

SHORT REPORT

Resurgence of bedbugs in southern France: a local problem or the tip of the iceberg?

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Abstract

Background Bedbugs (*Cimex lectularius*) have been feeding on sleeping human beings since prehistory. In Europe, bed bugs were common and endemic until World War II when improved body and home hygiene, and widespread use of insecticides led to almost complete eradication. Current evidence indicates that bedbugs are making a comeback in Europe, USA, Canada and Australia. In our practice in Southern France, we observed several cases within a period of only 1 year.

Objectives Based on this experience, we conducted an epidemiological study to evaluate the status of bedbugs in France.

Methods During summer 2009, we mailed a short questionnaire to all hospital professors in the CEDEF (Collège des Enseignants de Dermatologie de France) asking four questions: number of suspected diagnosis of bedbugs in the year 2009, and number of certain positive diagnosis, difficulties in treatment, use of a pest control professional for treatment, and finally personal opinion on actual incidence of bedbugs, compared with past years.

Results Of the 84 questionnaires sent, there were only 26 responses despite two reminders. The responses were predominantly southern France, probably as a result of intensive immigration and increased travel and trade. Difficulties encountered during diagnosis and treatment are also mentioned. Utilizing the services of entomological experts and pest control professionals is essential.

Conclusions France has the same experience regarding the resurgence of bedbugs as several European countries, USA, Canada and Australia, especially the southern regions. This emerging health problem has to be known by dermatologists. A national programme has been launched in France to assess actual incidence and study *C. lectularius*- related diseases.

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Keywords

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Introduction

Bed bugs (Fig. 1) (Insecta, Hemiptera and Cimicidae) have probably been associated with human beings since prehistory¹ antiquity and Egyptian civilization.²

Until the Second World War, bed bugs were endemic, because of poor hygienic conditions and crowding situations such as war and refugee camps. In London, in 1930, one Third of the population was infested. After this period, because of economic progress and insecticide development (DDT), incidence decreased and general population disremembered them.

Background

Since the past 10 years, Europe, USA, Canada and Australia had the experience of severe bed bug infestations.^{3–9}

France is also involved in this new health problem, and south east region seems to be particularly concerned. Since 2007, dermatologists have been often concerned by clinical presentations of bed bug bites, and infestations of the household have been confirmed by entomological investigations. There is clearly an increase of outpatient consultation in dermatological unities for bed bug dermatitis. Small clusters have occurred in closed or semi-closed communities in south east region (fire-fighters, soldiers, tramps, blocks of social flats etc.), or train travellers (Luxembourg, Paris and Nice).

Observation 1

A military man of 46 years was seen in 2009 at the hospital with a pruritus rash, which developed 48 h after sleeping at a hotel in



Figure 1 *Cimex lectularius* (Coll. JJ Morand).



Figure 3 Severe infestation in the flat of a schizophrenic man (Coll. JM Berenger).

southern France. Clinical examination showed linear lesions on trunk and extremities, erythematous and maculopapular, with purpuric centre (Fig. 2). Hotel director was contacted and revealed a previous infestation on summer 2007. Pest control has been made at this time. A new entomological examination revealed *Cimex lectularius* cadavers on bedroom floor and dry blood on sheets (blood meal). This case report illustrates treatment difficulties of bed bugs, and highlight utility of an entomologist diagnosis.

Observation 2

A schizophrenic man of 69 years, living alone, was seen at his flat after a declaration to sanitary authorities. He had from several months ago a pruritus rash, and did not succeed to treat his habitation. Expert medical report showed a severe infestation with more than 300 bed bugs in all rooms of the flat (Fig. 3).



Figure 2 Lesions in row or cluster pattern with characteristic hemorrhagic center (Coll. JJ Morand).

Entomologists decided to make a survey on the entire building, and put hangers with phone number and an explicative text to help lodgers to recognize bed bugs. They had several calls and found infestations in several habitations, but rapidly, hangers were picked up because they were considered as a blow to the honour of the residents. This case report illustrates the difficulties to treat a building. If all flats are not correctly treated together, infestations cannot be eliminated. Another « gate control » is the absence of legislation: neither the landlord nor the lesser is in the obligation to treat the apartment, and the cost of pest control devices and activities is expensive. Infestation can progress because of the ignorance of general population.

Our experience highlights that dermatologists are therefore in front line and that they can be used as sentinel to monitor spread of bedbugs.

Methods

To assess rapidly epidemiological situation in France, we decided to conduct a specific survey based on the French dermatologist notifications. During summer 2009, we sent a questionnaire to all Professors of CEDEF (Collège des Enseignants de Dermatologie de France), by mailing a booking form with four questions (numbers of suspected diagnostic of bed bug bites since the beginning of the year and numbers of proved cases, difficulties encountered during treatment, needs in pest control or in entomological expertise, feelings about the importance of bed bug problem in their region).

Results

Results are presented on French map, according to answers from each region (Fig. 4). Question mark is seen for the 'Côte d'or' region because diagnosis mentioned is very uncertain. On 84 questionnaires sent, only 26 dermatologists responded (despite two reminders). Even if results have to be analysed with the limitations such as small sample size and selection bias (dermatologist's hospital community, number of respondents), they emphasize the great



Figure 4 Map of France showing distribution of infestation based on survey data.

proportion of southern region concerned by bed bug resurgence. The respondents reported to have difficulties in making an accurate diagnosis and difficulties in treatment, because of a high rate of recurrence after treatment. Pruritus is the most difficult clinical manifestation to treat. However, there is a disregard on bed bug diagnosis, and utility of entomological expertise (that is rare), and help of pest control professionals is essential.

Discussion

Bed bugs are reddish brown, wingless, 5–7 mm long, nocturnal haematophagous insects, which are flat and elongated and have dorso-abdominal scent glands that can spread a defensive odour, well known by professionals when infestation is severe.

The term 'bed bug' designates *Cimex lectularius* as well as *Cimex hemipterus* respectively distributed in tempered climate like Europe for the first and tropical areas for the last.¹⁰

Bed bugs seldom inhabit beds and they can also hide on cracks and crevices, mattresses, springs, bed frames, wallpaper and bed-clothes.

They feed on the dark on human's skins exposed areas (but not specifically at night), on sleeping victims, attracted by warmth and carbon dioxide. Lesions are typically linear or on clustered arrangement and local aspect is a weal with a central haemorrhagic punctum (Fig. 2). These findings could be attributed to bed bug saliva injection which contains anticoagulants, vasodilatory compounds and proteolytic enzyme like apyrase.¹¹ Other clinical aspects are papular urticaria,¹² maculas or bullae.¹³

Pruritus can be incapacitating and recalcitrant to treatment. Pruritic weal reactions on the morning resolving on evening will

be attributed to the saliva antigen that can be responsible of allergic reactions, as anaphylaxis.¹⁴ One case of erythrodermia has been described.¹⁵

Immunological status of the host seems to determine the severity of cutaneous response as desensitization can occur after repeated bites.

Differential diagnosis has to be made with other arthropods (fleas, scabies, *Pyemotes ventricosus* with the typical 'signe de la comète'¹⁶) but clinical presentation of bed bugs is often typical (linear clustered, morning pruritus, exposed areas of skin). Other dermatological diagnoses have to be discussed: urticaria (but cutaneous lesions are fugacious), allergic eczema (causative agent will be found at history-taking) and bullous impetigo. Ekböm's syndrome (delusional parasitosis) can sometimes be difficult to differentiate when the patient gives the change for excoriation lesions but is suggested by patient behaviour during the consultation.

Bed bugs have been found infected with many infectious agents such as *Borrelia recurrentis* (relapsing fever), *Bacillus anthracis* (anthrax), *Leishmania donovani* (visceral leishmaniasis), *Francisella tularensis* (tularemia) and *Trypanosoma cruzi* (Chagas disease), *Rickettsia prowasekii* (typhus), *Coxiella burnetii* (Q fever), *Wuchereria bancrofti* and more in experimental conditions and in nature respectively.¹⁷ Its vector role has been suspected for some of them (hepatitis B and C,¹⁸ AIDS),¹⁹ but it has never been proved (except in specific hygienic conditions in Africa for hepatitis B).²⁰

Actual resurgence can be explained by several factors: development of tourism, increase in travels and trades,²¹ increase in insecticide resistance of bed bugs', lack of recognition of the existence of bed bugs by general populations that allows them to proliferate (furniture removal for example) and development of trades dealing with second hand goods. In addition, the withdrawal of the use of insecticide to control cockroaches combined with the decreased use of insecticide in household is another factor in this proliferation. Furthermore, the cost of pest control activities and products is too high for most of people and the absence of legislation do not force them (owners or leaseholder) to treat their household.

South east France, located on the Mediterranean coast, is characterized by a high number of harbours, with numbers of trading by ferries with North Africa and other countries of southern Europe and immigration activities, and a military navy site involved in high traffic. This local specific situation of south east region supports actual resurgence.

To cope with this new health problem, there is a need to inform general population to enable them to identify quickly bed bug infestation. Patients could be educated and helped also by a specific information site on the net like Toronto (<http://www.toronto.ca/health/bedbugs/infopublic.htm>). It is important to design a leaflet to inform dermatologists, civilians and military physicians about bed bugs and help them to diagnose and treat. This support could conduct to a larger study including private practice French practitioners (dermatologists, physicians...), associated to a compulsory notification of bed bugs infestation. A

national programme is started in France to study these points, involving dermatologists, entomologists and biologists (bacteriology, virology and genetics).²²

Conclusion

France has the same experience regarding the resurgence of bed bugs as several European countries, USA, Canada and Australia. Southern France is particularly concerned as suggested in our observations, what can be explained by increase trades and travels. This new health problem can be attributed to the ignorance of population, difficulties to treat due to resistance to insecticides and absence of legislations for treatment, and the increase in proliferation of bed bugs in blocks of flats. This emerging health problem has to be known by dermatologists. Pest control professional and entomologists can be useful to confirm the diagnosis and to implement the pest control. This preliminary study highlights the need of information for health professionals and general population and the lack of knowledge of the expansion of bed bugs in France. Further studies are needed to assess the situation. A national programme is launched in France to study *Cimex lectularius* related diseases.

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References

- Pagiotakopulu E, Buckland P. *Cimex lectularius*, the common bed bug from Pharaonic Egypt. *Antiquity* 1999; **73**: 908–911.
- Usinger RL, Povolny D. The discovery of a possible aboriginal population of the bed bug (*Cimex lectularius* Linnaeus, 1758). *Acta Mus Morav* 1966; **51**: 237–242.
- Reihardt K, Harder A, Holland S et al. Who knows the bed bug? Knowledge of adult bed bug appearance increases with people's age in three counties of Great Britain. *J Med Entomol* 2008; **45**: 956–958.
- Katz H. Bed bugs make a comeback. *Pest Control Technol* 2000; 79–81.
- Hwang SW, Svoboda TJ, De Jong LJ et al. Bed bug infestations in an Urban Environment. *Emerg Infect Dis* 2005; **11**: 533–538.
- Harlan JH. Bed bug control: challenging and still evolving. *Outlooks on Pest Management* 2007; **18**: 57–61.
- Masetti M, Bruschi F. Bedbug infestations recorded in Central Italy. *Parasitol Int* 2007; **56**: 81–83.
- Dogget SL, Geary MJ, Russel R. The resurgence of bedbugs in Australia: with notes on their ecology and control. *Env Health* 2004; **4**: 30–38.
- Romero A, Potter MF, Potter DA, Haynes KF. Insecticide resistance in the bed bug: a factor in the pest's sudden resurgence? *J Med Entomol* 2007; **44**: 175–178.
- Berenger JM, Delaunay P, Pages F. Les punaises de lit (Heteroptera, Cimicidae): une actualité « envahissante ». *Med Trop* 2008; **68**: 563–567.
- Valenzuela JG, Guimaraes JA, Ribeiro JM. A novel inhibitor of factor X activation from the salivary glands of the bed bug *Cimex lectularius*. *Exp Parasitol* 1996; **83**: 184–190.
- Scarupa M. Bed bug bites masquerading as urticaria. *J Allergy Clin Immunol* 2006; **117**: 1508–1509.
- Leverkus M. Bullous allergic hypersensitivity to bed bug bites mediated by IgE against salivary nitrophorin. *J Invest Dermatol* 2006; **126**: 91–96.
- Liebold K, Schliemann-Willers S, Wollina U. Disseminated bullous eruption with systemic reaction caused by *Cimex lectularius*. *J Eur Acad Dermatol Venereol* 2003; **17**: 461–463.
- Irizarry E, Brownell I, Keltz Pomeranz M, Perleman RO. The “louse blouse” as a cause of erythrodermia. *Arch Dermatol* 2007; **143**: 682–683.
- Delaunay P, Blanc V, Dandine M et al. Bedbugs and healthcare-associated dermatitis, France. *Emerg Infect Dis* 2009; **15**: 989–990.
- Burton GJ. Bedbugs in relation to transmission of human diseases. *Pub Health rep* 1963; **78**: 513–524.
- Silverman AL, Qu LH, Blow J et al. Assessment of hepatitis B virus DNA and hepatitis C virus RNA in the common bedbug (*Cimex lectularius* L.) and kissing bug (*Rodnius prolixus*). *Am J Gastroenterol* 2001; **96**: 2194–2198.
- Webb PA, Happ CM, Maupin GO et al. Potential for insect transmission of HIV: experimental exposure of *Cimex hemipterus* and *Toxorhynchites amboinensis* to human immunodeficiency virus. *J Infect Dis* 1989; **160**: 970–977.
- Vall Mayans M, Hall AJ, Inskip HM et al. Risk factors for transmission of hepatitis B virus to Gambian children. *Lancet* 1990; **336**: 1107–1109.
- Mouchtouri VA, Anagnostopoulou R, Samanidou-Voyadjoglou A et al. Surveillance study of vector species on board passenger ships, Risk factors related to infestations. *BMC Public Health* 2008; **8**: 8.
- Delaunay P. *Cimex lectularius* ou punaise de lits : Vecteur d'agents infectieux et rôle pathogène. Programme hospitalier de Recherche Clinique 2009, Laboratoire de Parasitologie et Mycologie, Hôpital de l'Archet, Nice, France.