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THE ECTOPARASITES OF COCKROACHES IN CHENNAI DISTRICT TAMIL NADU, INDIA

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ABSTRACT

We conducted a survey to determine the ecto-parasites of cockroaches collected from different locations of Chennai district Tamil Nadu, India. The cockroaches are mechanical transmitters of disease causing microorganisms such as intestinal parasites, bacteria, fungi, and viruses, helminthes and worms etc., The Samples were collected from June 2013 to October 2013. All cockroaches were captured during their feeding time in their natural habitat. A total of 510 cockroaches were collected from different locations using sweep net and simple hand picking methods and identified the ecto-parasites of cockroaches. In this study, the dominant cockroach species was *Periplaneta americana*360 (70.5%) followed by *Blatta orientalis* 21 (4.11 %). *Blatella germanica*92(18.03%), *Supellalon gipalpa*37(7.25%).The medically important parasites were identified are *Entamoeba histolytica* (32.75%),*Entamoeba coli*(15.25%),*Entamoeba blatti* (13.15%), *Enterobius vermicularis* (3%), *Ascaris lumbricoides*(15.15%), *Trichuristrichura*(2.35%),*Ascarislumbri coidseggs* (1.35%),*Entamoeba histolytica* cysts (7.35%),*Balantidium coli* (3.5%) and *Taenia* spp. eggs (2%).These results show that cockroaches are important reservoir for infectious pathogens that cause different diseases such as diarrhea or bowel disorder, asthma, polio, typhoid fever etc. The present work shows the first record of ecto-parasites of cockroaches' in Chennai district, Tamil Nadu.

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INTRODUCTION

Cockroaches are an oldest insect of the order Blattaria (or) Blattodea, the name cockroach, has been derived from Spanish Cucaracha.The primitive (or) ancestors of cockroaches have been existence for about 350 million years (or) since early carboniferous times. Cockroaches are swift runners, poor fliers, and nocturnal in habits. Globally Blattariae comprises about 5000 species under 398 genera in 28 families. In India there are a total of 186 species under 58 genera in 12 families. Thirty species are associated with human habitations. Cockroaches are omnivores; but they prefer to eat food sources such as sweets, cheese, starches, plants, vegetables and fruits.

Cockroaches may disseminate these microorganisms in many ways, predominantly by depositing them along with their excrement on human food (Robinson, 2005; Uneke, 2007).The role of cockroaches in the transmission of diseases and the studies indicate that about 40 different pathogens are naturally carried by roaches. (Such as polio, leprosy, bubonic, plague, dysentery, pneumonia, typhoid fever etc. The most common of these are the American cockroach (*Periplaneta Americana*) and the German cockroach (*Battelle Germanic*) (Robinson 2005; Nuke, 2007). The habits of living and eating, body structure, and mobility of cockroaches make them well adapted for mechanically transmitting diseases. Several studies have shown that cockroaches can carry disease-causing microorganisms such as *Escherichia coli*, *Enterobacterial* spp., *Klebsiella* spp., *Pseudomonas aeruginosa.* The importance of cockroaches as a pest is traditionally linked to their medical importance. They are known to be capable of carrying many common pathogenic organisms such as fungi, viruses, protozoa, and about 40 species of bacteria that are pathogenic to vertebrates (Glazer *et al*., 2005). Cockroaches feed indiscriminately on garbage and sewage and so have copious opportunity to disseminate human pathogens (Cotton, 2000; Pai, 2005). Also their nocturnal and filthy habits make them ideal carriers of various pathogenic microorganisms (Salehzadeha *et al*., 2007).

MATERIALS AND METHODS

This study was carried out in different places of Chennai district in Tamil Nadu India. In this study, we under took a project and used students to collect the samples from different places and the samples were collected from June 2013 to October 2013- between6:00 pm

to 09:00 pm. Analysis was carried out in November and December 2013.The cockroaches were caught using sweep net, simple with gloved hand picking methods and the collected samples were placed in a plastic container that had been hole-punched to allow for air flow. Only adult cockroaches that were caught alive and without missing any body parts were used in this study. The samples transported to the zoological survey of India for the identification. The cockroaches were identified using morphology as well as standard taxonomic keys (Tawatsin et al., 2001).

Collection size

In this study, 510cockroaches were collected from different places of Chennai district. Out of which, Ninety cockroaches were collected from D.G.Vaishnav college campus and Super market at Arumbakkam, hundred cockroaches collected from an Ice cream shop and provisional shop at Korattur, hundred + ten cockroaches collected from fruit market and vegetable market at Koyambedu, Ninety cockroaches collected from a hospital and rice millet Andaman and finally hundred + twenty cockroaches collected from oil mill and flour mill at Pattabiram.

Identification of cockroaches

The collected specimens were sent to zoological survey of India to identify the specimens. The cockroaches were identified using morphology as well as standard taxonomic keys (Tawatsin et al., 2001). The identified cockroaches' speciesareas1) *Periplaneta americana* 2) B*latti orientalis*3) *Blattela germanica and* 4) *Supella longipalpa* and 5) *Therea petiveriana.* After identification, the cockroaches were preserved and pinned in a sterilized insect box. .

Identification of parasites

After identification, each cockroach was thoroughly shaken in 5 ml of normal saline in a test tube for 60 seconds using a vortex. The cockroach was removed and the solution was centrifuged at 2000 rpm for 5 minutes. A portion of the sediment was examined using a light microscope to identify the parasites from external surface of cockroaches.

RESULTS

In this study, a total 510 cockroaches that were captured from ten different places in Chennai Tamil Nadu, India. The cockroaches had protozoan parasites and helminthes as

parasites, were isolated from their external surfaces, they are carriers that are capable of mechanically transmitting these parasitic organisms. The identified parasitic organisms were included the following species. The medically important parasites were identified are *Entamoeba histolytica* (32.75%)*Entamoeba coli*(15.25%),*Entamoeba blatti* (13.15%), *Enterobius vermicularis*(3%),*Ascaris lumbricoides* (15.15%),*Ascaris lumbricoides eggs* (1.35%), *Entamoeba histolytica* cysts (7.35%), *Balantidium coli* (3.5%) and *Taenia* spp. eggs (2%).Additionally there were some unidentified eggs on the external surface of cockroaches. These results show that cockroaches are important reservoir for infectious pathogens that cause different diseases such as diarrhea or bowel disorder, asthma, polio, typhoid fever etc. The present work shows the first record of ecto-parasites of cockroaches has been identified in Chennai district, Tamil Nadu.

Table 1: This table shows the total number of cockroaches, the number of parasitic carrier cockroaches, and the genus/species of the cockroaches captured from 10 different places in Chennai district of Tamil Nadu India.

Name of the places	Total no. of cockroaches captured	Total no. of parasitic carriers identified		Genus/species							
				P.americana		***B.orientalis***		***B.germanica***		***S.longipalpa***	
		Total	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
Arumbakkam	90	55	61.1	60	66.7	5	5.5	20	22.2	5	6.6
Korattur	100	60	60.0	75	75.0	7	7.0	12	12	6	6.0
Koyambedu	110	50	45.4	80	72.8	5	4.5	15	13.7	10	9.0
Nandanam	90	35	38.8	60	66.7	4	4.4	20	22.2	6	6.7
Pattabiram	120	45	37.5	85	70.8	-	0	25	20.9	10	8.3
Total	510	245	48.0	360	70.6	21	4.1	92	18.0	37	72

DISCUSSION

As shown here, cockroaches collected from ten different places are potential vectors of medically-important parasites, which is in agreement with previous studies (Fotedar *et al*., 1991; Graczyk *et al*., 2005; Salehzadeh *et al*., 2007; Uckay *et al*., 2009). In this study, *Periplaneta americana* was the predominant parasitic carrier of cockroach species and had 70.6% of the cockroaches in the collected samples. The present study shows a first record and a high rate of infection with ecto-parasites in cockroaches. The place Arumbakkam (61.1%)had the highest percentage of parasitic carrier cockroaches, this

may be because this place is located in a densely populated and drainage area, and the place Korattur had the second place of parasitic carriers, this may because presence of more chemical industries and populated area, while Pattabiram had the lowest (37.5%) percentage of parasitic carrier cockroaches. Cockroaches collected from residential areas were carrying medically important microorganisms and higher than Thyssen *et al.* (2004) which found 58. 3% of *Periplaneta americana* carrying the helminthes forms. The high level of parasitic infections in the present study might be due to the social and environmental conditions. The cockroaches transmit bacteria, viruses, protozoa and helminthes mechanically and biologically. Chan *et al*., (2004) revealed to cockroaches are known carriers of bacteria and fungi that produce disease in humans. However, the link between pathogenic helminthes and cockroaches has not been fully explored. In this study we found that the *Entamoeba histolytica* had the highest percentage of parasitic infection (32.75%) followed by *Entamoeba coli*(15.25%) and *Ascaris lumbricoides* (15.15%) and *Ascaris lumbricoides eggs* had the lowest percentage (1.35%).The parasite-related diseases can be prevented by controlling the cockroach population. This can be controlled at the public level as well as on a personal level by maintaining good and domestic hygiene.

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REFERENCES

1. Al-Mayfly H. M. H., M. S. M Al-Yaqoobi 2010. Parasites of Cockroach *Periplaneta americana* (L.) in Al-Diwaniya province, Iraq. – *Journal of Thi-Qar. Science*, 2 (3).
2. Chan, O.; Lee, K.; Hardman,J. and Navin, J. (2004). The cockroach as a host for *Trichinella* and *Enterobius vermicularis*: implications for publichealth. Hawaii Med. J.;63(3):74-77.

3. Chinchilla, M.; Guerrero, OM. Sastro A. and Sabah J. (1994) Cockroaches as Transport hosts of the protozoan *Toxoplasma gondii*. Rev. Biol. Trop.; 42: 329–31.
4. Glazer, I; Samish, M. and Delpino, F.(2005).Applications for the control of pests of humans and animals .CAB International eds.Grewal,R.U,Ehlers and D.I.Shapiro ilan. 295-312.
5. P. J. Gullan and P. S. Cranston, *The Insects: An Outline of Entomology*,Blackwell, Davis, Calif, USA, 2005.
6. Mimioglu, M. and Sahin, I. (1976*).* A parasitologicalstudy of cockroaches(Blattidae). Microbiyl. Bul.; 10(1):17-25.
7. Robinson WH. Handbook of urban insects and arachnids. Cambridge: Cambridge Univ. Press, 2005 (pp 35-64).
8. Salehzadeh, P. Tavacol, and H.Mahjub, "Bacterial, fungal and parasitic contamination of cockroaches in public hospitals of Hamadan, Iran," *Journal of Vector Borne Diseases*, vol. 44, no. 2, pp. 105–110, 2007.
9. Salehzadeh, A.; Tavacol P. and Mahjub H. (2007).Bacterial, fungal and parasitic contamination of cockroaches in public hospitals of Hamadan, Iran. J. Vect.Borne. Dis.*;* 44:105–110.
10. Tsai Y. H., K.M Cahil 1970. Parasites of German cockroaches (*Blattella germanica* L.) in New York City. – *Journal ofParasitology*, 56: 375-377.