

## Use of Mosquito repellent at Asansol, India

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### ABSTRACT

Most emerging infectious diseases today are arthropod-borne and cannot be prevented by vaccinations. Mosquitoes are among the most disturbing blood sucking insects afflicting human beings. Mosquitoes act as a vector for most of the life threatening diseases like malaria, yellow fever, dengue fever, chikungunya fever, filariasis, encephalitis, Mosquitoes alone transmit diseases to more than 700 million people and over one million deaths are reported annually across the globe. Therefore, the control of mosquitoes is an important public health concern around the world. One of the approaches for control of these mosquito borne diseases is the interruption of disease transmission by either killing the mosquitoes or preventing them from biting individuals by applying various types' synthetic or Natural chemical repellents. This term paper presents information on insect repellent and its history, discovery of lab based repellent, why use insect repellent, mosquito repellent, mosquitoes available in INDIA and their pathogenicity, situation in WEST BENGAL, classification of mosquito repellent, synthetic, physical, mechanical & biological control method, advantages and disadvantage of chemical repellents, types of mosquito repellent in market, choosing of repellent, mode of action, role of repellent in disease prevention, natural insect repellent plants, current research in this field, health hazard by the chemical repellents, homemade repellents, alternative measures to combat mosquito, malaria control activities in INDIA, condition in Paschim Bardhaman, Asansol.

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### 1. Introduction

Most emerging infectious diseases today are arthropod-borne and cannot be prevented by vaccinations. Because insect repellents offer important topical barriers of personal protection from arthropod borne infectious diseases. Mosquitoes are among the most disturbing blood sucking insects afflicting human beings. Several mosquito species belonging to genera *Anopheles*, *Culex* and *Aedes* are vectors for the pathogens of various diseases like Dengue fever, Malaria, Yellow fever, Japanese Encephalitis and several other infections. Mosquitoes alone transmit diseases to more than 700 million people and over one million deaths are reported annually across the globe. Malaria which is caused by *Plasmodium* parasites transmitted through the Bites of female *Anopheles* mosquitoes continues to impart a major disease burden on infants and young children in endemic regions. Japanese Encephalitis virus is transmitted to humans through infected *Culex* mosquitoes. Japanese Encephalitis causes an estimated 50,000 cases and 10,000 deaths every year worldwide. In Sri Lanka, there were less than 100 cases of Japanese Encephalitis reported in 2014. Moreover, every year there are around 200,000 cases of illness and 30,000 deaths worldwide from Yellow fever which is transmitted by the *Haemagogus* and *Aedes* species of mosquitoes between monkey and humans. The *Aedes aegypti* mosquito which spreads Dengue fever is responsible for more than 100 million infections worldwide every year, leading to thousands of deaths and more than 2.5 billion people or over 40% of the world's population are now at risk of Dengue. Therefore, the control of mosquitoes is an important public health concern around the world. One of the approaches for control of these mosquito-borne diseases is the interruption of disease

transmission by either killing the mosquitoes or preventing them from biting individuals. These strategies include prophylactic measures, mass drug administration campaigns, vaccinations, and antibiotic drugs and anti-viral that selectively target the parasite or inhibit the replication of the Arbovirus in the host. While extremely successful in the control of certain etiologic disease agents, such as filarial parasites and some strains of *Plasmodium*. The second method of control involves the prevention of transmission of the disease agent by the vector. This is accomplished by a variety of means including the abatement of vector populations and the use of biting deterrents. Insect repellents offer important topical barriers of personal protection from arthropod-borne Infectious diseases.

### 2. Material and Methods

Mosquitoes are relatively small insects, representative of the family Culicidae. Mosquito body is divided into three basic parts, namely, head, thorax and abdomen. Its head is consisting of sensors that help the mosquito to find and feed on people and animals. They have two large compound eyes that are capable of detecting even slight movements. Mosquito-antennae are long and contain sensitive receptors that detect carbon dioxide in human breath. The maxillary pulp picks up the odor and other chemicals released in human sweat. Males will not bite human beings and females start biting human beings after mating with males as female mosquitoes require human blood protein for the maturation of their eggs.

A mosquito repellent is a substance applied to body, clothing or use in home which prevent mosquitoes from landing or stay on that surface. Usually, mosquito repellents mode of

action is by masking human scent or by using a scent which mosquitoes naturally fudge. Carbon dioxide and lactic acid present in sweat act as an attractant for mosquitoes. There are many types of mosquito repellents which are commercially available in the market. Spray mosquito repellents are popular and maybe sprayed on the clothes, bags to deter mosquito. Cream or lotion types repellents are applied directly to the body skin and creating a repellent barrier. Currently, chemical mosquito repellent liquidizers are also widely used all around the world and also Asansol is not an exceptional. The liquidizers contain synthetic Pyrethroids that produce various toxicity including neurological diseases. In some cases it also show its hazard effects in newborn & pregnant by inhalation of toxic chemical. There are some physical methods of repel mosquitoes such as the traditional mosquito nets. They are referred as better protection from mosquitoes than coils and other repellents that are the reason of health hazards. Mosquito net assures guaranteed protection from mosquitoes while using. Mosquito coils are the most saleable product of repellent industry. Its low MRP. Attracts the lower economy

level public. They are Smokey types of repellent and inhalation of chemicals from coils cause respiratory infections and headaches & many more. Mechanical methods such as Electric Mosquito Zappers kill them upon contact with its lethal dose of electrical charge. Mosquito repellent products available based on sound productions. Female mosquito avoids the presence of male after mating once. Therefore, an ultrasound generator mimics the sound waves produced by the beating of male mosquito wing and this will repel female. So these are the traditional and modern mosquito repellent that we already used. But there is a problem increase that not controls them properly. The usages of chemical mosquito repellent day by day increases but the story of control is not change. Day by day increases of the same chemical use developed resistance in mosquito. So their population is resist and adapts these chemicals and we are the sufferer.

### 2.1 Study Cite:

This work was carried out in various wards of Asansol city, India.

**Table 1: Different Ward name and No.**

Serial No	Ward no	Ward name	Population Density As per Voter register
1.	9	Jamuraia	6543
2.	46	Hutton Road	7120
3.	53	Burnpur road Morh	6568
4.	83	Mohisila Colony 1	7586
5.	84	Ismile	8330
6.	85	Mohisila Colony 2	9420
7.	86	Talkuri	8024
8.	87	Damra	7241

### 2.2 Meteorology:

The climatic condition at Asansol mainly shows three distinct seasons: a short summer (March to May), a typical monsoon (June to September) and a rather chilly winter (October to February), General weather patterns prevailing in the study sites are more or less same. The maximum temperature and minimum temperature ranges from 35.1° C to 35.8° C during April - May and 7.2°C to 7.8°C during December - January respectively. The extreme high and low temperature ranges from 39.4° C to 40° C and 2.2° C to 5° C respectively. Monthly total rainfall varies from 2.7 mm, to 9.2 mm. (minimum) in the months of December to January and 710 mm, to 776 mm, in the months of June to July (maximum). The humidity ranges from 43 % to 69 % in April and 81 % to 88 % in August. The general weather condition is hot and humid in the summer time and moderately cold and dry in the winter time. (Banerjee, Tushar, 2019)

### 2.3 Study period:

Observations were conducted from April 2018 to December 2018, except short breaks of 5 to 10 days every

month for library consultation, consultation with the supervisor at the Department and collection of various records from different public and private offices especially from Asansol municipality Corporation.

### 3. Daily observation schedule

For convenience of study daily observations schedule and face to face interview with the common people, were divided into two shifts i.e., in the morning (8.00 a.m. to 10.00 a. m.) and in the afternoon (5.00 p.m. to 7.00 p.m.). In some cases observations were taken from 7.00 a.m. to 12.00 p.m. and from 4.00 p.m. to 8.00 p. m. In actual cases, however, the hours as scheduled above could not be followed exactly. But the deviations from the schedule observation hours were never more than 20 minutes. Thus observations were made throughout the day encompassing all the two shifts. Besides, observations were also made at different hour of the day whenever possible [1]

### 4. Result and Discussion

Table 2: Study reports of Selected Wards.

WARD NAME	SL NO.	House		Annual Income	No. Of Member	Type Of Repellent Used	Use Day Or Night DAY= D NIGHT= N	REMARKS SATISFACTORY= S NOT SATISFACTORY =NS	
		Rent	Permanent					S	NS
Hutton Road	1.	R		< 1 LAKH	6	SMOKE COIL	N		NS
	2.	R		< 1 LAKH	5	SMOKE COIL / STICK	D & N		NS
	3.		P	>1 LAKH	4	LIQUID OIL	N	S	
	4.		P	>1 LAKH	3	LIQUID OIL	N	S	
	5.		P	>1 LAKH	3	LIQUID OIL/ SPRAY	N	S	
Burnpur Road more	6.		P	>1 LAKH	5	LIQUID OIL/ SPRAY	N	S	
	7.		P	>1 LAKH	5	CREAM/ LIQUID OIL/SPRAY	N	S	
	8.		P	>1 LAKH	4	CREAM/ LIQUID OIL/SPRAY	N	S	
	9.	R		< 1 LAKH	8	SMOKE STICK	D & N		NS
	10.	R		< 1 LAKH	3	SMOKE STICK	D & N		NS
Mohishila colony 1	11.	R		<1 LAKH	6	SMOKE COIL / STICK	D & N		NS
	12.	R		<1 LAKH	5	SMOKE COIL	D & N		NS
	13.		P	>1 LAKH	4	LIQUID OIL	D & N		NS
	14.		P	>1 LAKH	2	LIQUID OIL/ SPRAY	D & N	S	
	15.		P	>1 LAKH	7	CREAM/ LIQUID OIL/SPRAY	D & N	S	
Ismile	16.	R		<1 LAKH	5	SMOKE COIL	N		NS
	17.	R		<1 LAKH	6	SMOKE STICK	N		NS
	18.	R		<1 LAKH	4	SMOKE STICK	N		NS
	19.	R		<1 LAKH	5	SMOKE CARD	N		NS
	20.		P	>1 LAKH	3	LIQUID OIL/ SPRAY	N	S	
Mohishila colony 2	21.		P	<1 LAKH	5	LIQUID OIL/ SPRAY	D & N	S	
	22.		P	<1 LAKH	4	SMOKE COIL	D & N		NS
	23.	R		>1 LAKH	5	SMOKE CARD	D & N		NS
	24.	R		>1 LAKH	8	LIQUID OIL/ SPRAY	D & N	S	
	25.	R		<1 LAKH	4	LIQUID OIL/ SPRAY	D & N	S	
Talkuri	26.		P	>1 LAKH	4	MOSQUITO NET	D	S	
	27.		P	>1 LAKH	5	MOSQUITO NET	N	S	
	28.	R		>1 LAKH	5	CREAM/ LIQUID OIL	D	S	
	29.		P	<1 LAKH	4	SMOKE COIL	D&N		NS
	30.		P	>1 LAKH	3	SMOKE CARD	D		NS
Damra	31.	R		<1 LAKH	5	MOSQUITO NET	N	S	
	32.	R		>1 LAKH	3	MOSQUITO NET	N	S	
	33.	R		<1 LAKH	5	MOSQUITO NET	N	S	
	34.	R		>1 LAKH	5	MOSQUITO NET	N	S	
	35.		P	<1 LAKH	3	MOSQUITO NET	N	S	
Jamuria	36.	R		>1 LAKH	4	CREAM/ LIQUID OIL	N	S	
	37.		P	<1 LAKH	5	MOSQUITO COIL	N		NS
	38.		P	<1 LAKH	3	SMOKE CARD	N		NS
	39.	R		<1 LAKH	7	SMOKE STICK	N		NS

	40.	R		>1 LAKH	4	CREAM/ LIQUID OIL	N	S	
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Above mention collected data from various wards shows diversity & clear scenario about mosquito repellent uses. Public are comfortable with harmful chemical repellent and they also aware that they inhale the toxic. We study among two types of people based on their annual income. The annual income > 1 lakh people uses less harmful repellent than the lower economy level people. Most of the Lower Economy Level (LEL) uses smoke type repellent that is purely harmful and reason for pulmonary diseases. When we see the pie chart most usable repellent is liquid chemical mosquito repellent (29%) and also uses in the 16 families. Second is spray type repellent i.e. used in 10 families and it is contributing 18%. Smoke coil & smoke stick which similarly shares 14% and used in 8 families. Mosquito net are used in 6 families, Mosquito repellent cream is used in 5 and mosquito repellent smoke card is used in 3 families (5%). Some families use not only liquid oil but also they use cream or lotion or spray for perfect protection other side smoke coil users use card and Smokey stick .some families still stay with the mosquito net i.e. old repellent and its effectiveness is not questionable. So their remark is quite interesting based on their uses of repellent-satisfactory and not satisfactory. Satisfactory repellent products i.e. liquid oil, cream, spray and the traditional

mosquito net but not satisfactory products are smoke coil, stick and cards. If we take some steps to avoid smoke coil, stick, card that is good steps to avoid chemicals and diseases also. Coil, cards are low prices so they are so attractive for lower economy people. Their protection time or effectiveness is lower than the other. But their harmfulness higher than other People of these wards does not use any natural repellent. They don't aware of it. Neem oil is good source of repellent. Extraction of Neem oil from the plant leaves and makes it repellent is not a hard process, but the lack of knowledge and awareness is the main issue. They even don't use some homemade repellent. Homemade repellents ingredients are quite easily to get and to form repellent. It is interesting to say that they all aware of the effects of these chemicals but they unwillingly accept the chemicals. In some wards cleanliness, drainage system good some are poor. Proper awareness about cleanliness is highly demandable. ASANSOL MUNICIPAL CORPORATION (AMC) takes lots of initiative about these but they need cooperation from people at the same time. AMC recruited various employees to observe the situation in all wards; they observe this situation and take some steps according to the problem. Their initiative is appreciable.

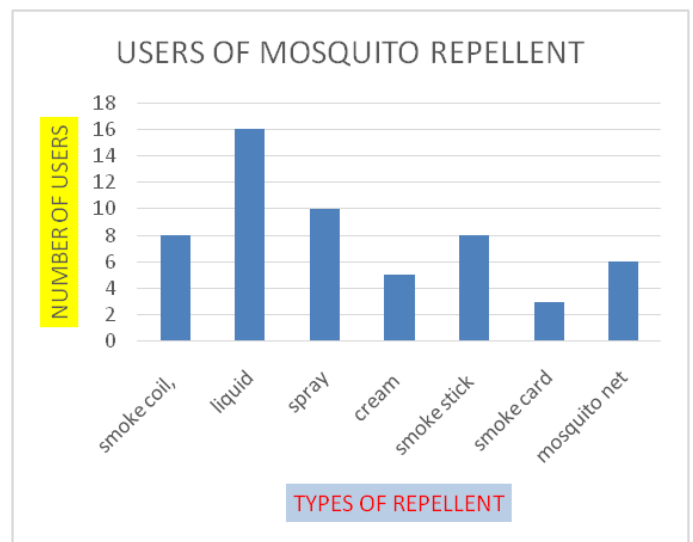
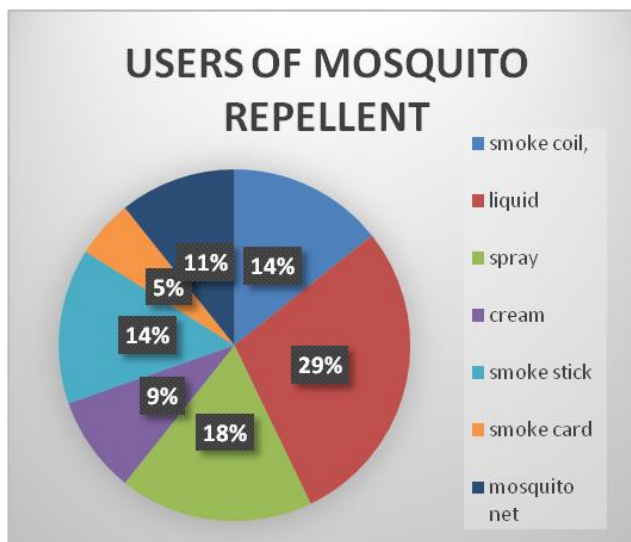


Figure: Graphical Representation of various Repellent.

**5. Conclusion**

Repellent science has advanced greatly in the last decade and will continue to progress in the future Repellents may have an increasingly important role in eliminating Mosquito from certain environments but natural products, such as essential oils, could play a major role in new repellent technology. Plants as alternative source of repellent agent reported in numerous ethno botanical evaluations. They have been used traditionally in many parts of the world. Compared to synthetic compounds, Natural products are presumed to be safer for human use. The resistance of mosquitoes to insecticides has increased during the last five decades; the natural products are usually simple, cost effective. Recent technological developments in herbal drugs motivating research. But pharmaceutical research in Mosquito repellent products yet to gear up .From above study

on review of mosquito repellent methods it is concluded that the natural mosquito repellent are the best methods to repelled mosquito as compare to synthetic methods. Disadvantage of natural mosquito repellents that it can evaporate completely may need more frequent re application to maintain full protection. Still Essential oils abundant in nature and apart from its medicinal and flavor value, its use in repelling mosquito can be considered as sustainable and biocompatible delivery device as green alternative. At the end we all know chemical repellents causes health hazard but still we use because of their rapid function. We involve in the health problem ourselves consciously or unconsciously. So it is concluded that we never control mosquito only manage the annoying insect, mosquito

## 6. Recommendation of Policies for Mosquito controlmanagement

1. Uses of Mosquito repellent like liquid form need to be minimize.
2. Do not use same chemical repellent so that Mosquito cannot get resistance for the same.
3. Try to less use of various traditional mosquito coils to prevent lungs diseases.
4. Proper gradient should be provided to eliminate standing water in drains, low-lying areas, ditches, borrow pits, etc.
5. People of Asansol should gain proper knowledge from the Asansol Municipality Corporation regarding their initiative.
6. Children and aged people keep away from the various mosquito repellent.
7. Manufacturing company should use natural ingredients to make mosquito Repellent
8. Use of Neem Oil should be increase as an alternative liquid chemical mosquito repellent.
9. Try to discover various type of Biological agent and develop their proper nourishment for mosquito control management.

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