



## Detection of Intestinal Parasites Transmitted Mechanically by House Flies (*Musca domestica*, Diptera: Muscidae) Infesting in Southern City of Libya.

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### Keywords:

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### ABSTRACT

A total of 90 isolates were obtained from two different sites (Al- Mahdia and Al-Jadeed) of Sebha city. Out of this number twenty eight (30%) isolates showed contamination of gastrointestinal protozoan parasites, namely *Entamoeba histolytica*/*Entamoeba dispar* (5.55%), *Entamoeba coli* (8.88%), *Blastocystis hominis* (15.55%) on external surface (body) of house flies. Only one isolate from Al- Mahdia locality showed *Hymenolepis nana* (1.11%) infestation to the house flies. In Al-Jadeed area, *H.nana* was not recorded in the isolates. Findings of this study indicate a relatively high infectivity rate in the disease vectors. House flies appeared to be a potential mechanical vector of intestinal protozoa in Sebha city and might be in other parts of Libya. This is the first study in Libya, which will provide knowledge on contamination of intestinal parasitic recovered from different external body parts of house flies.

الكشف عن الطفيليات المعوية التي تنتقل ميكانيكياً عن طريق الذباب المنزلي (*Diptera: Muscidae*, *Musca domestica*) التي تصيب مدينة جنوب ليبيا

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### الكلمات المفتاحية:

الذباب المنزلي  
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### المخلص

تم الحصول على 90 عزلة من منطقتين مختلفتين (المهدية والجديد) في مدينة سبها. من بين هذا العدد، أظهرت ثمانية وعشرون (30%) عزلة تلوثاً بطفيليات معدية معوية أولية، وهي *Entamoeba histolytica* / *Entamoeba dispar* (5.55%) و *Entamoeba coli* (8.88%) و *Blastocystis hominis* (15.55%) على السطح الخارجي (الجسم) للذباب المنزلي. أظهرت عزلة واحدة فقط من منطقة بورداي إصابة الذباب المنزلي بـ *Hymenolepis nana* (1.11%) في منطقة الجديد لم يتم تسجيل *H.nana* في العزلات. تشير نتائج هذه الدراسة إلى معدل إصابة مرتفع نسبياً في ناقلات المرض. يبدو أن الذباب المنزلي هو ناقل ميكانيكي محتمل للأوليات المعوية في مدينة سبها، وقد يكون في أجزاء أخرى من ليبيا. هذه هي الدراسة الأولى في ليبيا، والتي ستوفر المعرفة حول تلوث الطفيليات المعوية المستردة من أجزاء الجسم الخارجية المختلفة للذباب المنزلي.

### Introduction

The house fly (*Musca domestica*), is most common and widespread species of fly in the world and can be found in both rural and urban areas of tropical and temperate climates [13] [21]. It is a common household pest known to carrier of human diseases like pathogenic

bacteria, protozoa, metazoan, fungi and viruses worldwide [22] [16] [25] [15]. Apart from they are also responsible for transmitting intestinal parasites, which when outbreaks occur, could wreak havoc on both man and animals. Houseflies are important nuisance pests of

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domestic animals and people, as well as the main fly vectors of foodborne and animal pathogens [25]. Due to their indiscriminate movements, ability to fly long distances, and attraction to both decaying organic materials and places where food is prepared and stored, house flies greatly amplify the risk of human exposure to foodborne pathogens. House flies can transport microbial pathogens from reservoirs (animal manures) where they present a minimal hazard to people to places where they pose a great risk of food [22] [18]. House flies known to act as mechanical vectors of human diseases due to their unsanitary habits of feeding as they pick up the pathogens on their bodies with the aid of their hairy proboscis and feet and disseminate them by regurgitating vomits and depositing faecal droplets during the feeding process.

*Musca domestica* are commensal on humans, poultry, and animals. The feeding mechanisms and filthy breeding habits of these synanthropic insects make them efficient vectors and transmitters of human enteric protozoan parasites, and spread food-borne illness [19] [12] [6] Ronald Knight, and Leena Tamang [5] [14].

In the literature, most of the studies carried out in Libya showed only the prevalence of protozoan parasites in the population or patients. The commonest protozoan infections were *Blastocystis hominis*, followed by *Entamoeba histolytica/Entamoeba dispar* or *Girardia lamblia* and *Entamoeba coli* among Libyan population [8] [1] [2] [17]. Relatively low infections rates of intestinal parasites have been reported in Libya [7] [11] [17]. The helminthes infections are uncommon in Libya probably due to hot and dry weather in Southern region of the country [1] [11].

In Libya, so far studies have not made to determine the role of house fly as a mechanical vector of intestinal parasites to humans. The aim of this study was to identify the types and prevalence of human intestinal parasites transmitted mechanically by the house flies in Sebha city of Libya.

**Materials and Methods:**

**The study site:**

The study was carried out in two localities (Al- Mahdia and Al – Jadeed) of Southern city, Sebha (Fezzan region) of Libya during the period of December 2020 to March 2021

The total area of Sebha city is 15,330 Km2 and total population is 400 thousand people Sebha is a Libyan Desert and people of Sebha city have agricultural activities and animal husbandry practices. These flies were analyzed for the presence of parasitic contamination on external surface (body) and different parts of the body.

**Collection of the flies:**

A group of 90 houseflies (each group contains 20 flies) randomly were collected from human habitats of Al- Mahdia and Al-Jadeed

**Table: Identified species of intestinal parasites from house fly vector.**

Locality (area)	No. of samples examined	No. of detected intestinal Parasite (%)			
		<i>Entamoeba histolytica /dispar</i>	<i>Entamoeba coli</i>	<i>Blastocystis hominis</i>	<i>Hymenlepis nana</i>
Al- Mahdia	52	2(3.84%)*	6(11.53%)**	8(15.38%***)	1(1.11%)
Al-Jadeed	38	3(7.89%)	2(5.26%)	6(15.78%)	NIL

\*X2 = 4.426, p= 0.010

\*\* X2 = 5.214, p = 0.027

\*\*\* X2 = 0.640, p = 0.800

The most prevalent parasite was the vacuolar form of *Blastocystis hominis* (15.55%) followed by cysts of *Entamoeba coli* (8.88%) and cysts of *Entamoeba histolytica/ Entamoeba dispar* (5.55%) respectively. Only one isolate from Al- Mahdia showed ova of *Hymenolepis nana* (1.11%). No, other helminthes were recovered from two sites of this study. There was a significant difference in the prevalence of *Entamoeba histolytica/ Entamoeba dispar* (x2=4.426, p=0.010) and *Entamoeba coli* (x2=5.182, p=0.031) Al- Mahdia and Al-Jadeed respectively. No, significant difference (x2= 0.640, p=0.800) was found in the detection of *Blastocystis hominis* in Al-Mahdia and Al-Jadeed sites.

**Discussion**

*Musca domestica* (house fly) is one of the most common worldwide-distributed pest organism and the dominant synanthropic fly species in animal production, homes, and restaurants. It has been considered as vector of more than 100 pathogens [5] [18] [9]. The role of house flies in the spreading of gastrointestinal infections is dependent on

areas of Sebha city, during the period of daylight by using sweep net method [23] using sterile nylon net. Date of placement of net was recorded in each randomly collected site accordingly. The house flies were placed into labeled plastic containers and transported to the laboratory of Zoology Department, Faculty of Science, Sebha University for further studies. Traps were exposed for approximately five to eight hours and then collected for further to analysis.

Isolation of intestinal parasites from external surfaces of *M. domestica* flies. Forceps were used to place individual fly from each group of trap into sterile collection tubes and 25 ml of normal saline was added to each tube. The forceps were thoroughly cleaned with 70% alcohol and completely air dried between each fly and another to decrease the likelihood of cross-contamination. The flies were shackled vigorously in normal saline for 5 min at room temperature to dislodge parasites from external surfaces of the flies and house flies were discarded. The suspension resulting from washing of the flies was used to isolate the parasites. The washing solution was transferred into sterile 50 ml conical tubes and centrifuged at 3000 rpm for 5 minutes [14]. The supernatant was discarded and residue was examined for intestinal parasites.

**Examination of Parasites:**

Two slides were prepared from each sample, one in normal saline and other in Luglo,s Iodine for the staining cysts of protozoan parasites. Sediments were examined under light microscope using 10X for examination of parasite and 40X for identification. Slides were prepared in duplicates for each sample to increase the chance of parasite detection. The stages of parasites were identified based on morphological details as described by Soulsby (1982).

**Statistical Analysis:**

Data were presented as frequencies and percentages. Independent T-test and analysis of variance test of SPSS version 20 software package (SPSS, Inc. Chicago, Illinois) were used to determine the significance of the data. All p values were two-sided and a p-value that was less than or equal to 0.05 was considered to be statistically significant.

**Results:**

A total of 90 isolates were prepared from randomly collected house flies of two different localities of Sebha city (52 group of isolate from Al- Mahdia and 38 from Al-Jadeed). Each isolate contains 20 house flies for the detection of intestinal parasites. The results of detected intestinal parasites from the body surface of house flies vector are shown in Table. A total of 31.11% (28 out of 90 isolates) intestinal parasites were recovered from two sites.

their habit of visiting faecal material for oviposition. Transmission of human protozoan parasites by synanthropic insects is predominantly mechanical. In adult flies it occurs via mechanical dislodgement from the exoskeleton, fecal deposition, and regurgitation (vomit).

In the process of feeding of house flies pathogens stick on their mouth parts, wings, legs and other body surfaces, which they carry back to human habitations and animal farms. The house flies may drop these parasites on unprotected food and utensils, thereby facilitating the entry of these parasites in human body [26]. The spread of such infectious agents is directly dependent on the seasonal abundance of house flies, availability of faeces, and presence of pathogens in the faecal material, pathogen carrying capacity of each house fly, and access of house flies to unprotected food and utensils [10] [23].

In this study, more protozoan infections (30%) were recorded than metazoan infections (1.11%). This is in agreement with the result of Al-Diwaniya Province in Iraq [5] and Maiduguri metropolis in Nigeria [5] who reported more intestinal protozoans from the isolates

of house flies. Moreover, several reports in Libya have documented that most prevalent protozoan infections were *Blastocystis hominis*, followed by *Entamoeba histolytica*/ *Entamoeba dispar* or *Giardia lamblia* and *Entamoeba coli* in the stool samples of Libyan people attending hospitals and clinics [1] [2] [11]. In Libya, helminth infections are uncommon and relatively low infection rates have been reported [8] [1] [2] [11] [17].

In the present study, *B. hominis* was found to be the most common parasite recovered from the external surface of house fly vector. In Libya, data are not available for comparison on the intestinal parasites isolated from the body surface of house flies. Several studies in Libya have found that *B. hominis* is most common infection in the country [1] [20] [3]. Therefore, we assumed that house flies are potential mechanical vector for intestinal parasites in Sebha city and possibly might be mechanically adding *B. hominis* infection to some extent among Libyan community in the region and other parts of Libya. Parasitic studies of randomly collected flies from environment of two sites of Sebha city may provide an epidemiological tool for monitoring an existing sanitary condition and the intestinal parasites circulating in the area.

Mechanical transmission of pathogens by arthropods including house flies should not be overlooked. In Sebha city there is need to improve the hygiene, sanitation and protection of food from house flies to minimize transmission of intestinal parasites to humans.

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