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Research Article

Prevalence of Parasites of Public Health Importance Identified from *Musca Domestica* in Jos Metropolis, Plateau State-Nigeria

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Abstract: There are numerous *Musca domestica* (houseflies) in Jos environment which may carry parasites of public health importance. The eating and meat processing tables Jos in Jos do not lack the flies. The study was aimed at discovering the species and prevalence of parasites found in houseflies in Jos. 400 houseflies were captured from four areas of Jos metropolis - Old Bukuru Park, Abattoir, FSMLT hostel & Terminus and taken to the Federal School Medical Laboratory in Jos for parasite identification analysis of the internal and external parts of houseflies using Ochei & Kalhatkah method. The prevalence of parasites seen in the study are: Hookworm (32.9%), *Strongyloides* stercoralis (21.1%), *Entamoeba histolytica* (16.8%), *Ascaris lumbricoides* (13.2%), *Fasciola* spp (7.5%), *Teania* spp (5.7%), and *Balantidium coli* (2.9%). The study shows that both the external and internal parts of the flies in Jos Metropolis carried various concentration of parasites depending on the various locations understudy which includes: Hookworm, *Strongyloides stercoralis*, *Entamoeba Histolytica*, *Ascaris lumbricoides*, *Fasciola specie*, *Taenia specie*, and *Balantidium coli*. The implication is that the numerous flies amidst various hips of refuse in various areas of the metropolis could overwhelm community health professionals if not prevented. The parasites seen in his study can cause serious public health challenges in Jos Metropolis and therefore, needs the public health attention to reduce parasitic spread of infection in the Metropolis.

Keywords: *Musca domestica*, Parasites, Prevalence, Jos.

INTRODUCTION

Musca domestica (housefly) is harbours parasites, viruses and bacteria of public health importance through vomits or excreta or mechanically through its appendages (*Adenusi et al*. 2013). Nmorsi *et al*. 2006 reported that *Musca domestica* accounts for about 90% of all flies in human habitation all over the world. Houseflies has been implicated in transport of parasites (over 130 pathogens) of public health importance (Khamesipour *et al*. 2018; *Akinboade et al*. 2009). Houseflies from the dumps or refuse areas have been incriminated in transmission of helminth eggs, that is, *Ascaris lumbricoides*, *Trichuris trichuria*, *Enterobius vermicularis*, *Toxocara canis*, *Strongyloides stercoralis*, *Protozoan cyst*, and trophozoites such as *Entamoebahistolytical*, *Giardia species*, *Trichomonas species*, *Taenia species*, *Hymenolepsis species.* Also, *Eimeriatenella*, the coccidian parasite of poultry can be mechanically transmitted by houseflies (Mullen & Durden 2002). Houseflies are found mostly during the day and like warm places showing a preference for direct sunshine.

House flies distribute germs, parasites and other human pathogens and communicable diseases (Mike, 2014; Oghale *et al*., 2013; Othman, 2008). Sanchez *et al.* (2005) described house flies as a cosmopolitan pest of farms, homes and synanthropic to humans.

The mode of feeding of *musca domestica*, has been used to describe it as potential vectors of more than 100 serious pathogens which includes enteric protozoan cyst and trophozoites like *Entaemoba histolytica*, *Cryptosporidiumparvum* and *Entameoba coli*, *Sacrocystic species*, *Toxoplasma gondii*, *Isospora species*, *Giardia species*, *Trichomonas species* and *Diphyllobothrium species* (Obeta *et al*., 2020). These parasites have been reported to cause serious public health iissues. Excessive fly populations are very irritant to workers, and human habitations, which is a public health problem. (Mullen & Durden 2002).

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The breeding sites of *musca domerstica* includes dung, organic manure, garbage and waste from food processing sites, sea wage and accumulated plant materials and these sites are common in Jos metropolis as seen in the figures 4(a-d)

House flies as public health importance factors can cause nuisance and diseases. Therefore it is very important to provide control measures that would stop their breeding or elimination from such sites through direct killing with insecticides or by physical means such as traps, sticky tapes, fly swats and electrocuting grids. The best control measure is by improving environmental sanitation and hygiene which provides longer-lasting results, and more cost-effective with other benefits. Environmental sanitation and hygiene is achieved through reduction or elimination of fly breeding sites; reduction of sources that attract flies from other areas; prevention of contact between flies and disease-causing germs and protection of food, eating utensils and people from contact with flies.

MATERIALS AND METHODS

A wire gauze constructed box (capturing fly trap - box) was used to catch the flies from the four selected sites: Federal school of medical laboratory science Jos, Abattoir, Bukuru old-park and Terminus market. A total of One hundred (100) Houseflies were randomly collected from the four selected sites each (100x4=400) mentioned above and transported to the Parasitology/Entomology Laboratory of Federal School of Medical Laboratory Science Jos for medical laboratory identification of parasites using the methods described by Oghale *et al*. (2013) and Ochei & Kalhatkah (2008). The analysis was done using SPSS 17 and Microsoft excel. The result is presented in percentages and bar graphs.

RESULT

Table 1 shows the percentage distribution of parasitic pathogen transmitted by housefly (*musca domestica*) based on location, body part isolated and species isolated which shows that a total of 280 parasites representing seven viz (*Hookworm, S.stercoralis, Teania spp, Fasciola spp, Ascaris lumbricoides, B. coli, E. histolytica*) different species were isolated in four different study sites within Jos metropolis, at Old bukuru park Hookworm was isolated most frequent with distribution of 17(24.6%).while B.coli was least 3(4.3%). At Abattoir only four species were isolated (*Hookworm, S.stercoralis. Ascaris lumbricoides, E. histolytica*) Hookworm was the highest 35(43.2%) while *E. histolytica* was the least 9(11. 1%). At FSMLT hostel only five species were isolated *Hookworm* had the highest isolation 18(41.9%) while the least was *E. histolytica* 2(7.0%). At Terminus all 7 species were observed Hookworm was the highest isolation 22(25.3%) while *Ascaris lumbricoides* was the least 4(4.6%).

This is further described in figure 1 present a chart according to the parasites present in the five locations.

Figure 2 presents the percentage distribution of species of parasites isolated from four study location in Jos metropolis, shows that there was a significant difference in the species of housefly borne parasites isolated from vegetable handles at ($p<0.05$) hookworm had the highest isolation of 92(32.9%), followed by *S.stercoralis* 59(21.1%), next was *E. histolytica* 47(16.8%), *Ascaris lumbricoides* 37(13.2%), *Fasciola spp* 21(7.5%), *Teania spp* 16(5.7%), , and *B.coli* 8(2.9%).

Table 1: Percentage Distribution of Parasitic Pathogen Transmitted by Housefly (*Musca Domestica*) Based on Location, Body Part Isolated and Species Isolated

Location	Parasites	Body part	Class of parasite	No. isolated	Distribution (%)
	Hookworm	External	Helminths	17	24.6
	S.stercoralis	Internal	Helminths	6	8.7
Old bukuru park	*Teania spp*	External	Helminths	9	13.0
	Fasciola spp	Internal	Helminths	5	7.2
	Ascaris lumbricoides	Internal	Helminths	15	21.7
	B. coli	Internal	Protozoa	3	4.3
	E. histolytica	Internal	Protozoa	14	20.3

	TOTAL			**69**	
	Hookworm	External	Helminths	35	43.2
Abattoir	*S.stercoralis*	Internal	Helminths	23	28.4
	Ascaris lumbricoides	Internal	Helminths	14	17.3
	E. histolytica	internal	Protozoa	9	11. 1
	TOTAL			**81**	
	Hookworm	External	Helminths	18	41.9
	S.stercoralis	Internal	Helminths	11	25.6
FSMLT hostel	*Fasciola spp*	Internal	Helminths	7	16.7
	Ascaris lumbricoides	Internal	Helminths	5	9.3
	E. histolytica	internal	Protozoa	2	7.0
	TOTAL			**43**	
	Hookworm	External	Helminths	22	25.3
	S.stercoralis	Internal	Helminths	19	21.8
	Teania spp	External	Helminths	7	8.0
Terminus	*Fasciola spp*	Internal	Helminths	9	10.3
	Ascaris lumbricoides	Internal	Helminths	4	4.6
	B. coli	Internal	Protozoa	5	5.7
	E. histolytica	internal	Protozoa	21	24. 1
	TOTAL			**87**	
	X^2 =64. 138		**df=1**		**p=0.001**

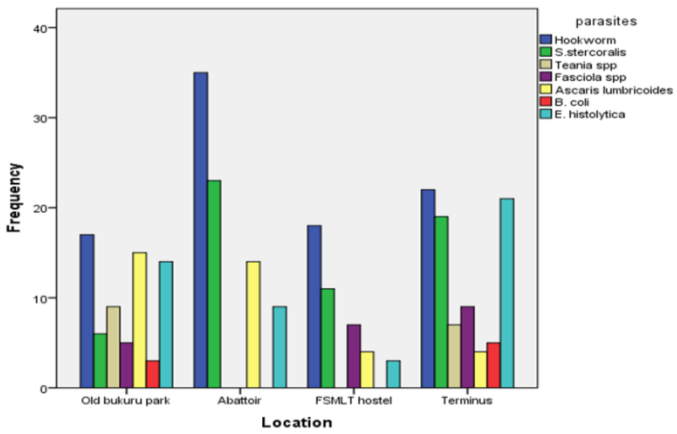


Figure 1: Frequency distribution of parasites isolated from four locations in Jos Metropolis

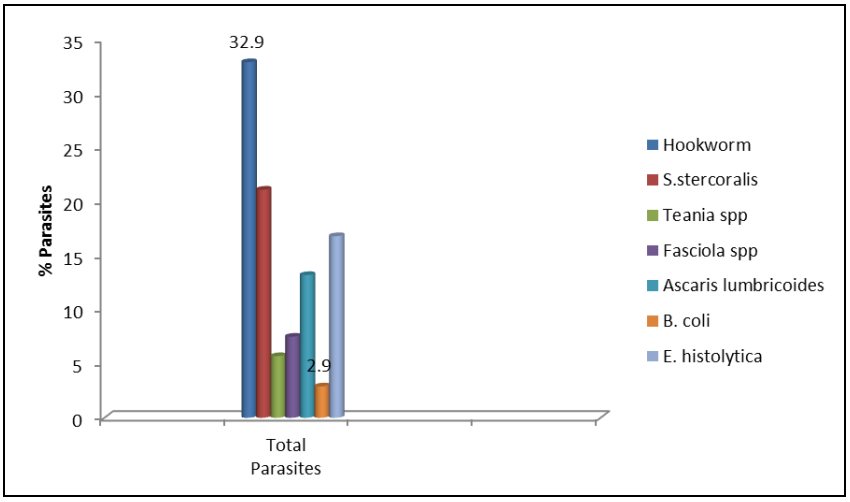
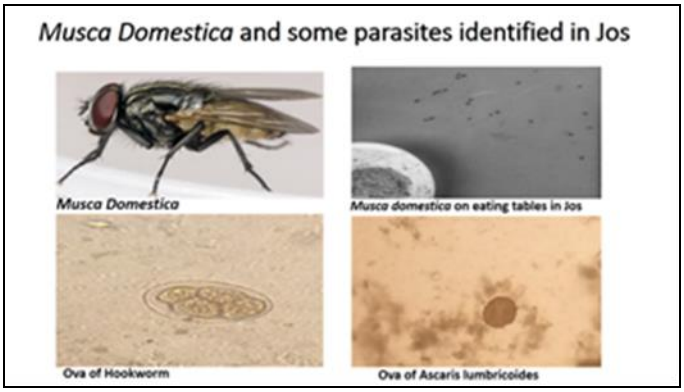


Figure 2: Percentage distribution of species of parasites isolated from four study location in Jos metropolis

Figure 3(a-d)



DISCUSSION

The study showed that *Musca domestica* is a carrier of parasites and in agreement with Graczyk *et al*. (1999).

Looking at the sites of houseflies collections: Federal school of medical laboratory science, Jos premises, Abattoir, Bukuru old-park and Terminus market as seen in table 1 above, helminths are more prevalent than protozoa in all the locations. Terminus market had housefly with the highest level of infection 19(76.0%) while federal school had the least 4(16.0%). Clearly speaking, the terminus market lacks adequate toilet facilities and waste management system since the bombing of terminus market with high density population of people unlike Federal school environment with few people added to the fact that is a health training institution. This agrees with Khamesipour *et al*. (2018) that put it that density and characteristics of the pathogens carried by house flies depend on the area of vector collection.

Oghale *et al*. (2013) showed that pit latrines had highest prevalence (57.6%) of parasites and lowest prevalence (30%) in eateries at Umuahia while E. *hystolytica* had a prevalence of 30.9% and H. nana has the least prevalence (11.4%). Hamoo & Alnuri (2019) in Iraq showed that E. *hystolytica* had a prevalence of 17.02% with *Isospora spp* having the least prevalence (2.1%) though included school toilet in their sites of study. This study had difference with these studies as helminth – hookworm had the highest prevalence (32.9%) and protozoa- B. coli had least prevalence (2.9%). It is understandable that Jos is in the North Central Nigeria but Umuahia is in South Eastern Nigeria while Iraq is abroad and could be as a result of study sites and environment as substantiated by Oghale *et al*. (2013).

Khamesipour *et al*. (2018) in their work found more than ten types of parasites with medical and /or veterinary significance, which could be transmitted by houseflies in different parts of the world, with the wide prevalence percentage, however this study showed seven parasites in Jos metropolis.

CONCLUSION

This study shows that both the external and internal parts of the flies carried one form of parasite or the other such as *Taenia specie, Ascaris lumbricoides, Hookworm, Strongyloides stercoralis, Entamoeba Histolytica and Fasciola specie* of which most residents are aware of it in Jos (Obeta *et al*., 2010) The parasites seen in his study can cause serious public health

implications in Jos Metropolis as they could lead to diseases like typhoid, cholera, polio, eye inflammation, salmonellosis, diarrhoea, dysentery, tuberculosis etc. in human and animals.

The residents of Jos metropolis are knowledgeable on the public environmental health effect of *musca domestica* in Jos and there is a need for all community health practitioners to partner with government and non-governmental bodies to reduce parasite burden, transport and diseases especially in the Terminus, Bukuru Park, Abattoir and Federal School in that order.

Based on findings of the researchers, it is highly recommended that:

1. The government should improve sanitation exercise in Jos metropolis to reduce the incidence and prevalence of parasites as a result of *Musca domestica*
2. The Government and Non- Governmental Organization (NGOs) should provide adequate and effective health care systems to treat and manage parasitic diseases that may affect the general public due to *Musca domestica* as mechanical vector of diseases such parasites.
3. There should be more awareness and education to the people based on disease and parasite carrying capacity of *Musca domestica* in Jos.
4. Agbalaka (2019) advised adequate cooking of food and vegetables in Jos metropolis as one may not be sure of their sources and possible contacts with *Musca domestica.*

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Financial Competing Interest

There is no financial competing interest in the study.

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