

Short Communication

Microbiological study of domestic cockroaches in human dwelling localities

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This descriptive study was carried out to determine bacterial infection rate of cockroaches in the residential dwellings. A total of 650 cockroaches were collected in Sanandaj city houses using sticky traps, direct collection and vacuum cleaner. After determination, 85 of them were examined in base standard methods for bacterial infection. Two species of cockroaches including *Blattella germanica* (54%) and *Periplaneta americana* (46%) were collected. 74% of cockroaches had bacterial infection and separated into seven groups including: *Pseudomonas*, *Enterobacter*, *Escherichia*, non pathogens *staphylococci*, *Klebsiella*, *Proteus* and *Serratia*. *Escherichia coli* had the most frequency (61.5%) and *Serratia* (6.1%) had the least.

Key words: Bacteria, intestinal, cockroaches, households.

INTRODUCTION

Cockroaches pose danger in the dairy industry since they carry microorganisms including *Salmonella*, *Pseudomonads*, *Escherichia coli*, *Listeria monocytogenes* and conidia of mycotoxigenic fungi (Bennet, 1993; Paul et al., 1992; Onuegbu, 1994; Burgess and Chetwyn, 1981; Agbodaze and Owusu, 1989; Fotedar et al., 1991; Cloarec et al., 1992; Pai et al., 2003a, 2003b). At the household level, there is correlation between cockroach infestation and standard levels of hygiene (Shah et al., 1996). The aim of this

study is, therefore, to identify the major cockroach species in houses environments in Sanandaj and to isolate the common pathogens from cockroaches. This study was carried out in various environments of houses in Sanandaj city Kurdistan province of Iran. Domestic cockroaches *Blattella germanica* and *Periplaneta americana* were trapped from various homes in Sanandaj city using sticky traps, direct collection and vacuum cleaner.

MATERIALS AND METHODS

Total of 450 samples were identified using reliable systematic keys. In order to determine the surface-adhering bacteria, 58 German cockroaches and 40 American cockroaches were randomly picked

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Table 1. Distribution and frequency of Bacteria isolated from *Blattela germanica* and *Periplaneta americana* in indoors in Sanandaj city, 2003.

Bacteria	External surface contamination (%)	Internal contamination (digestive organs) (%)	<i>Blattela germanica</i> (N=50) (%)	<i>Periplaneta americana</i> (N=35) (%)	Total (%)
<i>Proteus</i>	27 (51.9)	8 (61.5)*	12 (24)*	23 (65.7)	35 (53.8)
<i>Pseudomonas</i>	10 (19.2)	7 (53.8)	7 (14)	10 (28.6)	17 (26.1)
<i>Klebsiella</i>	20 (38.5)	4 (30.8)	4 (8)	20 (57.1)	24 (36.9)
<i>Escherichia coli</i>	40 (76.9)	-	10 (20)	30 (85.7)	40 (61.5)
<i>Non pathogens Staphylococcus</i>	20 (38.5)	-	-	20 (57.1)	20 (30.8)
<i>Enterobacter</i>	10 (19.2)	-	8 (16)	2 (5.7)	10 (15.4)
<i>Serratia</i>	4 (7.7)	-	2 (4)	2 (5.7)	4 (6.1)
Total of infected cockroaches	52 (80)	13 (20)			65 (100)

from each trap using forceps and transferred into 5 cc physiological sterile serum. In order to remove external contamination, cockroach's body was washed with ethylic alcohol for 2 min in sterile serum. In order to remove external contamination, cockroach's body was washed with ethylic alcohol for 2 min. In Various selective bacterial media including EMB (ATD, England), blood agar and SS (Merk, Germany) were used for growing bacteria. The cockroaches having external and internal contamination were labeled as infected cockroaches. The data were analyzed using SPSS statistical.

RESULTS AND DISCUSSION

A total of 650 cockroaches including 300 (46%) *P. americana* and 350 (54%) *B. germanica* were identified in this study. 85 cockroaches randomly selected and were detected as bacteriological examination. A total of 65 (74%) cockroaches were infected and 20 (26%) cockroaches were not infected. A total of 13 (20%) cockroaches had internal contamination (digestive organs) and 52 (80%) cockroaches had external surface contamination. A wide spectrum of bacteria including common food spoilage and pathogenic organisms such as opportunistic pathogens like non pathogenous *Staphylococcus*, *E. coli*, *Pseudomonas* spp., *Enterobacter* spp., *Klebsiella* spp., *Proteus* spp. and *Serratia* spp. were isolated. *E. coli* had (61.5%), the most common bacteria recovered on cockroaches. The second common recovered bacterium was *Proteus* (53.08%). *Serratia* (6.1%) had the least common bacteria recovered only on external surface of cockroaches. Most of the bacterial isolated from the internal and external surface of cockroaches were 'Gram positive' and often spore formers. The percentage of bacteria carried on the external surface or in digestive organs of cockroaches is given in Table 1. Bacterial infection showed that the most common infection (95%) belong to the cockroaches collected from places with low level standards of hygiene. In these places, 80% of cockroaches had external contamination. Results showed that *P. americana* had the most common infection in comparison to *B. germanica*. All of *P. americana* cockroaches and 70% *B. germanica*

examined in this study were infected with at least one bacterium. The percentage of isolation of bacteria from cockroaches is shown in Table 1. Results show that two main species including *B. germanica* and *P. americana* are the most common species in houses of Sanandaj city. Since most of the cockroaches were infected with two or three different types of bacteria, it is concluded that cockroaches have important role in transmission of pathogen agents such as bacteria.

In this study 7 different types of bacteria were detected from cockroaches. *E. coli* had the most common frequency and *Serratia* had the least common frequency in cockroaches. Results of this study are consistence with the results of studies in Zanjan, Tehran, Mashhad, Sari and Kashan (Mohammadi, 1998; Ash and Greenberg, 1980; Karimizarchi and Vatani, 2001; Doroodgar et al., 2002, 2006; Nejati et al., 2006). The isolation of *Enterobacter*, *Serratia*, *E. coli*, *Proteus*, *Klebsiella* and *Pseudomonas* from these cockroaches indicated that domestic pests could pose health problem to humans who may indicate the potential role of cockroaches to spread rare and emerging pathogens into the community. Studies showed that cockroaches have important role in nosocomial infection too. Cockroaches isolated from hospital and residential areas carried medically important microorganisms (Fotedar et al., 1991). Thus, cockroaches would represent a risk for the persons, although the involvement of cockroaches in disease transmission is difficult to demonstrate. Control and management of cockroach infestations in Sanandaj and elsewhere should be conducted to decrease the spread of these bacteria (Shahraki et al., 2010a, 2010b; Mpuchane et al., 2006).

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