Research Article

Knowledge and practice of primary health-care physicians regarding the dengue fever in Makkah Al-Mokarramah city, 2013

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Abstract

Background: Since 1994, Makkah province became a dengue-endemic area with high rate of dengue infection during spring and early summer. The primary-care physician plays a key role in dengue diagnosis, management, and prevention.

Objective: To assess the knowledge and practice of the primary-care physicians in the Ministry of Health regarding the preventive and clinical aspects of dengue fever in Makkah Al-Mokarramah city in 2013.

Materials and Methods: A cross-section analytical study was conducted including physicians working in selected primary health–care centers in Makkah Al-Mokarramah city. Self-administered validated questionnaire was applied. It comprised three main parts: sociodemographic data, questions to assess knowledge regarding preventive and clinical part of dengue fever, and questions to assess the practice regarding preventive and clinical part of dengue fever.

Results: A response rate of 90.9% was obtained among primary health–care physicians in Makkah. Almost one-third of them (34.8%) were aged 25–30 years and only 8.6% were over 45 years. Physicians in the age group 25–30 years constituted 42.1% of the participants. More than half of them (54.1%) were females. Overall, knowledge regarding dengue fever was excellent among 43.4% of the respondents and only insufficient among 10.1%. Almost three-quarters (74.2%) of the physicians always or most of the time performed dengue test if they suspect dengue compared to 16.4% never performed dengue test for suspected cases. Among those who did not perform dengue test and responded to the question, the most common reported cause was the unavailability of the test at their workplace (82.6%). Almost two-thirds of physicians (61.6%) reported that their center did not provide to the patients any type of preventive methods to avoid mosquito bite.

Conclusion: The results of this survey provide a useful opportunity to identify strengths and areas in need of improved knowledge and practice in primary-care management of dengue.

KEY WORDS: Dengue fever, knowledge, practice, primary health care, physicians

Introduction

Dengue is a mosquito-borne infection found in tropical and subtropical regions around the world. In recent years, transmission has increased predominantly in urban and semiurban areas and has become a major international public health concern.[1] It is a vector-borne disease that is transmitted from person to person by mosquitoes. According to the Centers for Disease Control and Prevention, there are two species of mosquitoes that transmit dengue fever, but the primary vector of dengue is *Aedes aegypti*.[2] This species, whose food source is human blood, lives mainly inside buildings in dark areas such as closets and bathrooms. However, it can also be found in outdoor areas with standing water such as construction sites and gardens.[3]

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Severe dengue (previously known as dengue hemorrhagic fever) was first recognized in the 1950s during dengue epidemics in the Philippines and Thailand. Today, severe dengue affects most Asian and Latin American countries and has become a leading cause of hospitalization and death among children in these regions.[1] Dengue fever has a wide range of presentations from mild to severe. On the mild side, it entails a low, self-limited fever, but severe cases can entail life-threatening hemorrhagic shock. The incubation period of the dengue fever virus in humans ranges from 3 to 14 days.[4]

This disease has a major impact on the health and economy of any population. In 2000, the estimated number of disability-adjusted life years lost to dengue was about 528 worldwide.[5] Dengue fever is treated by administering intravenous fluids and blood transfusions in severe cases. The treatment of dengue fever is only supportive, and there is no licensed vaccine or medication yet.[6] According to the World Health Organization (WHO), the incidence of this disease has increased around the globe. The number of people who are at risk of acquiring dengue is more than 2.5 billion, which is more than 40% of the world's population.[7]

According to the WHO, dengue can be classified into dengue fever (DF), dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS).[7] Most DF cases are self-limited, but DHF and DSS cases are life threatening if not treated. The mortality rate from complications of DF is 20% when untreated. However, it is less than 1% if recognized early and treated.[8]

Epidemic of a dengue-like disease appeared in the Arabian Peninsula in the late eighteenth century. The disease was described in Zanzibar, Dar el salaam, the east African coast, and Saudi Arabia.[9]

Outbreaks of dengue have been documented in the Eastern Mediterranean Region. The frequency of reported outbreaks continues to increase. Recent outbreaks of suspected dengue have been recorded in Pakistan, Saudi Arabia, Sudan, and Yemen.[10]

Since the first case of DHF died in Jeddah in 1993, Saudi Arabia has reported three major epidemics: a dengue virus serotype (DEN)-2 epidemic in 1994 with 469 cases of dengue, 23 of DHF, 2 of DSS, and 2 deaths; a DEN-1 epidemic in 2006 with 1269 cases of dengue, 27 of DHF, 12 of DSS, and 6 deaths; and a DEN-3 epidemic in 2008 with 775 cases of dengue, 9 of DHF, 4 of DSS, and 4 deaths.[11] The incidence of DF in Saudi Arabia by 2010 was 11.85/100,000 among Saudi nationals and 18.3/100,000 among non-Saudi nationals. The total number of cases was 3526.[12] Since 1994, Makkah province became a dengue-endemic area with high rate of dengue infection during spring and early summer.[13] Several dengue outbreaks have been reported after 2001 in the Makkah region.[14] Millions of Muslims living in hyperendemic dengue areas come yearly to Makkah for Hajj, with the possibility of introduction of dengue virus.[15]

This study aimed to assess the knowledge and practice of the primary health-care (PHC) physicians in the MOH regarding the preventive and clinical aspects of DF in Makkah Al-Mokarramah city in 2013.

Materials and Methods

It is a cross-sectional analytic study including PHC physicians in Makkah. Holy Makkah is the large holy city in Islamic world. It is the main place of the pilgrims to perform Umrah and Hajj. It is located in western area in kingdom of Saudi Arabia, which is now endemic area for DF. It contains 7 hospitals and 76 primary health–care centers (PHCCs); of them, 30 are in Makkah proper (Makkah city). Total population of Makkah city according to 2010 census was around 1,675,368.

PHC physicians from all selected PHCCs in Makkah Al-Mokarramah city constituted the target population. They are distributed over four sectors, Aladel (n = 62), AlShrae (n = 42), AlKakya (n = 84), and AlZaheer (n = 81).

The total number of PHC physicians in Makkah is 269. Assuming that, the knowledge of PHC physicians about DF is on average 50%. Setting the confidence interval of 95% and sample error of 5%, using the Raosoft sample size calculator program, the sample size calculated was 175 physicians.[16]

Validated structured self-administered questionnaire was applied for data collection. It has been previously used in a study conducted by Al-Ghamdi in Jeddah.[17] The questionnaire consists of three main parts: sociodemographic data, questions to assess knowledge and attitude regarding DF, and questions to assess the practice regarding DF.

A pilot study was conducted in one PHCC to test the methodology of the study. No modifications were needed according to the pilot results. Permissions were obtained from Makkah Joint Program of Family and Community Medicine and concerned authority in the MOH, PHC. Individual verbal consent for data collection was obtained from each participant.

Data were entered and analyzed using SPSS software, version 20. Because data were abnormally distributed (significant Kolmogorov–Smirnov test), continuous variables were presented as median, interquartile range, and mean rank whereas categorical variables were presented as frequency and percentage. Mann–Whitney test was applied to compare the score of two independent quantitative variables, and Kruskal–Wallis test was applied to compare the score of more than two independent quantitative variables. χ^2-Test was used for determining the difference or association between two categorical variables. A p-value of <0.05 was considered to be significant. This statistical analysis was performed with the assistance of statistical advisor. Physician's knowledge (overall and specific) regarding DF was categorized according to the mean knowledge score into four categories: insufficient (mean score $\leqslant$60%), good (mean score 61–75%), very good (mean score 76–85%), and excellent (mean score $>$85%).

Results

Of 175 PHC physicians invited to participate in the study, 159 responded by returning completed questionnaire, thereby a response rate of 90.9% was obtained.

The baseline characteristics of the PHC physicians who participated in the study are presented in Table 1. Sixty-seven physicians (42.1%) were in the age group 25–30 years and only 7.5% were in the age group of more than 50 years. Slightly more than half of them (54.1%) were females. Almost two-thirds of them (67.9%) were Saudi nationals. Regular PHCC practice was reported by 58.5% of them whereas family PHCC practice was reported by 41.5%. Regarding highest qualification, most of them (76.1%) had MBBS degree or equivalent.

Table 1: Baseline characteristics of the participants (n = 159)

Baseline characteristics	Categories	Frequency	Percent
Age (years)	25–30	67	42.1
	31–35	40	25.2
	36–40	16	10.1
	41–45	13	8.2
	46–50	11	6.9
	>50	12	7.5
Gender	Male	73	45.9
	Female	86	54.1
Nationality	Saudi	108	67.9
	Non-Saudi	51	32.1
Highest qualification	MBBS	121	76.1
	Diploma	12	7.5
	Board	26	16.4
Type of PHCC practice	Regular practice	93	58.5
	Family practice	66	41.5

Figure 1 shows that 57.2% of the participants had an excellent knowledge regarding clinical presentation of DF whereas only 12% had insufficient knowledge. Almost a third of the participants (31.4%) had insufficient knowledge regarding DF investigations, and almost half of them (49.7%) had good knowledge. The figure also shows that 77.4% of the participants had excellent knowledge regarding treatment of DF whereas only 3.8% had insufficient knowledge. It is obvious that almost a quarter of the respondents (27.0%) showed excellent knowledge regarding prevention and control of DF whereas 35.2% had insufficient knowledge. Overall, DF knowledge was excellent among 43.4% of the respondents and insufficient among only 10.1% of them.

Table 2 shows no statistically significant difference in the score of overall knowledge regarding DF among physicians of different age groups, gender, nationalities, types of PHCC practice, and with highest qualifications.

Table 3 shows that 17 PHC physicians (10.7%) did not see any suspected case of DF whereas majority of them (87.4%) saw between one and five cases. Most of the physicians (72.3%) look always or most of the time for skin or mucous membrane manifestation if they suspected dengue while 5.7% of them never look at these manifestations. Similarly, most of them (74.2%) always or most of the time performed blood pressure in any suspected DF case and only 9.4% never perform that. In Table 3, most of the physicians (74.2%) always or most of the time performed dengue test if they suspect dengue compared to 16.4% never perform dengue test for suspected cases. Among those who "always" or "most of the time" performed a dengue test for suspected cases, leukocyte, platelets, and hematocrit were commonly used (86.3%) followed by dengue serology (IgM/IgG) (29.0%). Among those who did not perform dengue test and responded to the question, the most common reported cause was the unavailability of the test at their workplace (82.6%). Regarding platelet count needed for patients referral, there was no definite answer obtained from physicians as approximately more than one third of them chose the platelet count

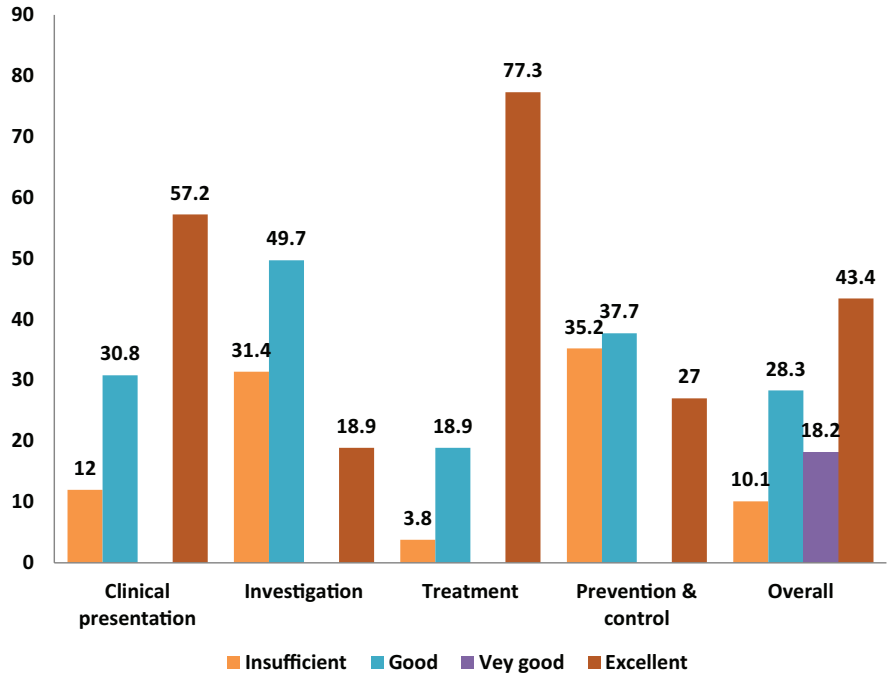

Figure 1: Level of knowledge regarding dengue fever among primary health–care physicians, Makkah

Table 2: Association of physicians' baseline characteristics with overall knowledge about dengue fever

	Knowledge score of clinical presentation of dengue fever (0–3)			*p*-Value
	Median	IQR	Mean rank	
Age (years)				0.774**
25–30	11	9–11	68.24	
31–35	10	9–12	67.97	
36–40	11	9.75–12.25	80.89	
41–45	10	8.5–11	64.77	
46–50	10	7–12	61.55	
>50	11	9–13	79.0	
Gender				0.900*
Male	10.5	9–12	69.05	
Female	10.0	9.75–11.25	69.89	
Nationality				0.906*
Saudi	10	9–11	69.23	
Non-Saudi	10	9–11	70.07	
Type of PHCC practice				0.847*
Regular	10	9–12	69.01	
Family	11	9–12	70.34	
Highest qualification				0.538**
MBBS or equivalent	10	9–12	70.64	
Diploma in Family Medicine	10	7.25–11.75	57.42	
Board in Family Medicine	11	8.75–12	70.68	

IQR, interquartile range.
*Mann–Whitney test; **Kruskal–Wallis test.

$<100{,}000/mm^3$ (39.0%), 47.8% chose $<50.000/mm^3$, and 9.4% chose $<80{,}000/mm^3$. Six physicians (3.8%) reported that platelet count is not an indicator for referral of DF cases. Also, Table 3 summarizes the response of physicians to questions about their practice regarding DF treatment. The majority of physicians (96.2%) cited that they always or most of the time advised oral fluids and rest to dengue patients. Similarly, 94.4% of them always or most of the time prescribed paracetamol to dengue patients. More than two-thirds of them (71%) always or most of the time performed daily full blood counts to monitor patients with suspected or confirmed dengue. The majority of physicians (96.2%) always or most of the time advised their patients to avoid mosquitoes bite. Almost two-thirds of physicians (61.6%) reported that their center did not provide to the patients any type of preventive method (repellent, nets, etc.) to avoid mosquito bite.

None of the studied factors (physicians' age, gender, nationality, type of PHCC practices, and highest qualification) were significantly associated with the platelet cutoff normally chosen for referral of patients for hospital management [Table 4].

Male physician were more likely to advice their patients with dengue to avoid mosquito bites than their female counterparts, $p = 0.005$. Physicians' age, nationality, type of PHCC practices, and highest qualification were significantly associated with advising patient with dengue to avoid mosquito bite [Table 5].

Discussion

Previous knowledge, attitude and practices (KAP) studies concerning control of dengue virus showed the lack of knowledge about clinical features or control measures as the most common problem.[18,19] This study found almost a third of PHC physicians had insufficient knowledge about important investigations of dengue as well as prevention measures toward DF. In southern Taiwan,[20] 90% of PHC physicians were familiar with vector control measures, which is in contrast with previous findings including ours. This might reflect the results of major efforts of health authority for dengue control in Taiwan.

About 43% of PHC physicians in Makkah, KSA, showed an excellent level of knowledge mainly regarding treatment and clinical presentation of DF. However, some major gaps in knowledge regarding some important issues that need reconsideration were identified such as believing that *A. aegypti*, the mosquito vector for dengue virus, typically bites after dark, prescription of aspirin or ibuprofen for confirmed dengue case, dengue infection by one serotype (DEN-1, -2, -3, and -4) will give lifelong immunity against all serotypes, and reporting that the most sensitive and specific method of acute dengue infection diagnosis is isolation in cell culture using immunofluorescence. Similar gaps in the PHC physicians' knowledge have been reported in a recent study conducted in Jeddah.[17]

Table 3: Practice of physicians regarding dengue fever

	N	%
How many suspected dengue cases do you see/week?		
Zero	17	10.7
1–5	139	87.4
6–10	3	1.9
Do you look for skin or mucous membrane manifestation if you suspect dengue?		
Always	72	45.3
Most of the time	43	27.0
Sometimes	35	22.0
Never	9	5.7
Do you perform blood pressure in any suspected case of dengue fever?		
Always	85	53.4
Most of the time	33	20.8
Sometimes	26	16.4
Never	15	9.4
Do you perform a dengue test if you suspect dengue?		
Always	73	45.9
Most of the time	45	28.3
Sometimes	15	9.4
Never	26	16.4
If you responded "always" or "most of the time" to above question, which of the following dengue diagnostic tests do you utilize most frequently? (*N* = 124)*		
Leukocyte, platelets, and hematocrit	107	86.3
Dengue serology (IgM/IgG)	36	29.0
Dengue reverse-transcription polymerase chain reaction (RT-PCR)	15	12.1
Viral culture	3	2.4
If you responded "sometimes" or "never" to first question, please explain briefly why you usually do not perform a dengue diagnostic test if you suspect dengue. (*n* = 23)**		
CBC is enough	4	17.4
Test not available	19	82.6
Please indicate the platelet count for which you would normally refer patients for hospital management.		
$<100{,}000/mm^3$	62	39.0
$<80{,}000/mm^3$	15	9.4
$<50{,}000/mm^3$	76	47.8
Platelet count is not an indicator	6	3.8
How frequently do you advice oral fluids and rest to dengue patients?		
Always	133	83.6
Most of the time	20	12.6
Sometimes/never	6	3.8
How frequently do you prescribe paracetamol to dengue patients?		
Always	113	71.1
Most of the time	37	23.3
Sometimes/never	9	5.6
How frequently do you perform daily full blood counts to monitor patients with suspected or confirmed dengue?		
Always	62	39.0
Most of the time	51	32.0
Sometimes	33	20.8
Never	13	8.2

(Continued in the next page)

Table 3: Continued.

	N	%
How frequently do you advice dengue patient to avoid mosquito bite?		
Always	124	78.0
Most of the time	29	18.2
Sometimes/never	6	3.8
Does your center provide to the patient with any type of preventive method (repellent, nets, etc.) to avoid mosquito bite?		
Always	20	12.6
Most of the time	21	13.2
Sometimes	20	12.6
Never	98	61.6

*Variable not mutually exclusive (sum is more than 100%); **12 missed.

In the community/national level of dengue control, PHC physicians and nurses serve as the first-line health-care providers of dengue case diagnosis, notification, and treatment. The knowledge of PHC physicians regarding dengue diseases also determines the outcome of dengue control. The previous KAP studies concerning dengue control showed a variety of different population and geographical areas. A survey of adult Thailand residents showed health education by health personnel had an important role in disseminating DHF information and prevention methods.[21] A significant association between knowledge of dengue and attitude toward *Aedes* mosquito control was reported in Malaysia, but good knowledge does not necessarily lead to good practice.[22]

Reducing dengue mortality requires an organized process that guarantees early recognition of the disease, and its management and referral when necessary. The key component of the process is the delivery of good clinical services at all levels of health care, from primary to tertiary levels. Most patients of dengue recover without requiring hospital admission whereas some may progress to severe disease. Simple but effective triage principles and management decisions applied at the primary- and secondary-care levels, where patients are first seen and evaluated, can help in

Table 4: Factors associated with performance of dengue test by physicians

	Performance of dengue test for suspected cases				χ^2-Value (*p*-value)
	Always [No. (%)]	Most of the time [No. (%)]	Sometime [No. (%)]	Never [No. (%)]	
Age (years)					
25–30((67)	22 (32.8)	24 (35.8)	6 (9.0)	15 (22.4)	20.52 (0.153)
31–35 (40)	19 (47.5)	10 (25.0)	4 (10.0)	7 (17.5)	
36–40 (16)	13 (81.3)	1 (6.3)	2 (12.5)	0 (0.0)	
41–45 (13)	8 (61.5)	2 (15.4)	2 (15.4)	1 (7.7)	
46–50 (11	6 (54.5)	3 (27.3)	0 (0.0)	2 (18.2)	
>50 (12)	5 (41.7)	5 (41.7)	1 (8.3)	1 (8.3)	
Gender					
Male (73)	34 (46.6)	18 (24.7)	5 (6.8)	16 (21.9)	4.16 (0.245)
Female (86)	39 (45.3)	27 (31.4)	10 (11.6)	10 (11.6)	
Nationality					
Saudi (108)	41 (38.0)	35 (32.4)	11 (10.2)	21 (19.4)	8.81 (0.032)
Non-Saudi (51)	32 (62.7)	10 (19.6)	4 (7.8)	5 (9.8)	
Type of PHCC practice					
Regular (93)	45 (48.4)	22 (23.7)	9 (9.7)	17 (18.3)	2.53 (0.470)
Family (66)	28 (42.4)	23 (34.8)	6 (9.1)	9 (13.6)	
Highest qualification					
MBBS or equivalent (121)	52 (43.0)	38 (31.4)	10 (8.3)	21 (17.4)	10.53 (0.104)
Diploma in Family Medicine (12)	5 (41.7)	4 (33.3)	0 (0.0)	3 (25.0)	
Board in Family Medicine (26)	16 (61.5)	3 (11.5)	5 (19.2)	2 (7.7)	

Table 5: Factors associated with advising dengue patient to avoid mosquito bite by PHC physicians

	How frequently do you advice dengue patient to avoid mosquito bite?				χ^2-value (*p*-value)
	Always [No. (%)]	Most of the time [No. (%)]	Sometime [No. (%)]	Never [No. (%)]	
Age (years)					13.17 (0.589)
25–30 (67)	51 (76.1)	12 (17.9)	2 (3.0)	2 (3.0)	
31–35 (40)	29 (72.5)	10 (25.0)	1 (2.5)	0 (0.0)	
36–40 (16)	11 (68.8)	5 (31.3)	0 (0.0)	0 (0.0)	
41–45 (13)	12 (92.3)	1 (7.7)	0 (0.0)	0 (0.0)	
46–50 (11	9 (81.8)	1 (9.1)	1 (9.1)	0 (0.0)	
>50 (12)	12 (100)	0 (0.0)	0 (0.0)	0 (0.0)	
Gender					12.78 (0.005)
Male (73)	62 (84.9)	7 (9.6)	4 (5.5)	0 (0.0)	
Female (86)	62 (72.1)	22 (25.6)	0(0.0)	2 (2.3)	
Nationality					3.29 (0.349)
Saudi (108)	84 (77.8)	18 (16.7)	4 (3.7)	2 (1.9)	
Non-Saudi (51)	40(78.4)	11(21.6)	0 (0.0)	0 (0.0)	
Type of PHCC practice					3.28 (0.351)
Regular (93)	73 (78.5)	17 (18.3)	3 (3.2)	0 (0.0)	
Family (66)	51 (77.3)	12 (18.2)	1 (1.5)	2 (3.0)	
Highest qualification					2.00 (0.919)
MBBS or equivalent (121)	93 (76.9)	22 (18.2)	4 (3.3)	2 (1.7)	
Diploma in Family Medicine (12)	10 (83.3)	2 (16.7)	0 (0.0)	0 (0.0)	
Board in Family Medicine (26)	21 (80.8)	5 (19.2)	0 (0.0)	0 (0.0)	

identifying those at risk of developing severe disease and needing hospital care. This should be complemented by prompt and appropriate management of severe dengue in referral centers.[3] In this survey, 19.5% of physicians did not recognize that persistent vomiting and abdominal pain are warning signs of severe dengue. However, the majority of them recognized that platelet count is one of the criteria for classifying DHF and they should refer any patient of dengue with warning sign.

The results of this survey show that dengue knowledge was not varied among physicians. Another similar study conducted in Singapore[8] did not confirm our finding and they reported instead that physicians' age and practice setting as important indicators for DF knowledge.

Most physicians who responded to the survey were noted to perform full blood counts frequently to monitor patients with suspected or confirmed dengue. This reflects somewhat good clinical practice. Leukopenia ($<6.0 \times 103$ cells/mm^3) and lymphopenia ($<0.58 \times 103$ cells/mm^3) have previously been identified as useful predictors of dengue during the early phase of the illness.[11] The responses showing that physicians monitor patients with proven or suspected dengue regularly represent good clinical practice in concordance with the WHO recommendations. Nonetheless, opportunities exist for further risk stratification to identify those patients requiring more frequent and diligent follow-up, based on criteria such as platelet counts $<100 \times 103$/mm^3 within the first 3 days of illness, 10 warning signs, as well as published guidelines for outpatient management of dengue.[3]

In this study, almost three-quarters of physicians cited that they performed dengue test if they suspect dengue cases, either always or most of the time. This is very essential as early diagnosis being a crucial first step. A comparable figure has been reported by Al-Ghamdi in his study among PHC physicians in Jeddah.[17] This finding could be attributed to the fact that the incidence of DF and DHF has increased significantly in Makkah over the last few years[23] and endemic occurrence of the disease in the city was recently confirmed[24], which increased the physicians' suspicion of the diseases.

Leukocyte, platelets, and hematocrit were commonly used followed by dengue serology as the diagnostic test of choice rather than the PCR or NS1 antigen test.[12] There are several issues with dengue serology tests; they may be falsely negative during the febrile early phase of illness, which is characterized by dengue viremia or antigenemia (hence dengue PCR/NS1).[13,14] In addition, dengue serology has been shown to have low specificity.[13,14] Because patients typically present to PHC physicians during the acute phase of illness, underutilizing PCR and NS1 testing may hinder early diagnosis. The latter tests are usually available in hospital laboratory services but may be less accessible or affordable in the clinics. Thus, tools such as the full blood count, clinical predictors of dengue,[11] and serial follow-up of suspected cases become even more important. Increasing physician

awareness of the appropriate timing of dengue diagnostic tests is a potential area for improvement. In Singapore, dengue diagnostic tests were ordered always or often by less than half of the surveyed physicians.

Most of physicians who did not perform dengue test have mentioned that the reason was unavailability of the test in their settings. The availability and affordability of serologic testing may represent limited understanding in the value of early diagnosis of dengue.

Among the physicians surveyed, 3.8% did not view low platelet count as an indicator for hospital referral. In another study conducted among PHC physicians in Singapore, a lower rate has been reported (0.8%).[11] In a study conducted in Jeddah, a rate of 5.1% has been reported.[17] The lack of correlation between the presence and degree of thrombocytopenia in dengue and risk of bleeding or severe illness has been well documented,[15,25] as has been the lack of benefit of prophylactic platelet transfusion in dengue.[26,27] The notion that thrombocytopenia necessitates hospital admission is another area with potential for improving dengue patient management.

Control measures can be integrated with strong local health systems by transferring responsibility, authority, resources, and knowledge from central to local level. However, it is critically important for the transfer of responsibility to be accompanied by the transfer of financial and technical resources. Transfer can be accomplished by offering, for instance, capacity-strengthening workshops or training courses in vector biology and control, epidemiology, and communication among other topics at the local level. At all administrative levels of government (state, provincial, departmental, and local), the dengue control program is usually part of the local health system, wherein lies the responsibility for planning, implementing, monitoring, and evaluating the local program.[28,29] Unexpected finding is documented in this study that almost two-thirds of physicians claimed that their center never provided the patient with any type of preventive method (repellent, nets, etc.) to avoid mosquito bite, taking into consideration that Makkah is considered as an endemic area for DF.

Among strengths of this study is inclusion of a relatively large sample size, as it captured 59.1% of the total PHC physicians in Makkah (159 of 269), with a high response rate (90.9%), thus minimizing selection bias and increasing precision. In addition, it is the first one in Makkah to look for evaluation of different aspects of knowledge and practice regarding DF among PHC physicians who serve the first line of contact with dengue cases. However, the study is not without limitations, among them, the questionnaire was somewhat long, that could reflect on the response rate of the physicians and quality of data. However, regular visits by the researcher to motivate physicians helped in obtaining a considerable response rate. Second, the study was based entirely on self-reporting. Consequently, it is possible that certain practices may have been overreported. Moreover, the study investigated the frequency that each approach was used, but this does not take into account the quality of advice given.

Conclusion

In conclusion, this survey provides a useful opportunity to identify strengths and areas in need of improved knowledge and practice in primary-care management of dengue.

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