



Effect of commercially available insecticides on house flies (*Musca domestica*) at Quetta city, Balochistan

Attiya Aslam¹, Muhammad Kamran Taj^{2*}, Imran Taj³, Ashiq Hussain⁴, Syeda Ayesha Ali⁵, Saima Azam⁶, Zohra Samreen⁷, Sakina Khan⁸, Lal Bibi⁹, Bibi Sazain Aman¹⁰

¹Department of Zoology, Sardar Bahadur Khan Women's University, Quetta, Balochistan, Pakistan

^{2-3, 5-6, 8-10}Centre for Advanced Studies in Vaccinology and Biotechnology (CASVAB), University of Balochistan, Quetta, Pakistan

^{4, 8}Bolan University of Medical and Health Sciences, Quetta, Balochistan, Pakistan

Abstract

Houseflies (*Musca domestica*) are serious health risk for society as they transmit many pathogens that cause different diseases. Due to its synanthropic nature houseflies are present with humans and human environments. In current study, effect of different commercially available insecticides was investigated against house flies (*Musca domestica*). Samples were collected from four different zones of Quetta city. The trials of insecticides were carried out on adult specimens of houseflies according to the method recommended by the WHO. Total nine insecticides were used in this study including, Finis chalk, Tar o mar liquid, Typhon killer, DDT powder, DDVP liquid, Finis liquid Mortein power guard, Lambda- cyhalothrin and Baygon. Results of this present study revealed that Taromao liquid, typhone killer and lambda- cyhalothrin were the most effective insecticides. Except finis chalk and DDT powder all other four insecticides were less effective but shows 100% mortality rate. House flies (*Musca domestica*) show highly resistance against Finis chalk and DDT powder.

Keywords: houseflies, insecticides, *Musca domestica*, effectiveness, commercial

1. Introduction

House fly is a true fly belongs to order Diptera contain 108 families of true flies ^[1] with more than 150,000 species ^[2]. Most of these flies are synanthropic, found with humans and human environments ^[3]. One specie *Musca domestica* (Diptera: Muscidae), is generally described as the house fly because of its great synanthropic nature ^[4]. They are more abundantly present in summer season but some adults in temperate region may stay alive in winter season. The most suitable temperature for the growth and development of house flies is between 10°C and 26°C ^[5]. *Musca domestica* flies are non-hematophagous and non-blood sucking. They reproduce and grow in dead organic matter such as human garbage, feces, animal manure, food and vegetable plants ^[6]. Habitat and synanthropic behavior of the *Musca domestica* makes it a potential carrier of different pathogenic microorganisms. They are responsible for transmitting diseases from animals to human and from animal to animal ^[7]. The house flies transmit different disease agents with the help of their body parts (legs, hair, and mouth parts) and body secretions such as regurgitates or vomit and feces. More than 100 pathogens are transmitted by house flies that cause diseases in human including typhoid, dysentery, anthrax, tuberculosis, cholera, and infantile diarrhea ^[8]. Experimentally, more than 100 diseases of animals are associated with houseflies ^[9]. In Pakistan, seasonal abundance of house flies is associated with intestinal diseases outbreaks like diarrhea in urban and rural areas. In Pakistan diarrhea is the main reason behind childhood deaths ^[10]. Control of houseflies shows fall in such outbreaks ^[11]. Recent reports suggest that, houseflies also transmit avian influenza or bird flu virus, causing globally serious risk to humans and poultry industry ^[12].

To control the population of house flies in urban areas, villages and other human settlements, improved sanitation is essential. Chemical control can be a supplement in hygiene measures ^[13]. To reduce the population of house flies by sanitation, prevent the flies breeding sources. Chemically house flies population could be controlled by using insecticides in different preadult stages and adult stage ^[14]. Current study was done to check the resistance level of house flies (*Musca domestica*) against different insecticides available in market and used in chemical control program in Quetta city Balochistan.

2. Materials and Methods

2.1 Study area

For current research house flies (*Musca domestica*) were collected from different zones (east, west, north and south) of Quetta city during the year 2019. These house flies samples were transferred to Center for Advanced Studies in Vaccinology and Biotechnology CASVAB, University of Baluchistan for the purpose of insecticide trials.

2.2 Collection of Samples

Total 1000 adult specimens of houseflies (*Musca domestica*) were collected randomly from four different zones of Quetta city with the help of arial insect nets.

2.3 Chemicals

Commercially available chemicals included Lambda-cyhalothrin, Finis insect killer liquid (Rich-d-trans Allethrin 0.1%, Cypermethrin 0.075%, Tetramethrin 0.1%, citronella perfume, Mortein power gard (Ready to use), Taro mar o liquid, Typhon killer, Typhon powder, Finis chalk, Dichlorvos or 2, 2-dichlorovinyl dimethyl phosphate

(DDVP) and solvents 99.725%) were used during experimental procedure insecticide.

2.4 Glass jar Method

According to the WHO standard method was used for insecticide test on adult houseflies (*Musca domestica*) (WHO, 1970) [15]. Concentrations of commercially prepared doses were given to flies with in the jar. Lambda cyhalothrin powder were diluted in 50 ml of tap water and 1ml solution was used. Those which need to be prepared were diluted in water according to requirements on magnetic stirrer. After dilution of insecticides, with the help of pipette 1ml of insecticide distributed it evenly in the glass jar. After adding insecticide in the glass jar then rolled on flat surface for to uniform distribution of insecticide in glass jar to achieve better results. The resistance of insecticides was evaluated by adding adult house flies were added in per glass jar. Nine insecticides test were performed during present studies, and readings of mortality were taken after 10 minutes interval

for 30 minutes.

3. Results

House flies (*Musca domestica*) were collected from different localities of Quetta city. Total 1000 adult specimens of flies were collected. Taxonomic keys were used for the identification of flies. Total 9 commercially formulated insecticides were used for experiment by using glass jar method as described by WHO (World Health Organization, 1970) [15].

3.1 Effects of insecticides on *Musca domestica*

This present study revealed that Taromao liquid, Typhone killer and Lambda- cyhalothrin were the most effective insecticides. Except Finis chalk and DDT powder all other four insecticides shows 100% mortality rate. Finis chalk and DDT powder were highly resistant against house flies (*Musca domestica*) as shown in Table-1.

Table 1: Results of effectiveness of different insecticides on houseflies (*Musca domestica*).

| S. No | Insecticide Name | Less than 30 sec. | Less than 1 min. | Less than 1 min, 30 sec | Less than 2 min | Less than 2 min, 30 sec. | Less than 3 min. |
|-------|----------------------------|-------------------|------------------|-------------------------|-----------------|--------------------------|------------------|
| 1 | Lambda- cyhalothrin | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 2 | Finis insect killer liquid | 50 % dead | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 3 | DDT powder | 100% alive | 100% alive | 100% alive | 100% alive | 100% alive | 100% alive |
| 4 | DDVP liquid | 60% dead | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 5 | Bagon | 30% dead | 60% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 6 | Mortein power gard | 80% dead | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 7 | Taro mar o liquid | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 8 | Typhon killer | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead | 100% dead |
| 9 | Finis chalk | 100% alive | 100% alive | 100% alive | 100% alive | 100% alive | 100% alive |

4. Discussion

The house fly (*Musca domestica*) is a major pest for human as well as for domestic animals. Houseflies are serious health risk for society as they transmit many pathogens so its population should be controlled. Chemical control of houseflies is difficult as Insecticide resistance has developed within all populations of *Musca domestica* around the world, causing an important problem for house fly control. Chemical control is not a permanent solution of this problem as it provides temporary relief. Proper sanitation measures in houses may help in elimination of houseflies from human habitation.

In this present study, our results revealed that Taromao liquid, typhone killer and lambda- cyhalothrin were the most effective insecticides. Except finis chalk and DDT powder all other four insecticides were less effective but shows 100% mortality rate. House flies (*Musca domestica*) show highly resistance against Finis chalk and DDT powder.

5. Conclusion

On the basis of results of current study it is suggested that chemical control method of houseflies provide assistance in control of houseflies. Although insecticides are effective against houseflies but it is a temporary control as houseflies develops resistance against insecticides day by day. However, proper sanitation measures, appropriate management of filth and waste and sewerage pipeline must be packed.

6. References

- Sales MD, Costa GL, Bittencourt VR. Isolation of fungi in *Musca domestica* Linnaeus, 1758 (Diptera: Muscidae) captured at two natural breeding grounds in the municipality of Seropédica, Rio de Janeiro, Brazil. Mem. Inst. Oswaldo. Cruz. 2002; 97(8):1107-1110.
- Thompson FC. Nearctic Diptera: twenty years later. Diptera diversity: status, challenges and tools. Brill, Leiden, 2009, 3-46.
- Borror DJ, Triplehorn CA, Johnson NF. An introduction to the study of insects. Saunders College Publishing, 1989.
- Gupta AK, Nayduch D, Verma P, Shah B, Ghate HV, Patole MS, et al. Phylogenetic characterization of bacteria in the gut of house flies (*Musca domestica* L.). FEMS Microbiol. Ecol. 2012; 79(3):581-593.
- Marshall SA. Insects: their natural history and diversity: with a photographic guide to insects of eastern North America. Buffalo, New York, Firefly Books, 2006.
- Moon RD. Muscid flies (Muscidae). Medical and veterinary entomology, 2002, 279-301.
- Ugbogu OC, Nwachukwu NC, Ogbuagu UN. Isolation of *Salmonella* and *Shigella* species from house flies (*Musca domestica* L.) in Uturu, Nigeria. Afr. J Biotechnol. 2006; 5(11):1090-1091.
- Mullen GR, Durden LA. Medical and veterinary entomology. Academic Press, 2009.

9. Forster M, Klimpel S, Mehlhorn H, Sievert K, Messler S, Pfeffer K. *et al.* Pilot study on synanthropic flies (eg Musca, Sarcophaga, Calliphora, Fannia, Lucilia, Stomoxys) as vectors of pathogenic microorganisms. *Parasitol. Res.* 2007; 101(1):243-246.
10. Nielsen M, Hoogvorst A, Konradsen F, Mudasser M, Van Der Hoek W, *et al.* Childhood diarrhea and hygiene: Mothers' perceptions and practices in the Punjab, Pakistan, IWMI, 2001.
11. Barin A, Arabkhazaeli F, Rahbari S, Madani SA. The housefly, *Musca domestica*, as a possible mechanical vector of Newcastle disease virus in the laboratory and field. *Med. Vet. Entomol.* 2010; 24(1):88-90.
12. Wanaratana S, Panyim S, Pakpinyo S. The potential of house flies to act as a vector of avian influenza subtype H5N1 under experimental conditions. *Med. Vet. Entomol.* 2011; 25(1):58-63.
13. Busvine JR. Insects and hygiene. The biology and control of insect pests of medical and domestic importance. London, Chapman & Hall, 1980, 190-211.
14. World Health Organization. Chemical methods for the control of arthropod vectors pests of public health importance. Geneva, 1984, 108.
15. WHO. Tentative instructions for determining the susceptibility or resistance of cockroaches to insecticides. Technical Report Series No. 443, World Health Organization, Geneva. Annex. 1970; 12:130133.