



The First Study on Prevalence of Bed bug in Iraq-Kurdistan region: A warning message

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ABSTRACT

Surveys of 34 infested locations in Kurdistan region, Iraq were conducted between June, 2014 and December, 2015. Out of the 135 rooms of different locations in Kurdistan regions investigated, 56 (41.5%) were infested with bed bugs. A total of 2050 bed bugs collected, comprising 973(47.5%) males and 1077(52.5%) females, 1557 eggs were also collected. The highest number of bed bugs collected in hotel and motel 640(31.2%), whereas the lowest number observed in hospital 15(0.7%). A total of 56 infested rooms, hospital showed lowest number 2(4.9%), followed by airport 3(42.9%), whereas a highest number of rooms infestation founded in apartment 21(70%).

Introduction

Bed bugs of the cimicid family are considered as blood-feeding insects that entirely feed on the blood of warm-blood animals. There are two species that generally feed on humans which are the common (temperate) bed bug, *Cimex lectularius* (Linnaeus 1758), and the tropical bed bug, *Cimex hemipterus* (Fabricius, 1803). The term most commonly refers to members of the genus *Cimex* of which *Cimex lectularius*, the common bed bug, is the species best adapted to human environments. Bed bugs are small, flat, oval-shaped wingless insects [1,2, 3,4]. The adult bed bug feeds one time a week under optimal environments. The major attractants appear to be human body temperature and carbon dioxide and also by certain chemicals [5].

Reports of Environmental Protection Agency (EPA) in the United States of America revealed that bed bugs are “a pest of significant health importance.”. Moreover, about 68 % of American’s pest professionals suggested that bed bugs are the most motivating pest to investigate for treatment, because more than 45 pathogens have been indicated in bed bugs [6]. In addition, the infestation of bed bug has been regarded among the primary factors which lead to economic losses in the hotels and tourism industry [7].

Bed bugs survive for long periods of time without feeding. They usually use warm-blooded animal as alternative host for feeding in case the unavailability of human blood. They feed during the night and hide in crevices during the day [8, 9]. The common effects from bed bug bites include rashes, bullae pruritic bumps, and rarely systemic allergic reactions [10,11,12,13,14], while no studies proved that bed bugs have ability to transmit any type of pathogens [15, 16,17].

After 1990s the population of bed bug submit significant re-emerged with growing of number, this is probable due to enlargement in international travel, trade, and the amount of insecticide-resistant bed bugs. The global infestation of bed bug expected to be increasing by 100–500 % in many location of the world. the global distribution of bed bug is concerning, due to having a significant socioeconomic load and a major concern to health. [18,19,20, 21,22,23,24,25,26,27,28,29].

The shortage of general public information about how to detect bed bugs, and the difficulty in control risky behavior for bed bug infestation make control of bed bug distribution difficult [3].

There were no data in scientific literature about the bed bug infestation in Iraqi-kurdistan region, thus,

this study was carry out in Kurdistan region, Iraq with the help of pest management professionals to find out the bed bug species exist, the recurrence of infestation, and the bed bugs distribution within various types of places. The information lead to pest management professionals in designing an active management plan about the bed bug elimination.

Materials and methods

Surveys of 34 infested sites in Kurdistan region, Iraq were conducted between June, 2014 and December, 2015. The locations were selected according to suspected infections, randomly selected rooms were visited and bed frames, inflatable mattress, floor, beds, bed sheets, blankets, pillows, carpets, wooden furniture, walls, baseboard, cracks and crevices, cushioned chairs other non-wooden furniture were accurately searched for infestation with bed bugs. The infestations also were identified by having blood fecal spots, empty egg cases, shed exoskeletons, live or dead adult bed bugs, nymphs, and eggs. Flashlight was applied for surveying process, while the materials used for collection included, forceps, brushes, collecting bottles, and 70% alcohol.

After finding the bed bugs, they were put into the collecting bottles using brushes. Then the collecting bottles were labeled with the name of material from which the bedbug was collected and the number of collected bedbugs per material [30, 31]. The collected bed bugs were transported to the laboratory and identified under a stereo microscope according to keys published by [32, 33].

Results and discussion

This study was the first in Kurdistan region. Out of the 135 rooms of different locations in Kurdistan regions were investigated, 56 (41.5) infested with bed bugs. A total of 2050 bed bugs were collected, comprising 973(47.5%) males and 1077(52.5%) females, 1557eggs were also collected Table(1). A highest number of bed bugs collected in hotel and motel 640(31.2%), whereas the lowest number observed in hospital 15(0.7%) Figure (1).

A total of 56 infested rooms, hospital showed lowest number 2(4.9 %), followed by airport 3(42.9 %), whereas a highest number of rooms infestation founded in apartment 21(70 %) (Figure 2). Our findings from the survey responses indicate that this area become infested by bed bugs, the total infestation 56 (41.5%) is too high when compared with the first surveillance. This results suggest that the new infestation in bed bug populations might came from a combination of (a) Extensive entry of foreign workers into multiple workplaces especially Nepalese, Bangladeshi and South East Asian workers and increased movement of populations across international borders (b) The lack of information in public institutions about the spread of bed bugs in public places, as well as the loss of any objection and protective measures.

One of the most dangerous factor in the bed bug distribution is the rotation of personal goods, the

common nest of bed bug is furniture, exchanging furniture between houses exposes receiver to possible bed bugs infestation [12].

The bed bugs global population has encounter significant resurgence since the late 1990s. This is likely due to an increase in worldwide travel, trade, and the amount of insecticide-resistant bed bugs. [34, 35, 36, 37].

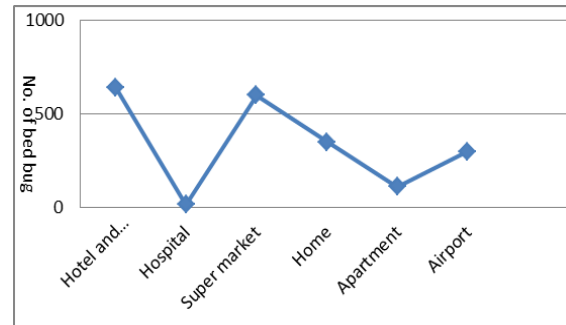


Figure (1): Total number of Bed bug infestation in different location, Kurdistan region during the period 2014-2015

The results of present study indicated that Apartment, Home and hotel three places where the most aggregation of bed bugs according to this improvement, as mean wherever there is a bed, the possibility of having bed bugs is higher. bed bugs (*Cimex lectularius*) have been found in many types of buildings such as homes, hotels, apartment houses, and shelters for homeless people [21,38, 39].

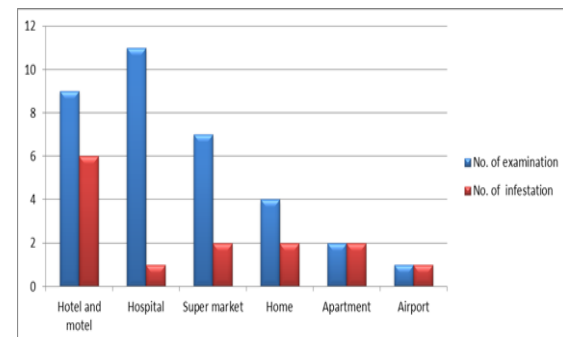


Figure (2): Number of examined and infested different site location by Bed bug, Kurdistan region during the period 2014-2015

Table (2) presented the distribution of bedbugs in Erbil governorate, in the 93 examined rooms 50 (53.8%) were infested with bedbugs, the highest infestation located in apartment 21(70 %) while the lowest infestation founded in hospital 2 (10 %). Out of 1805 bedbugs, 600 of them were collected in supermarket, followed by hotel and motel (430 bedbugs) whereas a lowest numbers of bedbugs observed in hospital (30), on the other hand, among the 1805 collected bedbugs, 949 were males and 856 females.

This study focused on Erbil governorate because it was the capital of Kurdistan region, and the aggregation of foreign workers, so there were differences between cities and infestations.

Backpackers, immigrants, guest workers, and the homeless have been specifically identified as sources of infestation [40, 21, 12]. District with high population and high rates of individuals' inter-movement was too much of a risk for the occasional dispersal of bed bugs between furniture, baggage, or clothing [41].

In the Sulemaniam and Duhok governorate a number of site and rooms examination are little as well as the infestation rooms also slight. In Duhok between 12 examined rooms only 3(66.7%) were infested, which were in the hotel and super market, likewise in the 160 collected bedbugs 71 were males and 89 females. Table (3).

The most common places which represent as best niches for bed bugs are homes, dormitories of the schools, health centers, buses and other transportation aids and the stores of clothes. The infestation of bed bugs is the major reason of pests in hotels [24,22].

The cities are more infested than the villages, because the conditions in the cities are more suitable for their growth and transmission. The factors made their infestation more in the cities are: a huge number of adjacent houses and apartments, trading with second hand beds and furniture, usage of second hand clothing and having common laundries in the hotels and apartments [42, 43]. The particular human behaviors, such as taking in second-hand furniture and disregard to check it, enlarged the possibility of bed bug infestations. Moreover group housing

conditions were more prone to infestations, active dispersal of bed bugs can occur [44].

In Sulemaniam 3(10%) of rooms infested by bedbugs, the highest infestation found in supermarket 2 (33.3%). Within 85 collected bedbugs, 14 were males and 11 females. Table (4)

The movement of bed bugs from one place to a different are through belongings like garments, suitcases, furniture, second-hand beds and bedding.

The occurrence of female adult bed bugs is more than the other stages of that insect. Therefore, most of the bed bugs found in people's belongings are the adult females. The reason behind dominance of female is their ability to store the male's sperms for more than a month. This capability of bearing sperms made them almost pregnant, and a single pregnant is enough to start a new infestation.

Conclusion

- 1- This study was the first, which comprise surveillance of bed bugs presence.
- 2- Kurdistan region has become at the risk of bed bug infestations.
- 3- *Cimex lectularius* was the only species of bed bug found in Kurdistan region in the study.
- 4- The main vector of bed bug was the foreign workers especial how comes from East Asia.
- 5- Hotel and motel were the most common place infested by bed bug.

Table (1): No. Bed bug distribution in Kurdistan region during period 2014-2015

	No. of site examination	No. of room examination	No. of room infestation %	No. of bed bug	No. of Males	No. of Females	No. of Eggs
Hotel and motel	9	29	17 (58.6%)	640	312	328	420
Hospital	11	41	2 (4.9%)	15	8	7	25
Super market	7	18	7 (38.9%)	635	323	312	452
Home	4	10	6 (60%)	350	150	200	270
Apartment	2	30	21(70%)	110	45	65	170
Airport	1	7	3(42.9%)	300	135	165	220
Total	34	135	56(41.5%)	2050	973	1077	1557

Table (2): No. Bed bug distribution in Erbil governorate during period 2014-2015

	No. of site examination	No. of room examination	No. of room infestation %	No. of bed bug	No. of Males	No. of Females	No. of Eggs
Hotel and motel	5	20	14(70%)	430	213	217	230
Hospital	7	20	2(10%)	15	8	7	25
Super market	2	6	4(66.7%)	600	305	295	395
Home	4	10	6(60%)	350	150	200	270
Apartment	2	30	21(70%)	110	45	65	170
Airport	1	7	3(42.9%)	300	135	165	220
Total	21	93	50(53.8%)	1805	856	949	1310

Table (3):No. of bed bug infestation distribution in Duhok governorate during period 2014-2015

	No. of site examination	No. of room examination	No. of room infestation %	No. of bed bug	No. of Males	No. of Females	No. of Eggs
Hotel and motel	2	3	2(66.7%)	150	67	83	0
Hospital	1	3	-	-	-	-	-
Super market	3	6	1(16.7%)	10	4	6	22
Home	--	-	-	-	-	-	-
Apartment	-	-	-	-	-	-	-
Airport	-	-	-	-	-	-	-
Total	6	12	3(15%)	160	71	89	142

Table (4): No. Bed bug distribution in Sulaimania governorate during period 2014-2015

	No. of site examination	No. of room examination	No. of room infestation %	No. of bed bug	No. of Males	No. of Females	No. of Eggs
Hotel and motel	2	6	1(16.6%)	60	32	28	70
Hospital	3	18	-	-	-	-	-
Super market	2	6	2(33.3%)	25	14	11	35
Home	--	-	-	-	-	-	-
Apartment	-	-	-	-	-	-	-
Airport	-	-	-	-	-	-	-
Total	7	30	3(10%)	85	46	39	105

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الدراسة الأولى حول انتشار بق الفراش في منطقة كردستان العراق: رسالة تحذير

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الملخص

شملت هذه الدراسة مسحا لاربعة وثلاثون موقعا مختلفا في اقليم كردستان العراق لتحديد تواجد حشرة بق الفراش وذلك خلال الفترة من شهر حزيران لغاية كانون الاول من العام 2014-2015. اظهرت النتائج ان 135 غرفة كانت موبوءة بالاصابة في مواقع البحث المختلفة ووجد ان 54 غرفة بلغت نسبة الاصابة فيها ببق الفراش 41.5% ، تم خلال البحث جمع 2050 حشرة لبق الفراش بلغ عدد الذكور فيها 974 اي ما نسبته 47.5% في حين كان عدد الاناث 1077 اي ما نسبته 52.5%، كما بلغ عدد البيض الذي تم جمعه 1557 بيضة. لوحظ ان اعلى عدد لبق الفراش الذي تم جمعه كان في الفنادق والموتيلات وبلغ 640 حشرة (31.2%) بينما اقل عدد للحشرة تم جمعه من المستشفيات وبلغ 15 حشرة (0.7). اظهرت النتائج ان 56 غرفة موبوءة ببق الفراش، اظهرت المستشفيات اقل عدد للغرف الموبوءة وبلغت 2 غرف بنسبة (4.9%). تلتها المطارات 3 غرف بنسبة (42.9%) في حين اظهرت الشقق السكنية ان 21 غرفة كانت موبوءة ونسبتها (70%).