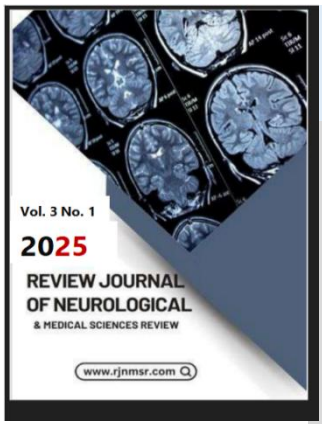

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An Investigation of Bed Bugs: A Study of Contamination at a Tea Stall in Hyderabad

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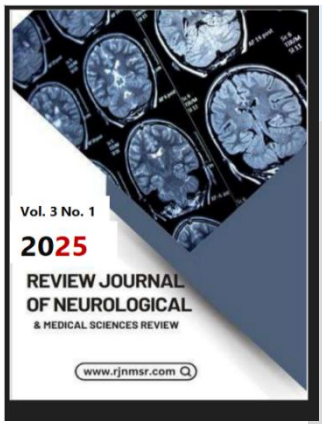
Abstract
Recent researches on bed bugs (Family: Cimicidae) have taken place because these pests are becoming active again around the world. Bed bugs tend to invade spaces that are both closed off and poorly ventilated. Tightly packed neighborhoods struggle with these more often, as furniture and bedding rarely move during Pakistan's hot and humid times. Beds bugs can injure people by biting and sucking blood or indirectly affect their mental health. In spite of different ways to control bed bugs, here heat treatment using boiling water was chosen. Cooking water kills insects by causing them to dry out. The strategy works well and is low-cost because it does not require any particular instruments or chemicals.

Keywords: Bed bug, Heat treatment, Thermal injury, Bite allergy and Mental health.

Introduction

Biology of Bed Bug

Bed bugs can easily be noticed and identified, since they are generally oval, always wingless, thin and have lengths from 1 to 7 millimeters (see Figure 1). Most of the time, their youthful stage has a cream-like hue which becomes reddish-brown as they mature (Obaid et al., 2022). They show up as insects with 1.5 pairs of long, jointed legs, a wide, flat head with pointed antennae and two black eyes. You will find that females are generally a bit smaller than males. A female will produce anywhere from 200 to 500 cream-colored eggs throughout her life. The World Health Organization reports that egg to adult bed bug development can take anywhere from six weeks to several months, depending on both temperature and how much food is available (Chen & Copes, 2010).



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Bed bugs live for six months to one year and it's possible for them to live more than two years without eating (Parola & Izri, 2020).

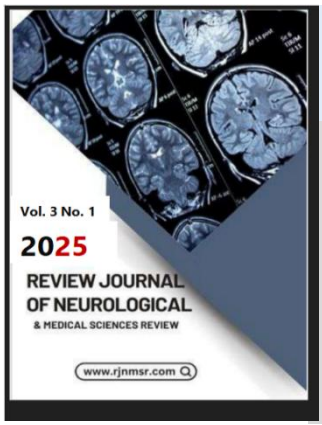
Figure 1. A picture of a bed bug (Cimex lectularius) getting a blood meal from a volunteer's arm (with permission from the CDC and Harvard University, by Drs. Gary Alpert and Harold Harlan)

If they want to feed or find a new home, bed bugs can move through the house by passing through holes in the walls, pipes, ducts or gutters. With humans absent, they often turn to mice, rats, chicken and many other animals for food (according to World Health Organization 2010). Even though bed bugs lack wings, they can move only a short distance. For this reason, bed bugs are spread mainly through their human hosts, thanks to old furniture, used mattresses and clothing. Researchers also claim that bed bugs may be brought into homes by migratory bird and bat species (Sheele, Libertin, Pritt, Wysokinska, & Pietri, 2021).

This species (*Cimex* spp.; Hemiptera: Cimicidae) is a common urban pest and a source of public health worries that costs society a lot. Absence of wings, a cryptic nature and the fact that it only feeds on blood at night make this an ectoparasites bug that lives on humans, other mammals or birds (Toga, Kimoto, Fujii, & Bono, 2024).

Bed bugs experienced a renewed importance as a public health pest over the past 10 years. Bed bug problems are seldom understood and not commonly reported when compared to infections such as Leishmaniosis, Malaria and Crimean-Congo hemorrhagic fever spreading across the world (Alizadeh et al., 2018).

Experiencing bed bugs can cause people to have anxiety, sleep deprivation, nightmares, shyness, lower blood and problems with their lives. At this time, bed bugs have not succeeded in spreading human diseases. The bites do not hurt, but they may cause itching and, under certain circumstances, lead to various other problems in some



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individuals. Most bed bug bites are found around the arms, forearms, legs, neck and face (Ismaeil, Elham, & Mona, 2017).

Spring and summer are the best times for bed bugs to spread in Pakistan. The life cycle of bed bugs is called Incomplete (hemimetabolous) because egg-hatched nymphs slowly turn to adults through five instars. You can find bed bugs all year round, but in less comfortable weather, these pests remain asleep in their hiding places. Most insects find safety inside cracks in furniture and the walls. As a result of high reproduction, their resurgence can be seen when their favored season arrives (Štefka, Votýpka, Lukeš, & Balvín, 2022).

Getting rid of bed bugs is a hard and expensive challenge for public health. Usually, bed bugs are active at night and prefer to hide in safe spots beneath beds and sofas, inside mattresses, on desks, chairs, cracks in woodwork and behind pictures. That's why controlling and spotting the infestation is not easy (Crawley & Borden, 2021).

To control today's bed bug infestations, integrated pest management is generally used, although the vast majority are eradicated with synthetic insecticides like Pyrethroids, Carbamates, Neonicotinoid and other families (Candy, Akhoundi, Bruel, & Izri, 2018).

Because it uses only heat, steam can kill every stage of bed bugs. The reason for using heat treatment is that bed bugs cannot survive very hot temperatures. Using steam equipment can eliminate dangerous heat that can be quite effective when treating infestations. As shown by previous lab results, steam can kill bed bugs hiding on surfaces as well as those embedded in fabrics or inside cracks (Wang et al., 2018).

Over the past twenty years, bed bugs, *Cimex lectularius* L. and *Cimex hemipterus* (F.), were found once again in many parts of the world (except in Antarctica). After 2007, the number of bed bug reports in China rose quickly and there is a possible risk for these pests to become widespread (Ren et al., 2020).

While there are good commercial items to control bed bugs, this study concentrated on studying the strength of heat treatment to eradicate bugs in crowded communities that lack access to good products.

Material and Methods

Visitors attending the tea stall swapped information about important matters involving food-allergy bites. Experts worked on figuring out what the allergy was caused by. After careful observation, it was discovered that a number of little creatures were emerging from wooden bench services in the sitting area Figure 3.

The sample was delivered to the Entomology Laboratory, Department of Parasitology, Government College University, Hyderabad, Pakistan. We identified these little bed bugs using a stereo-microscope and focused on their appearance Figure 2. A complaint from its customers led to the manager taking strong action. The water sat in pots and was boiled throughout the sitting area and sitting benches were exposed outside to sunlight. It was repeated, with hot water applied two separate times to both the sitting

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space and the benches. The next treatment took place three days after the initial one and there were two days left to do the third one (Figure 1).

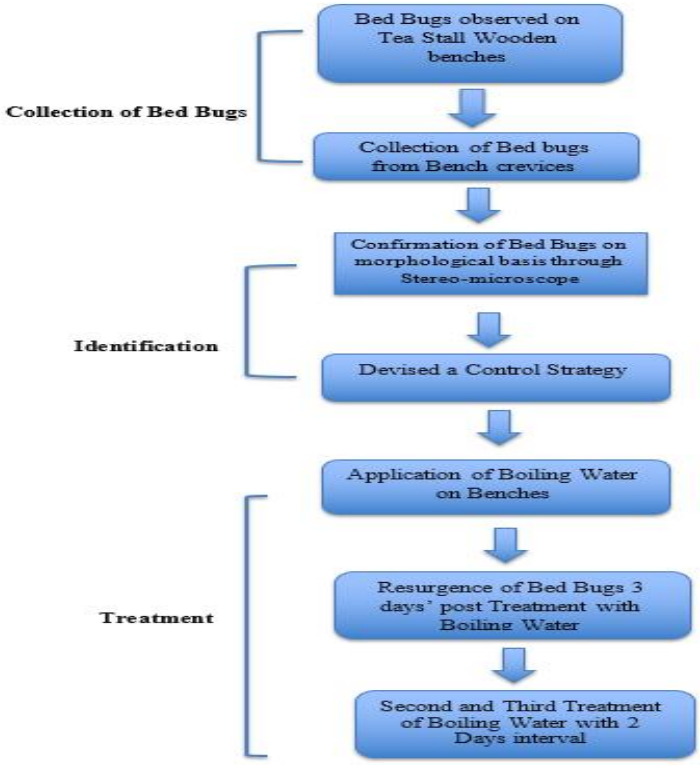


Figure.1. Materials and Method

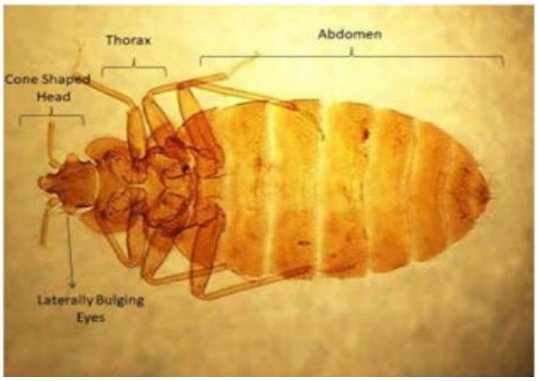


Figure 2: Bed Bug Labelled Under Sterio-Microscope

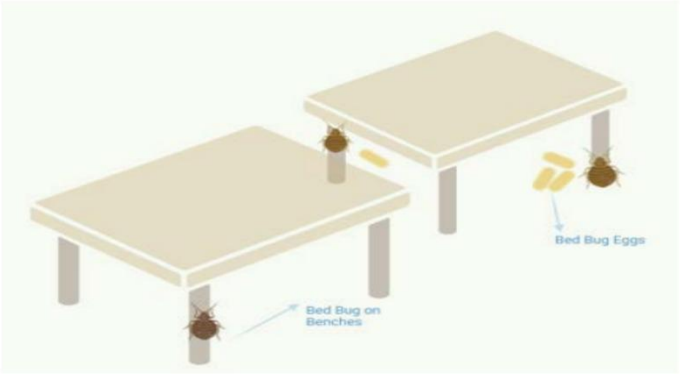
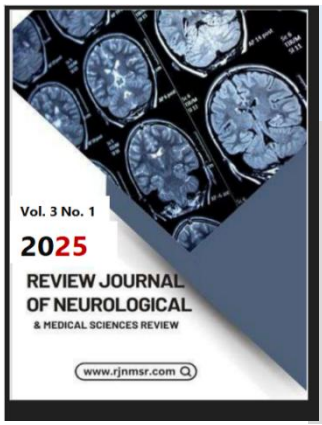


Figure 3: Bench Illustration with Bed Bugs

Results



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The population of bed bugs dropped noticeably after being treated with boiling water and they disappeared quickly afterward. Although treated, the bed bugs again showed up within three days but in smaller quantities than where no treatments had occurred. The resurgence of critters afterward meant that boiling water treatment only achieved a partial result.

Further boiling treatments showed much better results. When the process was applied a second and third time, many bed bugs were killed, until eventually, no more were visible. This proved that use of boiling water helped suppress the bed bug infestation in the apartment.

As well as getting rid of the bedbugs, topical hydrocortisone was used to deal with the individual's allergic response. The treatment was designed to help reduce the pain and swelling that comes from bed bug bites. The antibiotic hydrocortisone which is a cortisol steroid, decreases swelling and irritation caused by bed bug bites.

After boiling water was applied several times, the bed bug population was curtailed. Elimination occurred after a couple more applications. At the same time, using a hydrocortisone solution directly on the affected spots helped control the allergic effects of bed bug bites and led to a successful conclusion for the issue.

Discussion

Suspecting bed bug allergy was tough because mite allergies are like generic allergy symptoms. It was challenging, too, to discover what caused the allergic response. Those who had allergies were only those year-in-year-out tea stall patrons. We took a close look at the seating area around the tea stall. Observations showed that benches with crevices had more adults and nymphs than uncontained areas. To figure out and handle their health problems, laboratory tests had to be performed. Bed bugs are not able to survive temperatures above 45℃. Anything that heats your pet too much can cause physical harm and make your pet lose fluids, possibly ending in their death. Damage from desiccation effects both young and grown insects and also destroy the eggs, (Alizadeh, Jahanifard, & Sharififard, 2020). When applied, hot steam travels only upwards and cannot be used outside. Because of these points, the product is not absorbed into the small spaces in walls and furniture. There is a need for additional time to properly warm the cracks and crevices. Besides, it becomes expensive to create enough steam to manage bed bug infestations effectively. When you use boiling water correctly, it passes through the small spaces and cracks. It does not give the bugs any way to leave. Steam burns from hot water are enough to kill bed bugs as soon as they come in contact with them. This technology is easy to set up and apply, because it requires no special equipment (Lee, Wang, & Su, 2023).

Funding Statement

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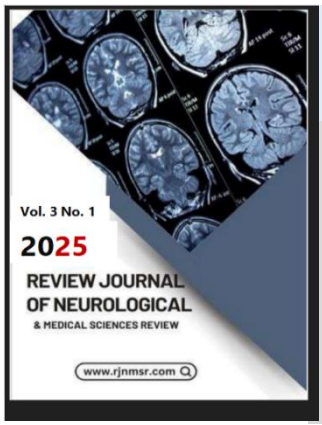
Data Availability Statement



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Only restricted data has been included in this project.

Competing Interest Statement

The authors have no conflicts of interest.

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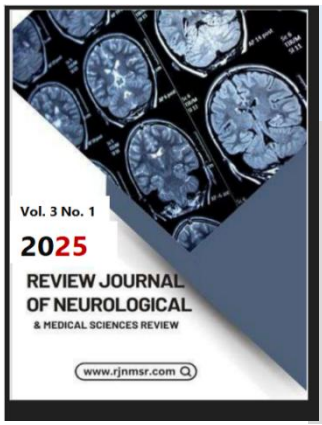

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