 2000).

Thirty three (33) samples of *M. tuberculata*

and 20 ml of stream water were collected from each of the 3 locations in 3 replicates (in a Complete Randomized Design) and transported to the laboratory for further parasitological examinations. The *M. tuberculata* samples were aseptically washed with sterile water and shell opened to expose soft intestinal gut contents with the aid of surgical blade.

Using methods of Adewole *et al.*, (2014) each incised gut contents were carefully transferred into petri-dishes filled with 10% normal saline solution for 20 min. After parasites appeared on the surface of liquid in petri-dish, larvae were carefully taken with dipper of glass slide and viewed in 40x light microscope (Leica DM 2500 Olympic, USA). Parasitic eggs were captured individually in 0.05 ml of water and pipetted into the petri-dishes. Each parasite was identified according to methods of Cheesbrough, (2000); Webster, (2013).

Data were analyzed using ANOVA (SAS, 1999) in all statistical tests, the mean differences were considered to be statistically significant if p-value were less than 0.05.

Results and discussion

Variations in the prevalence of helminths infection from *M. tuberculata* were observed within the 3 study sites (Table 1). The *Schistosoma mansoni* ($p < 0.05$ larvae count) recorded highest prevalence rate of 90.90% (with 3.00×10^3 cfu/g) at Ikpa, while Ibikpe community recorded least prevalence of 1.00% (2.00×10^3 cfu/g). For *Diphyllbothrium latum*, infection prevalence was 36.40 (5.00×10^2 cfu/g), 36.20 (3.15×10^1 cfu/g) and 28.40% (6.60×10^2 cfu/g) for Ikpa, Ibikpe and Ikot Udo communities respectively. According to Rollenburg, (2015) an area with prevalence rate of $\geq 10\%$ is endemic, while $\geq 50\%$ is

hyper-endemic. Differences in the prevalence of infection between these otherwise similar communities may be due to differences in how human waste is handled (Barbosa *et al.*, 2013). The high prevalence of *D. latum* may be due to lack of improvement in the standard of sanitation and poor management of streams (Adewole *et al.*, 2014). Eggs of parasitic helminths found in streams studied ranged in values ($p < 0.05$) from 28.00 to 36.00 egg/L (Table 1). The streams recorded parasites load above the WHO standard of < 1.00 helminth egg/L (WHO, 1989). However, there is a potential risk of transmission of diseases through excreted eggs in the case of irrigation untreated waste-water, as well as natural water receiving humans excreta (Feachem, 1983). The infection is initiated when a miracidium penetrates a susceptible snail via the head foot region, and subsequently develops into a primary sporocyst (Hotez *et al.*, 2010). Agricultural produce around infected streams should be washed with clean water and properly cooked before consumption (Nweke *et al.*, 2013).

In the present study, it was common to see that livestock also drank from streams at study sites. According to reports of Kosek *et al.*, (2003) *S. mansoni* debilitate infected livestock which are used for food and as work animals. Dick *et al.*, (2007) suggested that immature eggs are passed out in feces of mammalian host around wetlands. Taylor, (1970) agreed that initial pairing between human and livestock parasites occurred first in another susceptible host, such as a rodent. In this study, co-infection of helminth parasites (*D. latum* and *S. mansoni*) occurred. Studies of Hotez *et al.*, (2010) suggested that co-infections may be because of higher prevalence of each parasite and/or their similar mode of transmission which favours dual infection.

Table 1: Helminth parasitic counts in stream* and in *M. tuberculata* from Uruan wetland communities, Niger Delta, Nigeria**

Parasite	<i>Ikpa</i>		<i>Ibikpe</i>		<i>Ikot Udo</i>	
	Stage% Mean	Mean SEM	%	Mean	%	
<i>S. mansoni</i>	*Egg (egg/L) 4.10	26.70 28.00 ^c	36.00 ^a 1.02	4.10	32.00 ^b	
	**Larva (cfu/g) 6.00	90.90 8.4 x10 ^{2a}	3.00x10 ^{3b} 1.00	1.00	1.00	x10 ^{3c}
<i>D. latum</i>	Egg (egg/L) 6.00	72.70 29.00 ^c	33.00 ^b 1.10	22.30	35.00 ^a	
	Larva (cfu/g) 28.40	36.40 6.61 x10 ^{2a}	5.00x10 ^{2b} 1.50	36.20	3.15	x10 ^{1c}

% = rate of prevalence

SEM = standard error of mean

Value ^a = different superscript in same row are significantly different ($p < 0.05$) tested by DMRT.

Pullan and Brooker (2008), explained that chronic infection causes adverse morbidity related effects that are exacerbated by multiple species infections and high parasites loads. Bundy *et al.*, (1991) estimated that 26 - 68% of individuals with schistosomiasis are carriers of other helminth infections. Da Silva *et al.*, (2007) found that the strength of association of multi-helminth infections was not only because socio-economic or environmental conditions, but because of interaction between the parasites, as well as intrinsic host factors that increase susceptibility to several helminths.

Conclusion

Communities and livestock around

wetlands may be at risk of emerging parasitic infections. Due to public health concerns, further inter-disciplinary study on the epidemiology of fresh water snails is suggested.

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