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PREVALENCE OF DIPTEROUS FLIES ASSOCIATED WITH HUMAN AND ANIMAL DISEASES IN MENOUFIA GOVERNORATE, EGYPT

By

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Abstract

The present study focused on dipterous flies, distribution and their densities in nine centers of Menoufia Governorate, Egypt (Quesna, Shebeen El-Kom, Berkat El-Sabe, El-Bagour, Al-Shohada, Tala, Menof, Al-Sadat and Ashmon). The result indicated that 30 species belonging to 22 genera and 11 families were trapped from Menoufyia Governorate in spring 2015. *Musca domestica*, *Coproica vegans*, *Cop. Ferruginata*, *Sepsis thoracica*, *S. lateralis* and *S. fissa* were the most abundant species in the Governorate. The results showed that there was no statistically significant according to the total number of flies species between centers (F=0.794 & P=0.686). Data also indicated that there was statistically significant between species according to the total number of flies in Quesna center (F=2.576; P=0.040), but there was no statistically significant between species according to the total number of flies to other centers, Shebeen El-Kom (F=1.368; P=0.282), Berkat El-Sab (F=2.00; P=0.95), El-Bagour (F=0.771; P=0.95), Al-Shohada (F=0.900; P=0.564), Tala (F=1.926; P=0.110), Menof (F=1.640; P=0.170), Al-Sadat (F=1.537; P=0.216), Ashmon (F=0.611; P=0.759). Shebeen El-Kom Center showed the highest prevalence of the species of the most families due to suitable breeding sites. Ashmon showed the lowest prevalence of the most species.

Key Words: Egypt, Dipterous flies, densities, Menoufia Governorate.

Introduction

Dipterous are among the most important insects affecting the health of human and animals (Wilson, 1991). They act as vectors of pathogenic organisms (Smith, 1973). They breed in carrion and decaying organic matters, and attack man body causing myiasis in different sites (Smart, 1965).

This work aimed to survey and to identify dipterous flies of medical and veterinary importance in Menufia Governorate.

Materials and Methods

This work was done during the spring of the year 2015. Dipterous flies were collected from two villages for each center. Colored flies collections were done by using standard sweeping hand traps from garbage sites, and boxes (El-Bashier *et al*, 2006), as well as from decayed fruits, vegetables, animals and human excreta. Identification was done by using standard keys (Patton, 1933; James, 1947; Zumpt and Heinz 1950; Kamal, 1958; Zumpt, 1965; Steyskal and El-Baily, 1967; Shaumer and Kamal 1977; 1982; Shaumer *et al*, 1985; 1989; Morsy *et al*, 1991; Mohamed and Shoukry, 1991; Amin *et al*, 1997a).

Data subjected to analysis for variance and of the significant differences, the method of Robert and Sokal (1995) was used.

Results

The results are shown in tables (1, 2 & 3).

Table 1: Correlation between species according total number of flies in Centers, of Menoufia Governorate.

Center	No.	Minimum	Maximum	Mean	STD.	ANOVA test
Quesna	30	0.00	1245.00	69.3000	231.60626	F= 2.576, P= .040
Shebeen El-Kom	30	0.00	1722.00	124.7000	418.98689	F= 1.368, P= .282
Berket El- sab	30	0.00	1267.00	57.2000	230.50460	F= 2.000, P= .095
El-Bagour	30	0.00	972.00	35.1667	177.11891	F= .771, P= .618
Al-Shohada	30	0.00	535.00	23.4333	97.55553	F= .900, P= .564
Talla	30	0.00	967.00	75.6000	213.08159	F= 1.926, P= .110
Menouf	30	0.00	1553.00	92.1000	328.79659	F=1.640 , P= .170
Al-Sadat	30	0.00	1319.00	47.0000	240.61702	F= 1.537. P= .216
Ashmoun	30	0.00	1129.00	39.3000	205.84178	F= .611,P= .759

Table 2: Flies collected from Menoufia Governorate during spring season 2015

Species	Quesna	Shebeen El-Kom	Berket-El-Sabe	El- Bagour	El-Shohada	Tala	Menof	El- Sadat	Ashmon
Calliphora Vicina R.O.	2	2	2	1	0	0	1	1	0
Chrysomyia albiceps (wied.)	4	1	2	2	2	3	1	2	0
Lucilia sericata (Meig.)	8	5	8	3	3	5	3	4	4
Musca domestica L.	1245	1722	1267	972	535	967	982	1319	1129
Musca Sorbans (Wied.)	3	1	5	0	1	0	1	0	0
Muscina stabulance (Fallen)	0	1	0	0	1	0	0	1	0
Fannia canicularis (L.)	2	4	0	0	0	9	1	0	0
Stomoxys calcitrans (L.)	0	0	1	4	0	0	0	0	0
Synthesiomyia nudiseta (Van.)	0	1	0	0	1	0	0	0	0
Limnophora variegate (Stein)	0	9	1	0	0	0	1	1	0
Limnophora multipunctata (S)	0	0	0	0	0	0	1	0	0
Physiphora demandata (Fabr.)	1	4	1	6	7	2	5	1	3
Piophila casie (L.)	104	25	5	4	3	0	4	2	5
Parasarcophaga hirtipes Wied.	0	1	1	0	0	0	1	1	0
Coproica vagans (Haliday)	88	1601	114	2	14	144	88	0	18
Coproica ferruginata (Stenh.)	10	92	0	0	3	4	1553	0	1
Coproica digitata (Duda)	1	4	1	0	0	0	0	1	0
Ceroptera algira (vill.)	1	1	25	2	1	1	0	0	0
Copromyza costalis Zetter	1	21	4	1	25	10	6	0	2
Copromyza marginalis (Adams)	0	5	0	0	0	0	0	0	0
Limosina brivicostate (Duda)	1	0	0	0	0	0	0	0	2
Ischiolepta pusilla (Fallen)	1	0	0	0	0	0	0	0	0
Meoneura vagans (Fallen)	35	31	26	3	12	6	5	0	4
Hippelate pusio Low	35	64	33	44	10	56	32	74	6
Drosophila melanogaster Meig.	66	1	1	2	4	4	0	1	0
Drosophila histrioides O&K	0	3	0	1	2	0	0	1	0
Sepsis thoracica (Rob.- Des.)	339	3	43	1	3	604	67	0	2
Sepsis lateralis Wied.	51	22	110	6	71	50	3	0	3
Sepsis fissa Becker	81	117	65	1	5	402	8	0	0
Megaselia scalaris (Loew)	0	0	1	0	0	1	0	1	0

Table 3: Correlation between centers according to the total number of flies species in Menoufia Governorate.

No.	Minimum	Maximum	Mean	Std. Deviation	ANOVA test
9	703.300	3741.000	1879.333	3741.000	F=.794, P= 0.686

Discussion

This study was carried out in spring 2015 and covered nine centers of Menoufia Governorate in the Nile Delta. The survey yielded specimens belonging to 30 species, 22 genera and 11 families, Calliphoridae, Muscidae, Otitidae, Piophilidae, Sarcophagidae, Sphaeroceridae, Milichiidae, Chloropidae, Drosophilidae, Sepsidae and Phoridae. The results showed that there was no statistically significant according to the total number of flies species between centers (F=0.794 & P=0.686). Data also indicated that there was statistically significant between species according to the total number of flies in Quesna Center (F=2.576 & P=0.040), but without statistically significant between species according to the total number of flies to other centers, Shebeen El-Kom (F=1.368& P=0.282), Berkat El-Sabe (F=2.00&P=0.95), El-Bagour (F=0.771 & P=0.95), Al-Shohada (F=0.900 & P=0.564), Tala (F=1.926 & P=0.110), Menof (F=1.640 & P=0.170), Al-Sadat (F=1.537 & P=0.216), Ashmon (F=0.611 & P=0.759). Fam. Muscidae: *Musca domestica* L. was the highest density in all the Governorate Centers.

Limnophora multipuctata (S) was found only in Tala. *Musca sorbens* Wied., but not found in El-Bagour, Tala, al-Sadat and Ashmon. *Stomoxys calcitrans* (L.) was not found in Quesna, Shebeen El-Kom, Al-Shohada, Tala, Menof, Al-Sadat and Ashmon. *Synthesiomyia nudiseta* (Van,) was detected only in Shebeen El-Kom and Al-Shohada. Fam. Calliphoridae: *Chrysomyia albiceps* (Wied.) showed the highest density in Quesna while *Lucilia sericata* (Meig.) had the highest density in Berkat El-Sabe and Quesna, but *Calliphora vicina* (R.O.) was not found in Al-Shohada, Tala and Ashmon. Fam. Otitidae: *Physiphora demandata* (Fabr.) and Fam. Piophilidae: *Piophila casei* (L.) was not found in Tala. Fam. Sarcophagidae: *Parasarcophaga hirtipes* (Wied.) was found in Shebeen El-Kom, Berkat El Sabe, Al Sadat and Menof. Fam. Sphaeroceridae: *Coproica vagans* (Haliday) was found in all centers, with highest density in Shebeen El-Kom, but *Coproica ferruginata* (Stenh.) not found in El-Bagour, Berket El-Sabe and Al

Sadat, with the highest density in Menof. Fam. Milichiidae: *Meoneura vagans* (Fallen) was not found in Al-Sadat. Fam. Sepsidae: *S. thoracica* (Rob-Des.) and *S. lateralis* Wied. were not found in Al-Sadat with the highest density in Tala and Berkat El-Sabe, while *S. fissa* Becker showed the highest density in Tala but not found in Al-Sadat and Ashmon. Fam. Phoridae: *Megaselia scalaris* (Loew) was found in Barkat El-Sabe, Al-Sadat and Tala.

Musca domestica and *Coproica vagans* were the most abundant in all the Governorate Centers. This might be attributed to the accumulation of garbage, decaying fish, human and animals excreta; the highly attractive media for these two flies. The abundance of *M. domestica* all-over the governorate agreed with many Egyptian authors (Taha and Kamal, 1984; Hafez and Gamal-Eldin, 1959; Morsy *et al,* 1991; Am-in *et al,* 1998; Gadalla and Abd El-Halim, 2006; Abd El-Halim, 2010; Abd El-Halim *et al,* 2004; 2005; 2009; Abd El-Halim and Soliman 2011).

Abd El-Halim *et al*. (2005) studied the abundance and distribution of dipterous flies in five governorates: Qalyoubia, Menoufia, Beheira, Al-Fayium and Assuit, and found that *Musca sorbens* Wied *Parasarcophaga hirtipes* Wied, and *Physiphora demandata* (Fabr.) were the most abundant flies

Piophila casei were found in Menoufia Governorate but neither *Stomoxys calcitrans* nor *S. thoracica*. The other flies, *M. domestica*, *Chrysomyia albiceps*, *Lucilia sericata* and *Coproica vagans* showed the highest density that agreed with Amin *et al,* (1998).

On the other hand, Fekry *et al*. (1997) in Al-Arish reported a family of five persons infested in the eyes (5) and nose (2) with the Oestrus ovis larvae. They concluded that the physicians in the MOH rural health units should keep in mind opthalmomyiasis when dealing with non-specific catarrhal conjunctivitis particularly those people who are concerned with rearing of farm animals. Mazyad and Soliman (2006) in Cairo studied the biology of the Phorid fly *M. sacalaris* and found that it developed on a synthetic diet at 25^{o}C & 75$\pm$2% RH. The mean times for development and survival were for egg incubation 16.3hr (97.6%); larval period 7.3 days (97.6%); pupal period 9.8 days (95.8%, 91.6%); adult longevity 29.9 days, 24.8 days. Fecundity was 664.8 eggs. One generation required 19.7 days. They added that the morphological structures were useful for specific to identify the first and second instar larvae collected from human corpses might be used in forensic practice.

Tantawi *et al.* (2010) in Alexandria reported an accidental involvement of *L. cuprina* in MDT proved to be safe and effective. In November 2008, the laboratory colonies of *L. sericata* (the species regularly used in MDT) at the Faculty of Science, Alexandria University were renewed by *Lucilia* flies collected as third instar larvae on exposed rabbit carcasses. Flies from the new colonies were successfully used to heal the diabetic foot wounds of two patients at Alexandria Main University Hospital. Analysis of DNA sequences and adult and larval morphology revealed that these flies were *L. cuprina*. They added that despite the safety of *L. cuprina* strain in MDT, scientists rearing these blow flies for the wound debridement should regularly maintain high quality assurance of their species' identity to avoid possible clinical complications that might result from the introduction of an unexpected and invasive species to their laboratory colonies.

Abosdera and Morsy (2013) in Assuit studied the clinical pictures and pathogenesis of human oral cavity myiasis in ten children and the children's parents. The extracted larvae were *Lucilia sericata* (four cases), *Wohlfahrtia magnifica* (three cases), *Oestrus ovis* (three children and their parents) and *Musca d. vicina* (one case), which recommended zoonotic myiasis. The predisposing factors were mouth breathing, incompetent lips, low socioeconomic condition, malnutrition, and inability of the child to perform the daily activities due to the neurodegenerative

disease. Zaglool *et al.* (2013) in Saudi Arabia reported a case of a 40-year-old male diabetic patient, resident of a rural area, who visited the outpatient clinic of the diabetic center in Alnoor Specialist Hospital. He came to seek medical advice for a single wound in the back of his shoulder one mon th ago. After examination, a larva was eliminated and confirmed as the third-stage larva of *Sarcophaga* species.

Huchet *et al*. (2013) reported the first archaeological case of dog ectoparasitosis in the Ancient Egyptian. The study of a mummified young dog dated to the Roman period suggested a significant infestation by dog tick *Rhipicephalus sanguineus* Latreille, 1806, and louse fly *Hippobosca longipennis* Fabricius, 1805 as well as puparia of sarcosaprophagous species flies a potential source of myiasis.

Hassan *et al*. (2014) in Cairo used *Lucilia cuprina* maggots for treatment of an artificial diabetic foot wound in rabbit. The results showed that the treatment of the diabetic foot was achieved after 13 days. After this period the wound was completely healed and become free of microbial contamination. Morsy (2014) reported that almost non-blood suckers might attack man and animal to deposit their eggs or larvae of myiasis producing flies in skin, nose, eye, lung, ear, anus, vagina, and oral cavity as well as accidental gastrointestinal ones causing pathogenic condition known as myiasis. He added that nosocomial myiasis must be noted carefully, especially among the hospitalized patients and that nosocomial myiasis illustrated an unusual problem that might confront those responsible for the infection control programs. Also, Abdel-Hafeez *et al*. (2015) in Minia City reported three cases of wound myiasis among 280 patients with wounds at different parts of bodies. Two of them were diabetic patients. The third one had a history of hypertension with right side hemiplegia 2 years ago. All of them were elder. The larvae removed from cases 1 & 3 were the third-stage larvae of *Sarcophaga haemorrhoidalis* and hat from case 2 were the third-stage larvae of *Phormia regina*, which was very rare worldwide. They concluded that addition to the open and obsolete wound; diabetes mellitus and low socio-economic circumstances were important predisposing risk factors that led to the occurrence of myiasis in these patients.

El-Tawdy *et al.* (2016a) in Cairo reported that diabetic foot ulcer (DFU) was and still the major global and devastating complication of diabetes mellitus that affects at least 20% of diabetic patients during their lifetime and overviewed of the research evidence on maggot debridement therapy as the guide lines to the health professionals who might be users of this form of treatment now and in the future. They concluded that maggot debridement therapy proved to sample and safe worldwide a for diabetic foot ulcer to save money and avoid surgical intervention.

Moreover, El-Tawdy *et al.* (2016b) stated that osteomyelitis occurred either as a result of hematogenous seeding, contiguous spread of infection to bone from adjacent soft tissues and joints, or direct inoculation of infection into the bone as a result of trauma or surgery They added that hematogenous osteomyelitis was usually monomicrobial, while osteomyelitis due to contiguous spread or direct inoculation is usually polymicrobial. *Staphylococcus aureus*, coagulase-negative staphylococci and aerobic gram-negative bacilli were the commonest organisms; other pathogens including the streptococci, enterococci, anaerobes, fungi and mycobacteria were implicated. They added that the acute osteomyelitis typically presents with gradual onset of pain over several days. Treatment of osteomyelitis often requires both surgical debridement of necrotic material and antimicrobial therapy for eradication of infection. They concluded that optimal duration of antibiotic therapy is not certain; but continuing the parenteral antimicrobial therapy at least six weeks from the last debridement and recommended the application maggot therapy as an effective and environmentally

friendly treatment of the complicated necrotic wounds resistant to the conventional treatment and should also be considered in earlier stages of treatment.

Conclusion

The outcome data of this study in the different centers of Menoufia Governorate pave the way for a better understanding of the dipterous flies as mechanical transmitters of some zoonotic diseases. Consequently, based on these data and others a feasible control measure can be proposed.

Nevertheless, some of the myiasis producing dipterous species especially those of the genus *Lucilia* proved to have medical application of the human wounds superimposed by pathogenic microorganisms.

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