

Survey on Consumption of Insecticides for Control of Mosquito as Vector (Order: Diptera) In Vadodara, Gujarat, India

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Abstract- Present study shows that in spite of availability of “biorational” alternative in Vadodara for the control of mosquito species people are still dependent on conventional insecticides. In which maximum synthetic pyrethroid was used followed by organophosphate.

Index Terms- Biorational alternative, Organophosphate, Synthetic pyrethroid, Mosquito, Conventional Insecticides

I. INTRODUCTION

In world currently 300 mosquito species are identified from 39 genera and 135 subgenera (Remia and Logaswamy, 2010). Out of which *Aedes* spp., *Culex* spp. and *Anopheles* spp. as an important vectors causing dengue hemorrhagic fever (DHF), chikungunya, malaria, filariasis in human (Ringu-Perez *et al.*, 1997; Melrose, 2002). The present seen shows no proper vaccine available for control of these vector born diseases (Malaviga *et al.*, 2004). So, it encourages the use of conventional pesticides for its reduction by directly killing the mosquito species. So objective of the present survey was:

To do an extensive survey of the pesticide markets of Vadodara and interviews with the pest control service agencies and locals, regarding the use of insecticides for controlling mosquito. Hence it give an information on the number of conventional insecticides as well as other ecofriendly control agents present in Vadodara market and used by common peoples in Vadodara residential areas.

II. METHODOLOGY

Survey was conducted in all parts of Vadodara having pesticides shops/ agencies (Table-I). During survey the residential area located near these pesticides shops/ agencies were selected randomly to take the personal interview for the control measures used against mosquito.

III. RESULT AND DISCUSSION

The outcome of survey shows that 38 product of synthetic pyrethroid were present in the Vadodara market out of which 13 products which are low in cost are used by common peoples (Table II). Whereas organophosphate chemicals products are

only 17 none are familiar among selected residential area peoples (Table III). Only one product was found from carbamate and benzamide chemical group which are not in used among urban people (Table IV and V). Thus, Vadodara market shows the presence of 57 conventional insecticides belonging to different chemical group (Table VII). This shows the dominance of synthetic insecticides in Vadodara. Although there is presence of biological insecticides which is easy to apply, biodegradable, not harmful to non target animal as well as important tool in resistant management for control of mosquito (Table VI) but its popularity and practicability is hinder due to lack of awareness among common people.

Therefore the chemical control is still the main approach for the control of vector and pests of public health importance (Chavasse and Yap, 1997; Lee and Yap, 2003; Yap *et al.*, 2001). Due to indiscriminate use of insecticides mosquito start showing resistance to these insecticides (Howard *et al.*, 2011). 50 species of *Anopheles* are reported to the resistance to insecticides like pyrethroid shows the major concern for human health (Hemingway and Ranson, 2000; Ranson *et al.*, 2010). Similarly, *Culex* and *Aedes* spp. are showing resistant towards organophosphates (Hamdon *et al.*, 2005). Despite of this side effect household insecticide products are a common and popular mode of personal protection against household insect pests in all parts of the world. These products are including aerosols, mosquito coils, fumigation mats, liquid vaporizer and baits. These products are intended for daily indoor use, and inhalation exposure is therefore a particular concern for users (Pauluhn, 1996). These household insecticides was linked to a number of adverse effects like neurological damage and acute upper respiratory tract irritation (Glaser, 2005; Pauluhn and Mohr, 2006) and immune system weakening in human body (Hall, 2002; Kolaczinski and Curdis, 2004).

Thus this kind of survey work can be related to common men as well as a scientific community both by spreading the awareness to both scientific and non scientific community about the extraordinary uses of chemicals and their health hazards.

IV. CONCLUSION

Insect pests are an intimate part of every home. In the air, carpet, counter or cupboard, every home shares its resources with these tiny, often unseen invaders. A range of household insecticides products are available to combat these insect pests. But nearly all insecticides have the potential to significantly alter ecosystem; many are toxic to humans and other living organisms. So it is necessary to balance the needs with environmental and health issues when using insecticides. Anybody and everybody who is working with an insecticide or using it for killing the insect should very well understand that they are handling an extremely expensive poison. There is much more in the world of pesticide than what we see with our own eyes. As an entomologist we feel that in this 21st century we are taking less care with regards to use of pesticide. Small house, working parents and more money in a small family system has made general public insensitive towards the very high cost of pesticide. The pesticides are used indiscriminately within homes, the observation shows that there was no protocol and no norms regarding the use of any insecticide is implemented. Homes with children, old people and patients with

respiratory problems were simply being when exposed to insecticides. Homes with pregnant women were also not spared. So need of the hour is to make everybody aware of the side effects of these insecticides and emphasis should be on use of natural non-toxic control measures. To reduce reliance on pesticides an integrated approach is needed. Integrated Vector management (IVM) programmes are the best implemented measures to control insect pests and result in significant health and environmental benefits. It is necessary to create awareness among people about integrated approaches to control insect pests and the need of management. So health education and community participation are need of the hour and thus can result in significant reduced health risk and better living standard.

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Table I: Below given is the table shows the list of pesticide shops and pest control service agencies covered for fulfilling the above objectives, in different areas of Vadodara city.

SR.NO.	AREA	NAME OF THE SHOP/AGENCY	POSTAL ADDRESS	DISTANCE FROM The M. S. University of Baroda (Km)
1	Kothi	Gayatri Pest Control	Gayatri Pest Control B/S. Kuber Bhavan, Surat Blood Bank bldg., Kothi, Vadodara-1. (m): 9825460572	1.5
2	Vasna	Instar Pest Control	Instar Pest Control, D-49, shivam tenaments, opp.yamuna nagar, "iskon" road, harinagar, Baroda-390015. Ph.: 322892, (M): 9824066387	7
3	GIDC Makarpura	Ambachem Industries	Ambachem Industries Plot no. 272, GIDC Makarpura, Vadodara-390010. (O): 0265-2651846, 2642378	8
4	Alkapuri	Devi Dayal Sales LTD.	Devi Dayal Sales LTD. 33, Alkapuri society, baroda-390007. (O): 0265-2357797, 2352871, 2359617.	1
5	Dandia bazar	Azad Agencies	Azad Agencies in dandia bazaar, opp. Siddhivinayak Temple, Dandia Bazaar, Vadodara- 390001. (O): 0265-2433622/3252622.	3.5
6	Lehripura	Gujarat pest control	Gujarat pest control in fatepura, opp. Nyay mandir, khajuri market, lehripura road, Fatepura- 390006	3

			(O): 0265-2429007 (M): 9824081007	
7	Baroda dairy	Pest World	Pest World , 12- ground floor, Annapura bhavan, silver coin, near aagan tower, Makarpura three way, Manjalpur. (M): 9825017622	7
8	Vasna	Roas terminators pest management services	Roas terminators pest management services, B-17, vraj-vihar, nr. Sant vihar society, vasna road , vidhyunasar p.o., vadodara- 390015.	7
9	Gorwa	Ideal Pest Control Services	Ideal pest services in gorwa, 3-2, bakul park, b/h sahyog society, G.R. Road, Gorwa, Vadodara- 390016 Ph: 2391480, 2395391	8
10	Sardar patel market	Agrodeal Corporation	Agrodeal Corporation. A-7/8 , Sardar patel market, opp. Kevdabaug, Vadodara-390001. (O):0265-2437019	3
11	Sardar patel market	Dharti Pesticide.	Dharti Pesticide, A-9, Sardar Patel Veg. market, opp. Kevda baug, Navapura, Vadodara- 390001. (Ph): 0265-2974713, (M): 9727473737.	3
12	Sardar patel market	Mukesh Fertilizers	Mukesh Fertilizers 10, Jam chambers, opp. Sardar patel market, nr. Kevda baug. Vadodara- 390001. (O): 0265-2426066, (M): 9898329290	3
13	Sardar patel market	Goverdhan Traders	Goverdhan Traders, 1, Jam chambers, opp. Sardar patel market, nr. Kevda baug, Vadodara- 390001. (O): 0265-2424507	3
14	Sardar patel market	Shree Ganesh Traders	Shree Ganesh Traders Vadodara city branch: 8, jam chambers. Opp. Sardar patel market, nr. Kevda baug, Navapura, Vadodara-1 (O): 0265-2431893	3
15	Khanderao Market	Shreeji Pesticides	Shreeji Pesticides Laxminarayan bhavan, b/h khenderao market, Vadodara- 390001. (O): 0265-2433779	3
16	Kirtistumb	A Saj Agricare PVT. Ltd.	A Saj Agricare PVT. Ltd 3 lad apartments, opp. Pologround, V.K. Marg, vadodara- 390001. (O): 0265-2433355,2433292 (M): 9898139649	2.5
17	Alkapuri	Intensive pest control PVT. LTD.	Intensive pest control PVT. LTD. 510, 511, 512, 5 th floor, premier chamber, near LIC Office building, alkapuri (O): 0265-2432239,2343856 (M): 9825029556	1
18	Alkapuri	Paras chemicals corporation	Paras chemicals corporation, 12/13- anjali chambers, opp. Circuit house, R.C.Dutt road, vadodara- 390005. (O): 0265-2339118, 2344179 (M): 9426374504	1

19	Alkapuri	Grace biocare PVT. LTD.	Grace biocare PVT. LTD. 343/344 GIDC Estate, manjusar, alkapuri (M): 9825451866	1.5
20	Nizampura	Himalaya fertility	Himalaya fertility in nizampura, 220, arpan complex, nr. Deluxe char rasta, nizampura, vadodara- 390002 (M): 9825414835	
21	Karelibaug	Narmada Pest Control Services	Narmada Pest Control Services, Ground floor, prasant apartment, opp. Mental hospital, karelibaug, vadodara-390018 (M): 9925049382	7
22	Tarsali	Sitaram Medical Stores	G/12, Hirabag shoping centre, nr.daxshineshwar mahadev, Susen-Tarsali ring road, Vadodara-390009	8

Table II: Insecticides products belongs to synthetic pyrethroid available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

SR.NO.	PRODUCT/ INSECTICIDE	CHEMICAL COMPOSITION	MANUFACTURED BY	QUANTITY/COST (Rs.)
1.	Allout high power (mat)*	Prallethrin 1.0%	M/S ICON Household Products(P) Ltd.	Rs.45/30 mats
2.	Goodknight silver power (mat)*	Prallethrin 1.2%	Godrej Sara LEE Ltd.	Rs.50/30 mats
3.	Mortein power booster electric liquid (Electric liquid vaporizer)*	Transfluthrin 0.88%	Zobebe India Pvt. Ltd.	Rs.37/45ml
4.	Goodknight silver refill (Electric liquid vaporizer)*	Transfluthrin 0.88%	Godrej Sara LEE Ltd.	Rs.49/45ml
5.	Allout double power (Electric liquid vaporizer)*	Prallethrin 1.6%	SC Johson Products Pvt. Ltd.	Rs.48/35ml
6.	Goodknight maha jumbo coil (Coil)*	d-transAllethrin 0.1%	Godrej Sara LEE Ltd.	Rs.25/10coil
7.	Mortein power booster (Coil)*	d-transAllethrin 0.1%	Barat Box Factory Ltd.	Rs.25/10coil
8.	New Tortoise Activ (Coil)*	Transfluthrin 0.03%	Bombay Chemicals Pvt. Ltd.	Rs.20/10coils
9.	Goodknight advanced mosquitoes and flies spray (spray)*	d-transAllethrin 0.25%	Godrej Sara LEE Ltd.	Rs.75/225ml
10.	Baygon water based flying insect kiler (Aerosol spray)*	Cyfluthrin 0.025% + transfluthrin 0.04% + adjuvants	Midas Care Pharmaceuticals Pvt. Ltd..	Rs.72/250ml
11.	Pest Seal (Aerosol spray)	Deltamethrin 0.02% + allethrin 0.13% + dichloro-methane + odourmasking agent + de-odorised kerosene + propellent gas	Pest Control India Pvt. Ltd.	Rs.114/320ml

12.	Dash (Powder)	Alphacypermethrin 5% W.P	Megmani Organics Ltd.	Rs.45/50g
13.	NT-QUITO (Liquid)	Deltamethrin 2.5%	Chemet wets & Flows P. Ltd.	Rs.70/50ml
14.	Pest Seal (Liquid)	Deltamethrin 0.02%	Pest Control India Pvt. Ltd..	-
15.	Cyper CID-25 (Liquid)	Cypermethrin 25% EC	Bharat Insecticide Ltd.	Rs.105/250ml.
16.	Kokron multipurpose insect killer (Liquid)*	Deltamethrin 0.05% + allethrin + dichloromethane + deodorized kerosene	Vimson's Aerosol	Rs.60/250ml
17.	Swal home (Liquid)	Bifenthrin 2.5%	United Phosphorous Ltd.	Rs.325/500ml
18.	K-Othrine 2.5% WP (Liquid)	deltamethrin	Bayer Environmental Science	Rs. 1,250/1L
19.	Solfac 050 EW (Liquid)	Cyfluthrin 5%	Bayer Environmental Science	Rs. 1,900/1L
20.	Moscon 5WP (Powder)	Alphacypermethrin 5% WP	A. Saj Agricare Pvt . Ltd..	Rs. 1,7000/20Kg
21.	Responsar SCO 25 (Liquid)	Betacyfluthrin	Bayer Environmental Science	Rs.740/1L
22.	Olyset Net (Incorpo-rated in net fabric)	Permethrin 2% WP	Sumitomo Chemical India Pvt. Ltd.	Rs.525/100X 180X 150X
23.	TATA Sentry (Powder)	Lambda- cyhalothrin 10% WP	Rallis a TATA Enterprise	Rs.200/625g
24.	Gokilaht-S 5EC (Liquid) (thermal fogging)	cyphenothrin	Sumitomo Chemical India Pvt. Ltd.	Rs.840/L
25.	King fog ULV (Thermal fog)	Deltamethrin+ diesel oil or kerosene	Bayer Environmental Science	Rs. 1,700/L
26.	Mortein deep reach action mats (mat)*	Prallethrin 1% w/w red mat + adjuvants	Reckin benckiser (India) Ltd..	Rs.40/30mats
27.	New HIT more power (spray)*	dtrans-allethrin 0.25% + synergist(PBO) 0.50% + perfume 0.20% w/w + deodorized kerosene + propellent gas(LPG) 60.00%w/w	Godrej Sara LEE Ltd.	Rs.75/250ml
28.	Makad bomb 007 (powder)	Prallethrin	Raju product, Fatehpura, baroda	Rs.30/250g

29.	Proton (powder)	Lambda-cyhalothrin 10% WP	Herbanba Industries Ltd.Valsad, (GUJ)	Rs.200/62.5g
30.	Devicyprin (liquid)	Cypermethrin 25% EC	Devi Dayal Sales Ltd.	Rs.350/L
31.	Shastra (liquid)	Deltamethrin 2.8% EC	Devi Dayal Sales Ltd.	Rs.400/L
32.	N-CON 10% WP (powder)	Lambda-cyhalothrin 10% WP	Chemet wets & Flows P. Ltd.	Rs.600/L
33.	NT-Cock (liquid)	Alphacypermethrin 10% SC	Chemet wets & Flows P. Ltd.	Rs.600/L
34.	Remover (liquid)	Alphacypermethrin 10% SC	Kalyani Industries Pvt. Ltd.	Rs.600/L
35.	Farasa (liquid)	Alphamethrin 10% EC	BASF Pvt. Ltd.	Rs.1200/L
36.	Ultima/alphagin/fendona	Alphacypermethrin 10% SC	Ultima Research Pvt. Ltd.	Rs.650/Kg
37.	Canon smoke	Cypermethrin 3% w/w	Ultima Research Pvt. Ltd.	Rs.150/40g
38.	Delttox	Deltamethrin 1.25% ULV	Kalyani Industries.	Rs.1150/L

*= used as household insecticides against mosquito in residential area of Vadodara

Table III-Insecticides products belongs to organophosphorus chemical group available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

SR.NO.	PRODUCT/ INSECTICIDE	CHEMICAL COMPOSITION	MANUFACTURED BY	QUANTITY/COST (Rs.)
1.	TATA ROGOR (Liquid)	Dimethoate 30% EC + solvents- xylene, aromex + stabilizer	Rallis a TATA Enterprise	Rs.93/250ml
2.	Navigator (Liquid)	Chloropyriphos 20% EC	Gharda Chemical Ltd.	Rs.230/L
3.	Anaconda (Liquid)	Chloropyriphos 50% + Cypermethrin 5%	NDR & CO.	Rs.75/100ml
4.	Chlorguard (Liquid)	Chloropyriphos 20% EC	Gharda Chemical Ltd.	Rs.240/L
5.	Decent (Liquid)	Dichlorovos 70% EC	Hindustan Pvt. Ltd.	Rs.60/100ml
6.	Bloom (Liquid)	DDVP (dichlorvos) 76 % EC	Insecticides (India) Ltd.	Rs.60/100ml
7.	Lethal super 505 (Liquid)	Chloropriphos AI 50% + cypermethrin AI 5% EC	Insecticides (India) Ltd.	Rs.75/100ml
8.	Larcon SG	Temephos 1%	A. Saj Agricare Pvt.	Rs.3125/25Kg

	(Powder)		Ltd.	
9.	Larcon EC (Liquid)	Temephos 50% EC	A. Saj Agricare Pvt. Ltd.	Rs. 12500/5L
10.	Baytex Granules (Granules)	Fenthion 82.5%	Bayer Environmental Science	Rs. 5,093/25Kg
11.	Baytex 1000 EC (Liquid)	82.5% fenthion	Bayer Environmental Science	Rs. 1,785/1L
12.	Devimalt	Malathion 50% EC	Devi Dayal Sales Ltd.	Rs.250/1L
13.	Devigon 30	Dimethoate 30%EC	Devi Dayal Sales Ltd.	Rs.
14.	Devithion 50EC	Methyl parathion 50 EC	Devi Dayal Sales Ltd.	Rs.450/L
15.	Devithion 2%DP (dust powder)	Malathion 5% DP	Devi Dayal Sales Ltd.	Rs.35/Kg
16.	Nolar 500EC	Temephos	Chemet chemicals Pvt. Ltd.	Rs.1100/L
17.	Tempest/ Abate	Temephos 50%EC	Kalyani Industries.	Rs.1500/5L

Table IV. Insecticides products belongs to carbamate available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

SR.NO.	PRODUCT/ INSECTICIDE	CHEMICAL COMPOSITION	MANUFACTURED BY	QUANTITY/COST (Rs.)
1	Flyco 20 EC (Liquid)	Propoxur 20% W/W	A. Saj Agricare PVT. LTD	Rs.12500/5L

Table V-Insecticides products belongs to benzamide available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

SR.NO.	PRODUCT/ INSECTICIDE	CHEMICAL COMPOSITION	MANUFACTURED BY	QUANTITY/COST (Rs.)
1	Bi-Larv 25 WP (Powder)	Diflubenzuron 25% WP	Bayer environmental science	Rs.23450/5Kg

Table VI -Insecticides products belongs to biological insecticides available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

SR.NO.	PRODUCT/ INSECTICIDE	CHEMICAL COMPOSITION	MANUFACTURED BY	QUANTITY/COST (Rs.)
1	Vecto Bac 12 AS (Liquid)	Bacterium- Bacillus thuringiensis israelensis (Bti) H-14. Viable Bti H-14 endospores + delta endotoxin crystals	Sumitomo Chemical India PVT. LTD	Rs.23500/10L

Table VII: The status of insecticides used

SR.NO.	GROUP OF INSECTICIDE	NUMBER OF PRODUCTS
1.	SYNTHETIC PYRETHROIDS	38
2.	ORGANOPHOSPHATES	17
3.	CARBAMATE	1
4.	BENZAMIDE	1
TOTAL		TOTAL=57

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