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Knowledge and Attitude of the Public Towards Dengue Control in Urban and Rural Areas of Punjab

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Abstract.- The purpose of this study is to appraise the public opinion about dengue and its vectors, and to formulate an effective strategy that supports public health policy makers in dealing with the prevention and control of vectors of dengue in Lahore and Rawalpindi, Pakistan. A cross-sectional study was carried out in which a pre-structured and pre-tested questionnaire was adopted to determine the knowledge, attitude and practices regarding dengue and its vectors at Lahore and Rawalpindi. Total of 424 people (220 urban and 204 rural) were interviewed. Of the 424 people were interviewed, 98.2% urban and 90.2% rural regarded mosquitoes responsible for malaria; 85.5% urban, 76.5% rural, for dengue; 5.5% urban and 11.8% rural for cholera. 81.1% people were aware of dengue. TV/Radio was the most common source of information. The respondents were well informed and aware of the habitat of the mosquitoes. However, significant association was found among knowledge, attitude and practices that resulted in adoption of protection: mosquito mats > chemicals > bed nets.

Key words: Public awareness of Dengue control, mosquito as disease vector, malaria, cholera, Punjab.

INTRODUCTION

People are affected by mosquitoes that not only cause nuisance but also act as vectors of a number of diseases such as malaria, dengue fever, yellow fever, encephalitis (Murugan *et al*., 2007). Dengue is an acute contagious disease, sourced by single stranded RNA virus, imparted generally by bites of Culicine mosquitoes of genus *Aedes*, principally, *Aedes aegypti* and *Aedes albopictus* (Pontes *et al*., 2000).

In Asia, dengue fever (DF) and dengue hemorrhagic fever (DHF) have spread to China, Sri Lanka, India and Maldives in 1950 (Kabilan *et al*., 2005; Islam *et al*., 2006). The epidemics of DF and DHF in Pakistan was first reported from Karachi in 1994 (Chan *et al*., 1995). In mid 2005, 15-20 patients of DF and DHF were admitted in Aga Khan University Hospital, Karachi (Jamil *et al*., 2007). Abandoned urbanization synchronized inhabitant's expansion manipulated in substandard lodging and insufficient water, caused cesspool and shocking desolate structures, finally boosted the population growth of mosquitoes (Gubler and Clark, 1995). Therefore, necessitating the development improved, proactive and sustainable program for the control of vector mosquito backed by high degree of political and community will (Gratz, 2004).

To begin with the sharing of knowledge among population in this research plan against vectors of risky disease is to assess the knowledge of vectors, disease and practices that are generally used. Although people's awareness about dengue required, primarily community contribution, participation seems complicated with outcome in modified behavior, attitude and good practice in disease prevention (van Benthem *et al*., 2002). Keeping this rationale in view, the study was planned for perceiving the knowledge on mosquitoes, mosquito-borne diseases especially dengue with practices already exercised, which may work as guide line for the policy makers and health authorities in order to manage mosquitoes for improved living standards.

MATERIALS AND METHODS

Based on the history of dengue the study was conducted in two cities of Punjab province: Lahore (Coordinates: 31.32°N and 74.22°E, elevation: 217m) and Rawalpindi (Coordinates: 33.36°N and 73.02°E, elevation: 500m). Rawalpindi is chaotic but relatively dust-free city in comparison with Lahore, with the weather highly unpredictable (summer: 40 to 50°C and winter: 10 to -3°C).

Both urban and rural settings were selected

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and responses against three genera *Aedes*, *Culex* and *Anopheles* as being dominant in urban and rural environment were recorded. Collection sites included drains, rock pools, bamboo stumps, discarded tires, tree holes, public, septic tanks in the rural and rice fields, live stock farms, rain catchments, tap catch basins and stagnant pools as the major breeding habitats in the urban areas.

Study design

A questionnaire was designed to collect facts on demographic characteristics (age, sex and education), people's knowledge about dengue and its vector, and practices using open and close ended questions on their vision about the breeding sites (Oguonu *et al*., 2005; Koenraadt *et al*., 2006). The questionnaire was developed in English, and later interpreted into local language, Punjabi, Urdu and Pothowari, and then re-translated to English.

Knowledge attitude and perception survey

The knowledge attitude and perception (KAP) survey was carried out from March 2007 to September 2007. Two teams of three individuals conducted interviews with one trained interviewer, one of the first two authors and one local individual. Head of the family was regarded as the main respondent however in his absence another adult dweller was interviewed. At least, two attempts were made to interview the head of family during the day (between 9:00 AM to 3:00 PM). Knowledge of dengue was evaluated by asking questions related with vector's status, sustainability and protective measures. However, questions were asked about the protective measures employed against adult mosquitoes and open-ended questions were administered pertaining to knowledge and attitude.

Data management

Knowledge on status of mosquito was defined in terms of respondent's approach on options like harmful, beneficial and no concern. Individual's knowledge of black mosquito was also assessed particularly if he or she had the ability to distinguish black and dusty pale colored mosquitoes. Similarly, information on disease spread by mosquitoes (malaria, dengue and yellow fever), in general and dengue, in particular, was also recorded. Overall knowledge was classified and the individuals were scored for knowledge on status of mosquitoes, knowledge on attitude and knowledge on preventive measures. The general scores for each respondent were between 0-3.

Statistical analysis

The relationships among knowledge, practices and attitude were analyzed with chi-square test of association, using Statistical Package of Social Sciences (SPSS 13).

RESULTS

Demographic characteristics

Table I shows the demographic characteristics of 424 people (220 urban and 204 rural), including 87.7% males. The females were reluctant for interview because of traditional and conservative thinking. The age of respondents varied between 10-89 years, of which 45.3% were between 31-50 years [40% urban and 51% rural (P=0.010)]. Non significant difference was recorded in sex and age distribution (in urban and rural areas).Overall 13.2% respondents (7.3% urban and 19.6% rural) were illiterate, 65.1% (80% urban and 49% rural) had education up to middle school and the remaining (21.7%) received education up to matriculation and above.

Table I.- Demographic characteristics of 424 respondents in urban and rural areas.

	Urban n (%)	Rural n (%)	Total n (%)	P value
Gender				
Male	192 (87.3)	180(88.2)	372 (87.7)	0.76
Female	28 (12.7)	24 (11.8)	52 (12.3)	
Age (years)				
10-20	20 (9.1)	24 (11.8)	44 (10.4)	
21-30	104(47.3)	64 (31.4)	168(39.6)	≤0.001
31-50	88 (40)	104 (51)	192 (45.3)	
> 50	8 (3.6)	12 (5.9)	20 (4.7)	
Education				
Illiterate	16 (7.3)	40 (19.6)	56 (13.2)	
Upto middle	170 (80)	100 (49)	276 (65.1)	< 0.001
Above middle	28 (12.7)	64 (31.4)	92 (21.7)	

P values are based on chi-square analysis showing significance

Knowledge of the respondents

The data (Table II) indicated that 94.3% respondents (98.2% urban and 90.2% rural) regarded mosquitoes as harmful because of infectious ailments; malaria (98.2% urban, 98% rural), dengue (85.5% urban, 76.5% rural), cholera (5.5% urban, 11.8% rural) and others (1.8% urban, 2% rural). While 67.3% urban and 47.1% rural respondents heard about the black mosquito with breeding places associated in the descending order; house>field>forest>others. Rainy season (41.8% urban and 31.4% rural) was regarded as the most dominating period that exhibit maximum occurrence and activity followed by summer, spring and winter. Respondents were inquired about the landing sites. On overall basis, maximum bites were recorded by people on their hands = feet (54.5% and 35.3%)>joints (14.5% and 29.4%) >other = don't know (3.6% and 0%) in urban and rural areas respectively. About half (48.1%) respondents considered little role of vegetation in the spread of mosquito.

Table II also showed that 364 respondents out of 424, heard about dengue fever (96.4% urban and 74.5% rural). The sources of information of dengue fever differed significantly in urban and rural populations. In urban area, the most commonly cited sources were TV/Radio (60%), print media (30.9%), friends (27.3%), internet (5.5%) and personal experience (1.8%), where as rural community reported TV/Radio (35.3%), friends (35.3%), print media (21.6%), internet (3.9%) and personal experience (0%). Mosquitoes were considered as main vectors of dengue fever (85.5% urban and 86.3% rural) along with limited or no health facilities recorded for the patients.

Chi square analysis on verifications of knowledge demonstrated (Fig. 1) location, gender, age and education are significantly related with overall knowledge of dengue. Persons living in urban areas had significantly better knowledge about dengue than in rural and males were more familiar than females. Youngsters possess updated information on global emerging issues.

Attitude

Majority of the respondents considered dengue as a severe disease. When inquired about

Table II.- Knowledge of mosquitoes, especially dengue mosquito, their breeding sites, seasons of abundance, transmission of diseases, sources of information and method of spreading dengue.

	Urban n (%)	**Rural** n (%)	***P value***
Mosquito knowledge			
Harmful	216 (98.2)	184(90.2)	< 0.001
Beneficial	4 (1.8)	0	
No Concern	0	20 (9.8)	
Diseases spread by mosquito			
Malaria	216 (98.2)	200 (98)	0.914
Dengue	188 (85.5)	156 (76.5)	0.018
Cholera	12 (5.5)	24 (11.8)	0.020
Others	4 (1.8)	4 (2)	0.914
Heard about black mosquito			
Yes	148 (67.3)	96 (47.1)	< 0.001
No	72 (32.7)	108 (52.9)	
Breeding places of black mosquito			
Fields	40 (18.2)	28 (13.7)	0.212
House	68 (30.9)	52 (25.5)	0.216
Forest	44 (20)	20 (9.8)	0.003
Other	44 (20)	24 (11.8)	0.021
Seasons of abundance			
Summer	76 (34.5)	68 (33.3)	0.792
Winter	20 (9.1)	12 (5.9)	0.211
Spring	44 (20)	20 (9.8)	0.003
Rainy	92 (41.8)	64 (31.4)	0.026
Don't know	4 (1.8)	4 (2)	0.914
Where they bite			
Hands	120(54.5)	72 (35.3)	<0.001
Feet	120 (54.5)	72 (35.3)	< 0.001
Joints	32 (14.5)	60 (29.4)	< 0.001
Other	8 (3.6)	0	
Don't know	8 (3.6)	0	0.006
Role of vegetation in mosquito abundance			
High	64 (29.1)	40 (19.6)	
Little	112 (50.9)	92 (45.1)	0.001
Don't know	44 (20)	72 (35.3)	
Heard about dengue fever			
Yes	212 (96.4)	152 (74.5)	
No	8 (3.6)	52 (25.5)	< 0.001
Sources of information			
Personal information	4 (1.8)	0	0.053
Friend	60 (27.3)	72 (35.3)	0.075
Print media	68 (30.9)	44 (21.6)	0.029
Radio/ TV	132 (60)	44 (21.6)	< 0.001
Internet	12 (5.5)	8 (3.9)	0.457
Spreading method of dengue			
Mosquito	188 (85.5)	176 (86.3)	
Air	4 (1.8)	0	
Water	8 (3.6)	0	< 0.001
Other	20 (9.1)	28 (13.7)	

***** Some respondents gave more than one answer. *P* value showing significance.

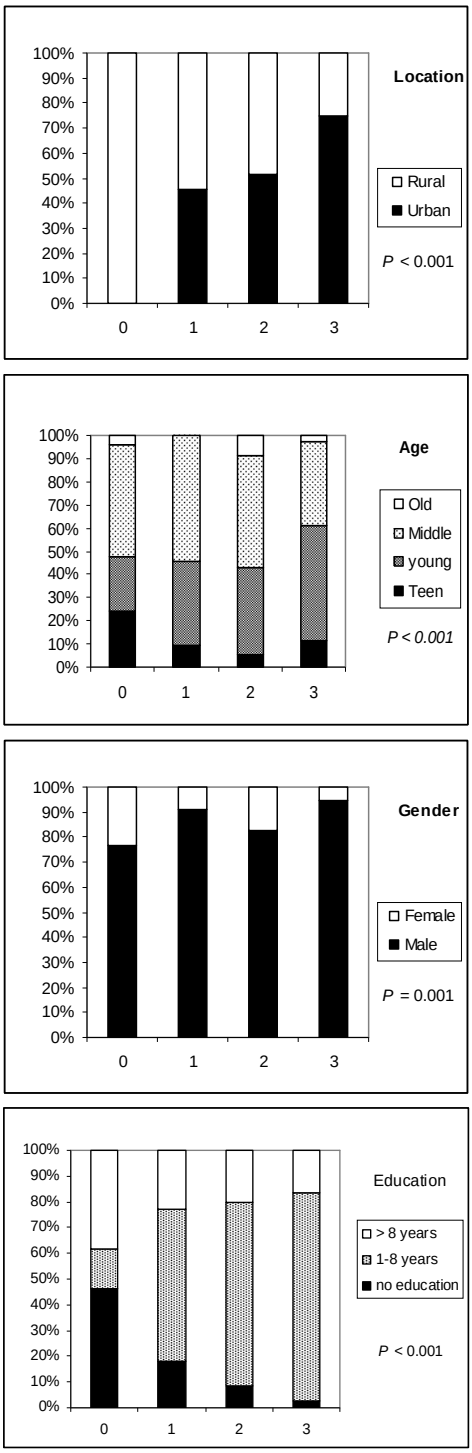

Fig. 1. Perception of dengue knowledge in Punjab province, Pakistan. *P* values are based on regression analysis that displayed the overall impact on differences in knowledge scores in each group.

last year dengue rumor and its impact on the inhabitants (Table III), 67.3% respondents in urban area were afraid of dengue as against 39.2% in rural. When inquired about the future possibilities of dengue spread, it was noted as "little chance" of dengue spread (69.1% urban and 56.9% rural). However, youngsters were most susceptible in urban and rural areas followed by children, old man and women (Table III).

Table III.- Attitude of respondents in urban and rural areas.

	Urban n (%)	Rural n (%)	P value
Last year, impact of dengue rumors			
Afraid	148 (67.3)	80 (39.2)	
Not afraid	16 (7.3)	12 (5.9)	< 0.001
Not particular	48 (21.8)	84 (41.2)	
None	8 (3.6)	28 (13.7)	
Future probability of dengue spread			
High Chance	32 (14.5)	24 (11.8)	
Little Chance	152 (69.1)	116 (56.9)	≤0.001
No Chance	28 (12.7)	36 (17.6)	
Susceptible group of mosquito bite			
Children (less than 5 yrs)	132 (60)	128 (62.7)	0.562
Women	36 (16.3)	60 (29.4)	0.001
Young	144 (65.5)	160 (78.4)	0.003
Old man	40 (18.2)	40 (19.6)	0.708

***** Some respondents gave more than one answer. *P* value showing significance

Practices

This study reflected that nearly three fourth (72.6%) respondents used mosquito mats as paramount preventive measure (78.2% urban and 66.7% rural) followed by chemicals and bed nets (Table IV). With regards to manage black-mosquito, considerable deviation was recorded in urban and rural pockets. However, the most frequent measure in urban (65.5%) was spraying on breeding sites followed by spraying in houses (49.1%), where as spraying in houses (51%) was judged best in rural areas followed by spraying on breeding sites (39.2%). A total of 36 respondents in rural scenery believed that none of measure was valuable in controlling mosquito. Urban respondents reported that authorities (Govt. and Non-Govt.) did take steps to prevent mosquito breeding, and rural settings were neglected.

Table IV.- Practices applied in urban and rural areas.

	Urban n (%)	Rural n (%)	P value
Preventive measures adopted against mosquito			
Chemicals	28 (12.7)	44 (21.6)	0.015
Bed nets	24 (10.9)	44 (21.6)	0.003
Mosquito mats	172 (78.2)	136 (66.7)	0.008
Other	4 (1.8)	0	0.053
Most effective spray in controlling black mosquitoes			
Spray in houses	108 (49.1)	104 (51)	0.697
Spray on breeding sites	144 (65.5)	80 (39.2)	< 0.001
None	4 (1.8)	36 (17.6)	< 0.001
Area ever sprayed by Govt. or Non-Govt. organization			
Yes	188 (85.5)	84 (41.2)	
No	32 (14.5)	120 (58.8)	< 0.001

***** Some respondents gave more than one answer. *P* value showing significance

Impact of knowledge with practices and attitude

Knowledge had significant impact on practices and attitude of inhabitants (Tables V, VI). The respondents with knowledge were more reluctant to use chemicals, preferably using mosquito mats where as spraying on the breeding sites, reflected excellent strategy for managing the population densities. Contrary to those respondents without knowledge, preferred to spray in houses regardless of breeding habitat (Table V).

Knowledge, in fact, improved the perception and attitude of the respondents which was obviously reflected from the study that with the updating of dengue knowledge, more than half of the respondents reported that the incidence of the disease could be less in the next year due to little dengue cases in last year. The young individuals were most vulnerable in mosquito transferred diseases (Table III).

DISCUSSION

Since knowledge was high in urban region, we found evidence that knowledge was set into practice with proper observation and application. Urban inhabitant used their attitude with good effect to manipulate their vicinity for reduction of mosquito density by marking breeding habitat with good consequence of planning a strategy that might be safe, sound and eco-friendly (Phuanukoonnon *et al*., 2005), and notably, mosquito's proliferation occurred in water medium, for efficient control, approach must be compatible with water. On the other hand, rural areas with less schooling and awareness, relied more on chemicals to check population level in order to get quick response (Doannio *et al*., 2004) but acquired risky allergic, breathing, coughing and headache results (Snehalatha *et al*., 2003). Compared with studies in other parts of the world, more importantly in Thailand, people still don't have much skill of differentiating the dengue symptoms until they don't have knowledge of black mosquito (Koenraadt *et al*., 2006; Nalongsack *et al*., 2009). Interestingly in our study, urban individuals were better guided through the TV/Radio and print media. Previous researchers counted dengue knowledge through disease symptoms, vector population, control measures and scoring (Pontes *et al*., 2000; Perez-Guerra *et al*., 2005).

We got persons with good knowledge of mosquito. They were more concerned and spent much for its control. Second, mosquito mats were dominant in preventive measures followed by chemical and bed nets in both urban and rural areas, causing useful control inside houses. These results are in agreement with Indian researchers (Snehalatha *et al*., 2003) who by scrutinizing urban and rural communities, explained that urban respondents were more attentive and conscious of mosquito-transmissible diseases and mosquito coils are most frequently used as compared to other options (Mulla *et al*., 2001). Source reduction techniques over-shadowed the chemical measures, when these were backed by non-chemical measures *i.e.* repellents (Phuanukoonnon *et al*., 2005). The magnitude of dengue outbreaks in Pakistan (Chan *et al*., 1995) is still ambiguous because the seasons were not stable during the last two decades, due to which mosquito population density changed every year with respect to variation in temperature, relative humidity and precipitation.

In conclusion, our results suggest that such surveys should be chalked out for characterizing more authentic information that fulfills desired targets. However, public education movement may have good effects on individuals that increase understanding. Even though, these campaigns are

Table V.- Association of dengue knowledge with attitude.

Attitude	Knowledge n (%)				*P value*
	0	1	2	3	
Last year, impact of dengue rumors					
Afraid	4 (7.7)	56 (63.6)	80 (57.1)	88 (61.1)	
Not afraid	0	0	16 (11.4)	12 (8.3)	
Not particular	20 (38.5)	28 (31.8)	40 (28.6)	44 (30.6)	
None	28 (53.8)	4 (4.5)	4 (2.9)	0	< 0.001
Future probability of dengue spread					
High Chance	4 (7.7)	4 (4.5)	36 (25.7)	12 (8.3)	
Little Chance	12 (23.1)	68 (77.3)	72 (51.4)	116 (80.6)	
No Chance	8 (15.4)	12 (13.6)	28 (20)	16 (11.1)	< 0.001
Susceptible group of mosquito bite					
Children (less than 5 years)	36 (69.2)	56 (63.6)	76 (54.3)	92 (63.9)	0.180
Women	24 (46.2)	20 (22.7)	28 (20)	24 (16.7)	< 0.001
Young	32 (61.5)	68 (77.3)	104 (74.3)	100 (69.4)	0.186
Old man	12 (23.1)	20 (22.7)	20 (14.3)	28 (19.4)	0.333

***** Some respondents gave more than one answer. *P* value showing significance

Table VI.- Association of dengue knowledge with practices.

Practices	Knowledge n (%)				*P value*
	0	1	2	3	
Preventive measures					
Chemicals	16 (30.6)	8 (9.1)	32 (22.9)	16 (11.1)	< 0.001
Bed Nets	20 (38.5)	16 (18.2)	20 (14.3)	12 (8.3)	< 0.001
Mosquito mats	24 (46.2)	64 (72.7)	96 (68.6)	124 (86.1)	< 0.001
Effective Spray against black mosquito					
Spray in houses	32 (61.5)	52 (59.1)	76 (54.3)	52 (36.1)	< 0.001
Spray in breeding sites	20 (38.5)	40 (45.5)	64 (45.7)	100 (69.4)	< 0.001
None	8 (15.4)	12 (13.6)	4 (2.9)	16 (11.1)	0.009
Area ever sprayed by Govt. or non-Govt. organization					
Yes	12 (23.1)	56 (63.6)	80 (57.1)	124 (86.1)	< 0.001
No	40 (76.9)	32 (36.4)	60 (42.9)	20 (13.9)	

***** Some respondents gave more than one answer. *P* value showing significance

related with improved practices and understanding of dengue symptoms, assisted in early stage dengue recognition since this directs to good management of precious life. So this improved knowledge would lead to good preventive measures of dengue nevertheless achieved with surveillance of dengue vectors: *Aedes aegypti* and *Aedes albopictus*, in rural and urban residential and settlements. This will provide useful outcome that filling the gap between knowledge and effective preventive measures can further help to cope with not only emerging but also threatening issues like dengue.

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