

Research Article

ISSN 2320-4818

JSIR 2013; 2(6): 1052-1057

© 2013, All rights reserved

Received: 19-08-2013

Accepted: 31-12-2013

Somia Gul

Faculty of Pharmacy, Jinnah
University for Women, Karachi,
Pakistan

Sara Ibrahim, Nabiha Wasif

Faculty of Pharmacy, Jinnah
University for Women, Karachi,
Pakistan

Affia Zafari, Rabbiya Syed

Faculty of Pharmacy, Jinnah
University for Women, Karachi,
Pakistan

Correspondence:

Somia Gul

Faculty of Pharmacy, Jinnah
University for Women, Block 5,
Karachi, Pakistan

E-mail: drsomi1983@yahoo.com

Mosquito repellents: Killing mosquitoes or yourselves

Somia Gul*, Sara Ibrahim, Nabiha Wasif, Affia Zafar, Rabbiya Syed

Abstract

Introduction: Mosquito repellents are most commonly used in Pakistan. Now a day it's used has increased because of dengue, malaria and yellow fever. There are many types of mosquito repellents including sprays, lotions creams and coils etc. The main constituent of mosquito repellent is DEET which is hazardous to human health. Many people are allergic to these repellents. The aim of current study is to determine the risk and hazards due to the use of mosquito repellents. **Methodology:** The survey was conducted at different clinics, hospitals, colleges and other different public places with and without complains of reactions on prolong use or even having information regarding toxicity. People presenting with primary complain of skin reactions were significantly due to illiteracy, using cheap and low standard products and excessive use of repellents. **Result:** Most of the people used mosquito repellents as a precaution to dengue and malaria. Illiterate people preferred coils due to their low cost while literate people preferred sprays and lotions. Some people got allergic reactions due to mosquito repellents some suffered from sore throat, runny nose, red eyes and even seizures. **Conclusion:** This research highlights the need for training of medical professionals and pharmaceutical industries to maintain hygiene and provide information regarding the use of these repellents products. A total health building scheme is essential for the healthy use of these products in the population. Such a scheme should consist of proper maintenance of sanitation, inappropriate use of repellents, and complete counselling regarding these products.

Keywords: Mosquito repellents; DEET; Coils; Skin reactions.

Introduction

Mosquitoes transmit disease 700million people annually.¹ Currently the use of mosquito repellent has increased in Pakistan due to epidemic of dengue. The best known mosquito repellent is N, N-diethyl-m-toluamide, now called N, N-diethyl-3-methylbenzamide (DEET).² Repellent repels mosquitoes- that is, it reduces the chances of being bitten- but it does not mosquito-proof a person. In this light, repellent use offers individuals added protection against mosquito-borne diseases. In the community, it reduces the transmission of mosquito-borne diseases. Although there are many different types of mosquito repellents in market like sprays, coils, lotions, mats etc³, some people use natural aliments like Burning a bit of the herb, growing plants like horsemint, rosemary, marigolds and eating more garlic.⁴ Some people are allergic to mosquito repellents and some are not. Mosquito repellents can cause runny nose watery eyes and hoarseness rarely seizure^{5,6}, encephalitis⁷ and even cancer.⁸

It has been reported in a study which is carried out on Chinese and Malaysian coils suggested that smoke of mosquito coil contains particulate matter (2.5) which is equally produced by the smoke of 75-137 cigarettes and release of formaldehyde from

burning of one mosquito coil is equal to same mass produced by burning 51 cigarettes.⁹ In Kuala Lumpur, a research was carried out which stated that if person with asthma complaint reduces exposure to mosquito coil may reduce in prevalence of persistent wheeze, chest illness and asthma up to 29%.¹⁰ The risk of lung cancer was found during a study, carried out in Taiwan between 2002 and 2004 which states that there is a risk of lung cancer which is 14times higher in smokers who exposes from mosquito coils as non smokers.¹¹ DEET is also a part of many mosquito repellent products and there is enormous work has been done on its toxicity as in a research it is stated that DEET is although effective, but according to the case reports, it was found that it is associated with seizure due to which its use is limited in young children.¹²⁻¹⁸ It has been written in a report that most of the data on DEET's toxic effects in humans stem from case reports of ingestion of the chemical. Due to the ingestion it may lead to hypotension, seizures and coma within as little as 1 hour. Deaths have been associated with serum concentrations of 1 mmol/L.^{19, 20} In Canada, a research showed that an adult may suffer from psychosis who had applied a product on skin that contains 70% of DEET. He may also suffer from immediate contact dermatitis that uses as dermal application.²¹ According to a research done which states that excess use of DEET (325 mg/kg daily) than the normal human dose has been led to maternal toxic effects and low birth weights of offspring.²² An analytical study was performed in Indonesia revealed that bis (chloromethyl) ether (BCME) is potent lung carcinogen which is formed by formaldehyde and hydrogen chloride combustion.²³ E.K. Patel *et. al* in their literature reveals that chemical mosquito repellent are very hazardous for skin and nervous system and produce toxic effects like skin rashes, swelling, eye irritation, anaphylactic shock, low blood pressure and brain swelling in children.²⁴

Human health is one of the biggest issues now a days, Our Aim of researching on this topic is to make people aware regarding the hidden health problems associated with the use of mosquito repellent. Much of our community doesn't know what hazards mosquito repellents can do to our body.

Healthcare professionals firstly and most importantly should be trained to educate people regarding the usage and effects of over usage. Awareness programs should be carried out, through print media, publications etc, seminars

should be conducted, companies should provide complete information regarding their product i.e. the toxicity profile as well, so that the people maintain their sanitation, use natural products more (like using nets, or using repellents derived from natural sources) and use repellents as less as possible.

Methodology

The survey was conducted among 100 peoples (age 18-60) of Pakistan belonging to different categories of our society including students, house wives, working man and women and house maids. The study is based on general questionnaire and general interview which were taken at different universities, colleges, clinics, hospitals and other public places. Survey was examined or inspect closely and thoroughly. General questionnaire and interview included the questions regarding use of mosquito repellents and their side/adverse effects experienced by people. When questioned it was noted that most of the people didn't know how to use repellents and were using it because they had seen advertisement or was recommended by their family or friend. However in some cases people stopped the usage of repellents because of allergic reactions.

Statistical Analysis

The results are expressed in percentages through pie charts, doughnut chart and bar graphs to compare the use of mosquito repellent among genders, types of mosquito repellents used, the side effects which were experienced by the individuals, usage of different types of repellents used among literate and illiterate people and number of individual allergic and non allergic individuals (figure 1-figure 5).

Result

100 people aged 18-60 years were studied in our survey. As shown in figure 1, 39% individuals experienced allergic reactions. Frequent symptoms were itching, redness of skin, sore throat, breathlessness, coughing, and redness of eye. While the most common side effect observed in individuals using mosquito repellent was sore throat which includes hoarseness of voice. 28% people preferred coil because of the low cost of the coil, that's why it is most common product among illiterate people (figure 5). From our survey we have found that allergic reactions are more common in males than females as shown in figure 2.

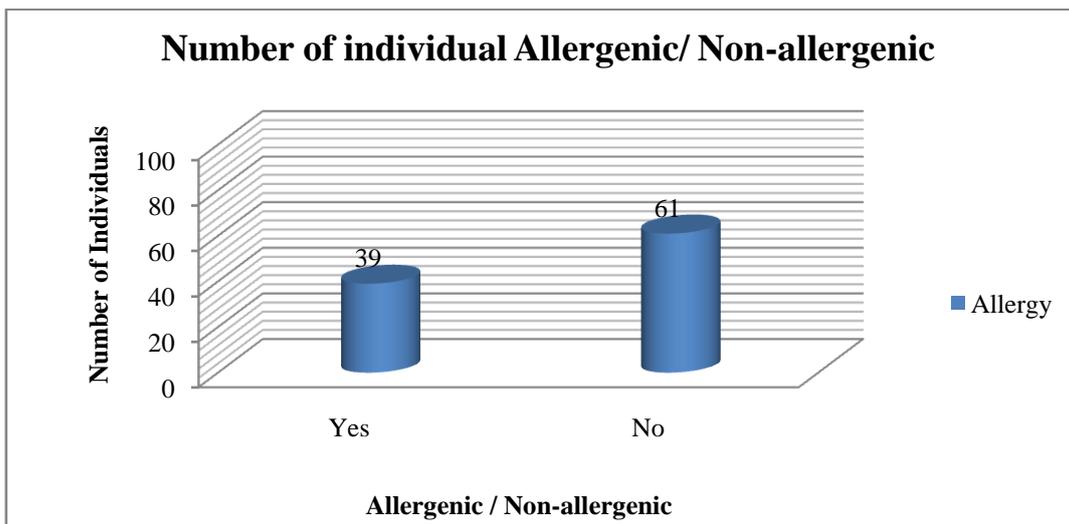


Figure 1: Number of Individuals With and Without Allergic Reactions Using Mosquito Repellents

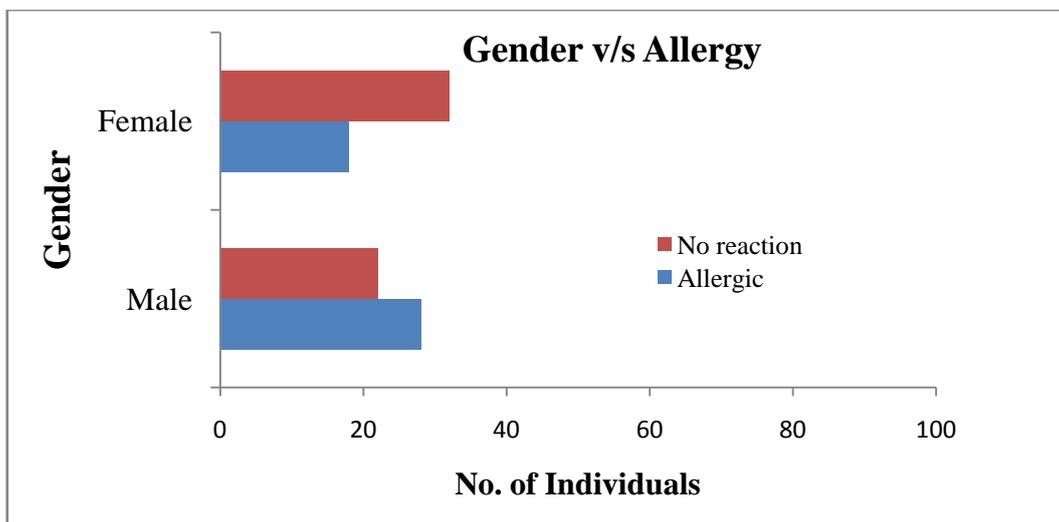


Figure 2: Relationship between Gender and Allergic Reactions Using Mosquito Repellents

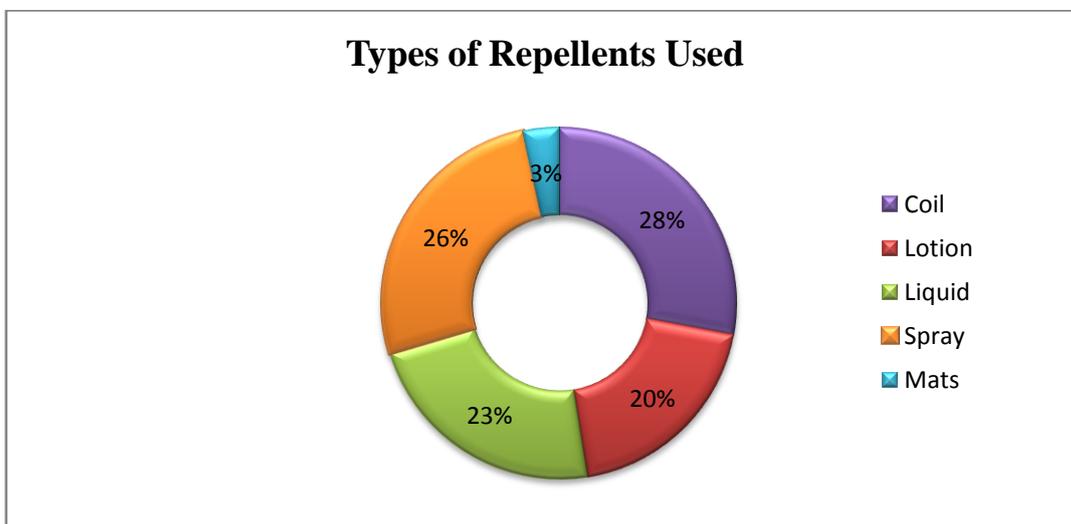


Figure 3: Percentage Ratio of Types of Mosquito Repellents Used

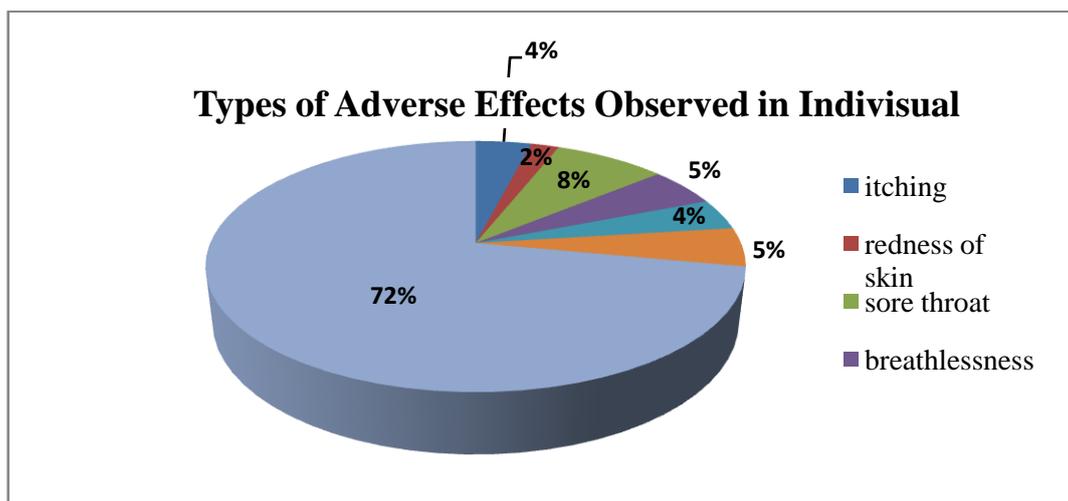


Figure 4: Types of Adverse Effects Observed in Mosquito Repellents Users

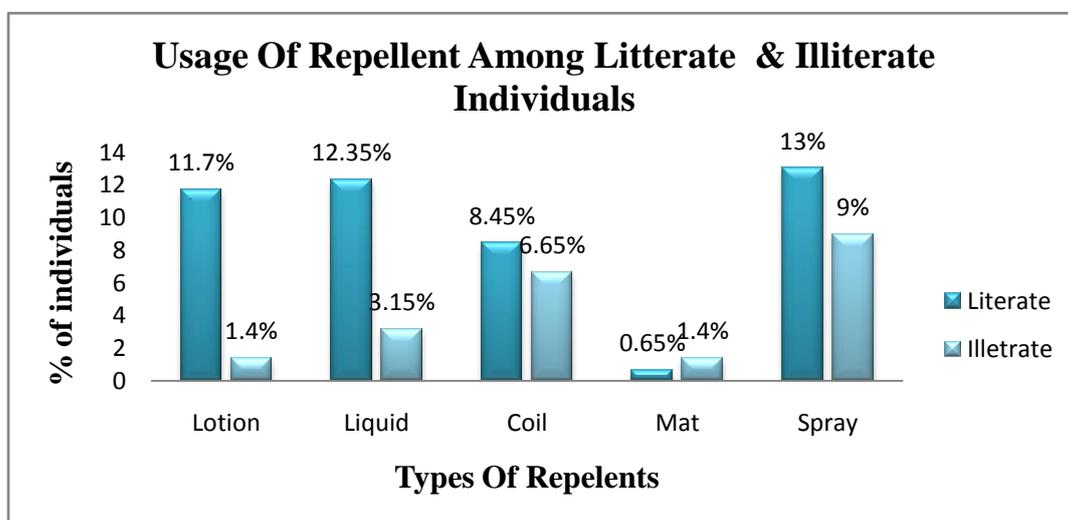


Figure 5: Percentage Use of Mosquito Repellents among Litterate and Illiterate Individuals

Discussion

The use of mosquito repellents is increase day by day due to occurrence of many harmful diseases like dengue, malaria, yellow fever etc. As a part other than effectiveness, mosquitos repellent are also responsible for many side effects. The purpose of our research is to study the side effects happen due to these repellents. Form the survey result, it reveals that many individuals suffer from side effects and some of them are unaware that they experience the side effects due to mosquito repellents use.

39% of the individual were experiencing side effects and getting allergenic to mosquito repellents, while the 61% of the individual were not. This figure obtain is although not too huge and is not obtained after long term exposure but

still it a problem that it can get worsen on long term exposure.

Current study indicated the occurrence of irrational usage of repellants, Health hazards on human health, and illiteracy (lack of information regarding product). According to our survey we observed that, 28 males out of 50 experienced different allergic reactions and 22 had no reactions, whereas 18 females out of 50 had allergic reaction and 32 had no reaction. We observed that allergic reactions were more common in males than in females. There may be a number of factors such as in Pakistan, males are more prone to mosquito bites, as they work outside more, experience different working conditions, work in unhealthy environments as compared to females. And to avoid mosquito bites they use mosquito repellants

more which may lead to more serious allergic reactions like anaphylactic shock by continual application of mosquito repellent.

8% individual experienced sore throat, 5% breathlessness and 4% coughing which may be due to inhalation of vapors produced by the use of mosquito repellents (figure: 4). While other adverse effects could be due to direct exposure of mosquito repellent to the skin or eye causing 5% individual to suffer from redness of eye, 2% redness of skin and 4% itching. 72% people didn't have any kind reaction but by this we cannot say that these people will experience any adverse effect by long term use of mosquito repellent.

The most commonly use mosquito repellent is coil (figure: 3). General interviews and questionnaires showed that people of all classes commonly use spray before sleep and during sleep they use coils, liquid, lotions etc. The reason of abundant use of coil is its inexpensive characteristic. It also shows that nowadays people of middle class and upper class preferably use liquid repellent due to its lowest side effect that many of them experience vomiting, redness of nose and hoarseness of voice in using coils. In past years the mats were used commonly but nowadays, sprays and liquids have taken its place and only lower classes are using mats.

Most of the illiterate people doesn't use any type of repellent that's why they suffer more from diseases like malaria, dengue etc. In literate class the use of spray and liquid is very common while in illiterate class the use of coil is very common.

Conclusion

This research highlights the need for training of medical professionals and pharmaceutical industries to maintain hygiene and provide information regarding the use of these repellents products. A total health building scheme is essential for the healthy use of these products in the population. Such a scheme should consist of proper maintenance of sanitation, inappropriate use of repellants, and complete counseling regarding these products.

References

1. Mark S. Fradin, M.D., and John F. Day, Ph.D. Comparative Efficacy of Insect Repellents against Mosquito Bites, *N Engl J Med* 2002; 347:13-18.
2. Mafong EA, Kaplan LA. Insect repellents. What really works? 1997; 102(2):63, 68-9, 74.

3. Roger S. Nasci, Emily Zielinski-Gutierrez, Robert A. Wirtz, William G. Brogdon Protection against Mosquitoes, Ticks, & Other Insects & Arthropods Chapter 2 - 2012 Yellow Book - Travelers' Health – CDC.
4. Marta Ferreira Maia and Sarah J Moore Plant-based insect repellents: a review of their efficacy, development and testing *Malar J.* 2011; 10(Suppl 1): S11. Published online 2011, doi: 10.1186/1475-2875-10-S1-S11.
5. Oransky, S., et al. "Seizures Temporarily Associated with Use of DEET Insect Repellent-New York and Connecticut." *Morbidity and Mortality Weekly Report* 1989 38(39):678-680.
6. Lipscomb, J.W., et al. "Seizure following brief exposure to the insect repellent N, N-diethyl-m-toluamide." *Ann.Emerg.Med.* 1992; 21(3): 315-317.
7. Roland, E.H., et al. "Toxic encephalopathy in a child after brief exposure to insect repellents." *Can.Med.Assoc.J.* 1985; 132(2): 155-156.
8. Pahwa, Punam PhD; McDuffie, Helen H. PhD; Dosman, James A. MD; McLaughlin, John R. PhD; Spinelli, John J. PhD; Robson, Diane; Fincham, Shirley PhD Hodgkin Lymphoma, Multiple Myeloma, Soft Tissue Sarcomas, Insect Repellents, and Phenoxyherbicides .*jom.0000201563.18108.af* 2006 - Volume 48 - Issue 3 - pp 264-274.
9. Weili Liu, Junfeng Zhang, Jamal H Hashim, Juliana Jalaludin, ZailinaHashim, and Bernard D Goldstein Joint Graduate Program in Exposure Measurement and Assessment, University of Medicine and Dentistry of New Jersey (UMDNJ) and Rutgers University, 170 Frelinghuysen Road, Piscataway, NJ 08854, USA. *Environ Health Perspect.* 2003; 111(12): 1454–1460.
10. Azizi BH, Henry RL. The effects of indoor environmental factors on respiratory illness in primary school children in Kuala Lumpur. *Int J Epidemiol.* 1991; (1):144–150.
11. Chen SC, Wong RH, Shiu LJ, Chiou MC, Lee H. Exposure to mosquito coil smoke may be a risk factor for lung cancer in Taiwan. *J Epidemiol.* 2008; 18:19–25.
12. Epidemiologic notes and reported seizures temporally associated with use of DEET insect repellants — New York and Connecticut. *MMWR Morb Mortal Wkly Rep*1989; 38:678-80.

13. Gryboski J, Weinstein D, Ordway NK. Toxic encephalopathy apparently related to the use of an insect repellent. *N Engl J Med* 1961; 264:289-91.
14. Roland EH, Jan JE, Rigg JM. Toxic encephalopathy in a child after brief exposure to insect repellents. *Can Med Assoc J*. 1985 *CMAJ* 1985; 132(2):155-6.
15. Edwards DL, Johnson CE. Insect-repellent-induced toxic encephalopathy in a child. *Clin Pharm* 1987; 6:496-8.
16. Heick HMC, Shipman RT, Norman MG, James W. Reyelike syndrome associated with use of insect repellent in a presumed heterozygote for ornithine carbamoyltransferase deficiency. *J Pediatr* 1980; 97:471-3.
17. Lipscomb JW, Kramer JE, Leikny JB. Seizure following brief exposure to the insect repellent N, N-diethyl-m-toluamide. *Ann Emerg Med* 1992; 21:315-7.
18. Letter from S.L. Oransky to the Department of Environment, Albany, NY; On file with the Department of Environment, Bureau of Pesticides Management, Hudson Valley Regional Poison Center, Albany, CMAJ NY 1991.
19. Ellenhorn M. *Ellenhorn's medical toxicology: diagnosis and treatment of human poisoning*. 1997; 2nd ed. Baltimore: William & Wilkins; ISBN 0-683-30031-8.
20. Teinenbein M. Toxicity of diethyltoluamide-containing insect repellents [letter]. *JAMA* 1988; 259:2239-40.
21. Ellenhorn M. *Ellenhorn's medical toxicology: diagnosis and treatment of human poisoning*. 1997 2nd ed. Baltimore: William & Wilkins; 1997, 2047 pp., ISBN 0-683-30031-8.
22. Schoenig GP, Neepier-Bradley TL, Fisher LC, Hartnagel RE Jr. Teratological evaluations of DEET in rats and rabbits. *Fund Appl Toxicol* 1994; 23:63-9.
23. Robert I Krieger, Travis M Dinoff, and XiaofeiZhang Octachlorodipropyl ether (s-2) mosquito coils are inadequately studied for residential use in Asia and illegal in the United States *Environ Health Perspect*. 2003 September; 111(12): 1439-1442.
24. EK.Patel, A. Gupta and RJ.Oswal. A Review On: Mosquito Repellent Methods. *IJPCBS* 2012; 2(3): 310-317.