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ABUNDANCE AND PARASITIC LOAD OF HOUSEFLY (*MUSCA DOMESTICA*) IN AMANSEA AREA OF ANAMBRA STATE, NIGERIA.

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ABSTRACT: *Houseflies (Musca domestica) are major transmitters of pathogenic organisms to humans worldwide. This study was carried out to determine the relative abundance of housefly and its parasitic load in four different sites in the Amansea area of Anambra state, Nigeria. The housefly samples were collected with the aid of fly trap and sweep net and analyzed using sedimentation methods. Data obtained was calculated and expressed as simple percentages while chi-square was used to test for differences in prevalence rates of parasites in the study areas. Out of the 259 houseflies examined, 74 were infested with a prevalence of 28.57%. Houseflies were more abundant in the abattoir 92(35.52) followed by market area 71(27.41%), refuse dump sites (19.69%) while holy family hostels recorded the lowest abundance (17.37) (P=0.000). Houseflies infested with parasites were mostly found in holy family hostel 31(68.89) while the market area had the least infested house flies 5(7.04%). Two protozoan parasites (Entamoeba histolytica and Entamoeba coli) and two nematodes (Strongyloides stercoralis and Ascaris lumbricoides) were the parasites seen from the microscopic examination of samples. E. histolytica (7.61%) and E. coli (5.43%) were the parasites seen in Abattoir while S. stercoralis (7.04%) was the only parasite in the market area. E. histolytica (17.78%) and A. lumbricoides (51.11%) were seen in holy family hostel while E. coli (11.76%), S. stercoralis (7.84%) and A. lumbricoides (31.37%) were the parasites recovered from the houseflies in the Refuse dump site. The infestation of houseflies in the area is a threat to human health due to their ability to act as mechanical vectors for transmission of infectious pathogens. Hence, proper disposal and prompt removal of waste by environmental officers should be prioritized in the area as well as mass education of the public on the health implications of poor hygiene and poor sanitary practices.*

KEYWORDS: Abundance, Prevalence, Housefly (*Musca domestica*), Protozoa, Nematodes, Anambra.

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INTRODUCTION

Houseflies are synanthropic single-winged organisms belonging to the family muscidae, order diptera, suborder Cyclorrhapha, phylum arthropoda (Onyewe *et al*., 2016; Amawulu *et al*., 2020). Out of all the flies known to be in existence, houseflies scientifically known as *Musca domestica* are the most abundant species and constitute a public nuisance globally (Nmorsi *et al*., 2006). It is on record that over 4200 species spread across over 170 genera of the family muscidae exist. Some members such as *M. domestica* are considered to be of significant public health importance (Onyenwe *et al*., 2016). As key players in the epidemiology of parasitic diseases, houseflies have been implicated in the transmission of eye worm infection and acute gastroenteritis among little children in underdeveloped countries as well as transmission of healthcare associated infections with multiple drug-resistant bacteria in hospital surroundings (Nwangwu *et al*., 2013). Studies conducted worldwide have implicated houseflies as major transmitters of more than 100 different species of pathogens (Agbalaka *et al*., 2020; Khamesipour *et al*., 2018). Infections due to houseflies constitute a public health concern in underdeveloped countries where prevention and control modalities are often hindered due to poverty (Ogunniyi *et al*., 2015). Adult house flies feed on a variety of substances ranging from meat broth, feces, decaying organic matter, milk, garbage, fluid materials and human food (Iqbal *et al*., 2014; Ahmadu *et al*., 2016). The indiscriminate littering of our surrounding with feces, carcass and garbage tends to attract flies around our dwelling places (Oyeyemi *et al*., 2016) These filth loving organisms are responsible for the passive transmission of infectious agents from one host to another but without undergoing biological development of the parasite in the body of the arthropod vector (Issa, 2019). Studies have also demonstrated that housefly are direct transmissive agent for several parasites such as cysts of *E. histolytica, E. coli, G. lamblia* and Oocysts of *T. gondii, Isospora spp* and egg or larva of *A. lumbricoides, T. trichiura* and Hookworm (Amawulu *et al*., 2020). They also transmit many other helminth eggs such as *T. caracanis, S. stercoralis, Taenia, Trichomonas, Dipylidium* and *Hymenolepis* species (Issa, 2019; Mbakwe *et al*., 2021), *Schistosoma spp, E. vermicularis* and *Trichostrongylus spp* (Deakpe *et al*., 2018). Most of these parasites are resistant to adverse environmental conditions, hence can survive for 5-6 hours on the body of the housefly and up to 35 days after infestation (Ibrahim *et al*., 2018). In-view of the role played by houseflies in disease dissemination, this study was therefore undertaken to survey the parasitic load of houseflies in the Amansea area, as a measure of the sanitary conditions of the area.

MATERIALS AND METHOD

Study Area

The study was carried out in abattoir, holy family hostel, Amansea market and refuse dump site all in Amansea. Amansea is located in Awka North Local Government area of Anambra state, Southeastern Nigeria. It is bounded in the south by Awka town, in the north by the Manu River in Ebenebe town, in the west by Mgbakwu and to the east by Ezinato/Ubibia stream. Amansea lies within latitude 6°12'N and longitude 7°06'E. The town has a relative humidity of 79.4% with an annual rainfall of 2000-3000mm (Iwueze *et al*., 2013).

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Sample Collection

A total of 256 houseflies were randomly collected from four localities, namely: abattoir, holy family hostel, Amansea market and refuse dump site using a fly trap covered with cone shaped paper and sweep net made from mosquito net. Fresh meat was placed in the fly trap to serve as bait. Using a sweep net, 10 sweeps were made per site between 9am and 4pm. The houseflies were transferred to a labeled plastic transparent container containing 75% alcohol and transported to the zoology laboratory of Nnamdi Azikiwe University, Awka, Anambra State, for parasitological examination.

Laboratory Procedure

The samples collected were analyzed using sedimentation techniques. The test tubes containing the houseflies and 10% formal saline were vigorously shaken to release the parasites on the body of the houseflies. Another clean, sterile centrifuge tube was half filled with the suspension from washing of the flies and was centrifuged at 2000 rpm for 2 minutes. The supernatant was decanted and about 1g of the sediments was placed on a clean microscope slide, covered with a cover glass and examined microscopically using x10 and x40 objectives. A drop of Lugol's iodine was also added to the smear on the slide to aid detection of parasites (Nwangwu *et al*., 2014). Identification of parasites was done using color atlas of parasitology by Sullivan (2009)

Data Analysis

Data obtained from the study was subjected to statistical analysis using SPSS version 21. Prevalence rates were calculated and expressed as percentages. Chi-square test was used to test for the difference in the prevalence rates among the variables.

RESULTS

From the four locations sampled, houseflies were more abundant in the abattoir 92(35.52%) followed by market area 71(27.41%). Refuse dump site recorded an abundance ratio of 19.69% while the holy family hostel had the least number of houseflies with an abundance ratio of 17.38% as shown in Table 1.

Table 1: Overall abundance of housefly per site in Amansea

Study sites	Number of housefly trapped	Abundance(%)
Abattoir	92	35.52
Market area	71	27.41
Holy family hostel	45	17.38
Refuse dump	51	19.69
Total	259	100.00

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From the different study locations, various parasite forms were observed. For the houseflies trapped in the abattoir, cyst forms of both E. histolytica and E. coli were observed. In Houseflies trapped from the market area, larval form of S. *stercoralis* was observed. The house flies trapped in the holy family hostel were the cyst form of *E. histolytica* and ova of *A. lumbricoides.* For infected flies trapped in refuse dumps, ova of *A. lumbricoides,* larva of *S. stercoralis* and cyst of *E. coli* were seen respectively as shown in Table 2.

Table 2: Parasite stages recovered from housefly in the study locations in Amansea

Species	Sites	Phylum(%)	Form seen
E.*histolytica*	Abattoir, Holy family hostel	Protozoa	Cyst
E. coli	Abattoir, Refuse dump site	Protozoa	Cyst
S.stercoralis	Market area	Nematoda	Larva
A.lumbricoides	Holy family hostel, Refuse dump site	Nematoda	Ova

Out of the 259 houseflies examined, 74 were infected with an overall prevalence of 28.57%. The number of infected houseflies was highest in holy family hostel 31(68.89%) followed by those from refuse dump site 26(50.98%). Houseflies from abattoir recorded prevalence of 12(13.04%) while those from the market area had the lowest prevalence of 7.04% as shown in Table 3

Table 3: Prevalence of housefly infestation in the study sites

Study sites	Number of Houseflies examined	Number of Houseflies infected	Prevalence (%)
Abattoir	92	12	13.04
Market area	71	5	7.04
Holy family hostel	45	31	68.89
Refuse dump	51	26	50.98
Total	**259**	**74**	**28.57**
χ^2 :75.386	Pvalue:0.000		

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Based on parasites prevalence in the different study sites, *E. histolytica* had a prevalence of 7.61% in abattoir and 17.78% in holy family hostel while *E. coli* recorded prevalence of 5.43% in abattoir and 11.76% in refuse dump. Also *S. stercoralis* revealed prevalence of 7.04% and 7.84% in market area and refuse dump sites respectively. Prevalence of *A. lumbricoides* was 51.11% in holy family hostels and 31.37% in refuse dumps as shown in Table 4.

Table 4: Prevalence of parasites species in the selected study sites in Amansea

Study sites	*E. histolytica*	*E. coli*	*S. stercoralis*	*A. lumbricoides*
Abattoir	7(7.61)	5(5.43)	-	-
Market area	-	-	5(7.04)	-
Holy family hostel	8(17.78)	-	-	23(51.11)
Refuse dump	-	6(11.76)	4(7.84)	16(31.37)
χ^2 :76.891	Pvalue:0.010			

DISCUSSION

The findings of this study show that houseflies are highly infected with an overall prevalence of 28.57% in the area and thus can be serving as a source of disease transmission within the study localities. This result is higher than the 16.7% prevalence reported by Amawulu *et al*. (2020) in Amassoma community of Bayelsa state as well as the 2.9% reported in central Sudan by Ibrahim et al. (2018). This can be as a result of the different levels of sanitation in those areas. The result of this study also revealed that house flies were more abundant in the abattoir (35.52%). This result agrees with the work of Nmorsi *et al*. (2006) who also reported the highest housefly abundance in an abattoir in Ekpoma, Edo State, Nigeria. This finding is in contrast to the work of Onyenwe *et al*. (2016) that reported highest housefly abundance in a farm center in Umudike, Abia state. This observation could be as a result of the differences in the sanitary measures kept in the various study sites. For instance, the activities in the abattoir lead to the generation of several wastes that serve as breeding sites for houseflies. Most of these abattoirs generate both solid and fluid wastes which also facilitate the feeding process of houseflies and other vectors. By implication, this liquid waste generated from these abattoirs constitute a milieu of parasitological consequence, hence constitute a threat to public health. This study further reveals the presence of parasite species like *E. histolytica, S. stercoralis, A. lumbricoides* and *E. coli* from the sampled houseflies in the study locations. This result is in agreement with the findings of Ahmadu *et al*. (2016) in Maiduguri, northern Nigeria, Deakpe *et al*. (2018) in Benue state and Nmorsi *et al*. (2006) in Edo state that stated the presence of these parasites on houseflies from their separate studies conducted in different parts of the country. This study is also in line with the findings of Oyeyemi *et al*. (2016) who also recovered *A. lumbricoides, T. trichiura* from houseflies. However, studies conducted by Amawulu *et al*. (2020) revealed the presence of different parasite species such as *T. caracanis, Diphyllobothrium, Dipylidium, Hymenolepis* and *Taenia.* This can be partly due to the microorganisms predominant in the area as well as the prevailing weather and environment conditions. The parasite prevalence in relation to location showed that house flies collected

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from holy family hostels recorded higher prevalence followed by refuse dump sites than the other locations. This could be attributed to the high population of humans living in the area which may have contributed to more generated wastes and a corresponding increase in pathogens in the environment. This observation is in line with the findings of Onyenwe *et al*. (2016) who also noted that the flies captured around the hostel showed more parasite prevalence irrespective of the fewer number of flies. The result of the current study contradicts the findings of Ogunniyi *et al*. (2015) that reported highest infection of houseflies in abattoirs. This may be as a result of improper disposal of waste in the area thereby making the surrounding a perfect breeding ground for infectious agents.

CONCLUSION

The present study revealed that houseflies are potential transmitters of parasitic infection and significantly contribute to the spread of food borne parasitic diseases. Several species of parasites isolated from the houseflies including *E. histolytica*, S. stercoralis, A. *lumbricoides* and E. *coli* are endemic in the study area. The presence of these parasites, therefore poses a greater risk of infection to humans living in the Amansea area of Anambra state. Holy family hostel revealed highest parasite prevalence which points to the unhygienic practices of the student inhabitants.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

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