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# Knowledge, Attitudes, and Practices of male Medical students in relation to the prevention of Dengue Fever: A Study in KSA

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Dengue fever is a public health concern worldwide. People's attitudes, knowledge, and practices have implications for DF prevention and control. DF caused by *Aedes aegypti* and *Aedes albopictus*, which are endemic in certain cities of Saudi Arabia, such as Jeddah and Makkah. The aim of study was to determine the knowledge, attitudes, and practices of male medical students from various specializations in the second, third and fourth year with an average age of 18 to 25 years at Umm Al -Qura University, Makkah a large town in KSA in relation to DF prevention. This cross-sectional descriptive study was based on students' responses to an online, self-reported Knowledge, Attitude, and Practices (KAP) research survey. In total, 384 students completed the survey. The data were analyzed using SPSS test. The KAP had been measured by carried out using a scoring system and determined as good or bad depend on 80%cut-off point. A statistical analysis method to predict a binary outcome, such as good or bad, was used to examine the associated factors, in quantitative analysis. A value of $p < 0.005$ considered as significant of statistical. The results showed a significant correlation between knowledge on prevention of DF and infected students with the disease ($p < 0.001$). They also showed that student practices were significantly associated with student infection rates ($p < 0.010$). Moreover, the findings revealed a highly significant association between the specializations of the students and their knowledge, attitudes, and practices in relation to DF prevention ($p < 0.000$ for all). Our study found a strong significant correlation between the specializations of the students and their knowledge, attitudes, and practices in relation to DF prevention ($p < 0.000$ for all). The addition of an infectious disease study program to the university's medical specialization curriculum is be recommended, as well as research and development on educational strategies and effective measures to improve students' behaviors and practices in relation to DF prevention.

**Keywords: Dengue, Infectious disease, University Students, Survey**

## INTRODUCTION

Dengue fever (DF) is a viral infection transmitted by mosquitoes called female *Aedes aegypti* **(**Ibrahim et al. 2009**).** There are ten global health risks including dengue fever in 2019, according to the (WHO) (Jayawickreme et al. 2021**).** Although there is no cure for dengue fever, proper medical care can reduce fatality rates. In addition, the best way of control (DF) to avoid mosquito bites **(**Alhazmi et al. 2016**).** it is most widespread in tropical and subtropical areas, especially in impoverished urban, suburban, and rural settings. (Alhazmi et al.2016). The dengue virus (DENV) divided into four serotypes: (DEN-1, DEN-2, DEN-3 and DEN-4) (Ibrahim et al. 2009**).** vector of one of them via the female mosquito (*Aedes aegypti*) in rare cases, the virus can be occurred due to white-striped body of mosquito called *Aedes albopictus* (Www.moh.gov.sa.,2022). Dengue fever is widespread in 128 countries around the world, (Www.oatext.com. Retrieved February 3, 2022**)** there has been a 30-fold surge worldwide .DF has spread over the past five decades, making it a global public health problem [5]. 30-fold in occurrence over the last five decades, making it a world public health issue **.** In addition, around two-thirds of the world's population lives in places spread with *Aedes aegypti*. **(Ibrahim, et al.2009).** DF affects an estimated 50 million individuals each year, with an estimated 2.5 billion people living in countries where dengue is endemic. DF outbreaks were documented in the Eastern Mediterranean Region, with reported outbreaks in Egypt dating as far back as 1799. According to the recent study, The number of cases of DENV each year is estimated to be 390 million cases, which is more than a threefold rise higher than a

prior WHO estimate (Alhazmi et al. 2016)., WHO created and conducted a "World Strategy for control and prevention of dengue" from 2012 to 2020, in order to reduce dengue death rate and prevalence of dengue by 2020 and evaluating the disease burden (Jayawickreme et al.2021). Dengue fever affects an estimated 50 million individuals each year, with 2.5 billion people living in dengue-endemic countries. (Jayawickreme et al. 2021). DF and dengue hemorrhagic fever (DHF) have become more common in recent years (Ibrahim et al. 2009), and they continue to be public health concerns in Saudi Arabia's western region. (Ibrahim et al. 2009)

In addition, the majority of cases of DF/DHF have been documented in metropolitan areas. The WHO, on the other hand, has confirmed that the disease has spread to peri-urban and rural areas (Ibrahim et al. 2009**).** In 2013, the incidence of DF in the (KSA) estimated as 21.71 for each 100,000 persons. From April to July, there was a rise in the incidence of DF (Alhazmi et al. 2016)**.** Number of DF cases increased in Makkah, Saudi Arabia, in 2019 compared to the past two years, due to high density of rains. The incidence of DF shows regional differences, with DF being most prevalent in Jeddah, KSA (67.73% of all cases), followed by Makkah, KSA (Alhazmi et al. 2016), post-rainfall vector management operations in Makkah, KSA may help contain the disease (Melebari et al. 2021). A large number of previous studies, most of which were conducted in Asia, have concentrate on how population view dengue fever disease. Only a few studies have focused on better understanding the perspectives of physicians**. (**Ho et al. 2013); (Thaver et al. 2011). One study performed in Taiwan that focused on health professionals' knowledge of mosquito-borne diseases (malaria, yellow fever, and dengue) noted a significant knowledge deficit **(**Huang et al. 2011) Study conducted in Karachi, clinicians had basic awareness related dengue fever but were insufficiency in investigation for cases clinically and treatment and fill the gap with more training**.** (Thaver et al. 2011) Research implemented in Pakistan revealed that health care providers had a strong conception of dengue pathophysiology than clinical detection of cases and management (Handel et al. 2016). In a study conducted in Makkah, KSA on primary health care professionals, more than half of the study population had excellent knowledge of the clinical presentation of DF but insufficient knowledge of the diagnosis of the disease (Alzahrani et al. 2016). Research performed in Abidjan (Cote d'Ivore) for health professionals working in public hospitals revealed that one fifth of health professionals had a good knowledge and good diagnostic practice of DF and three-quarters of health professionals aware with hazard of dengue fever disease (Ekra et al. 2017).. In a study conducted in Malaysia among Patients Experiencing the 2017 Outbreak, the authors found a lack of knowledge regarding the transmission of DF and strategies that can prevent the risk of infection (Van et al. 2019). Another study was conducted in Malaysia mention that individuals who have high level of knowledge related to DF are more probable to follow more adequate DF prevention measures compare to people with low level of knowledge (Roslan et al. 2020). Factors based on a high level of knowledge can lead to good DF prevention measures and are responsible for reductions in incidence of dengue fever infection (Abir et al. 2016). Therefore, assessment of people knowledge, attitude, and practice is of very importance for enhancing integrated control measures, thus far, as there is no effective vaccine approved, vector control and preventing mosquito bites through community empowerment and engagement are effective options for prevention (Rahman et al. 2022). Another study showed that only fifty percent of the total respondents have good level of awareness (50.7%) but they had insufficient knowledge related dengue during pregnancy. 53.2% of individuals had negative attitude and 50.2% show poor practice for dengue control. Out of 85 of target group who participated in the dengue seroprevalence study, 74.1% (n = 63) were positive for dengue IgG and 7.1% (n = 6) were positive for dengue IgM. Among all sociodemographic variable, race is the only independent predicator for all KAP levels ($P < 0.05$) (www.who.int/emergencies/ten-threats-to-global-health-in-2019. Accessed 4 Jan 2020.)**.** Dengue fever diseases classified as one of the top ten threats to global health in 2019 by world health organization [18]. the study done by Brady et al. (2012) show that the number of cases of dengue fever 3.9 billion and 40%-50% of the world's population being at risk of infection. 128 countries globally are at risk of dengue infection, of which more than fifty percent of the worldwide burden being in Asia Bhatt et al (2013); (Brady et al. 2012)**.** The study done by (Md et al. 2022)**.** Reveled that some of students had good ideal awareness related to DF (66.72%), attitude (89.28%), and practices (68.32%). Nevertheless, many of them they suffer from a lack of knowledge about this disease's infectious behavior, Aedes mosquito breeding sites recognizing, and the DF viral infection risk during pregnancy. Strong association ($p < 0.001$) were mentioned in the KAP components. Sex, housing unit, major, and dengue-relevant to respondents were found to be significant predictors ($p < 0.05$) of KAP level in the univariate analysis. **(**Md et al. 2022) The research showed only fifty percent of the total participants have good knowledge (50.7%) but they had lack of knowledge about dengue during pregnancy. 53.2% of people had less attitude and 50.2% showed bad practice for control of dengue. Out of 85 of target group who agreed to participate in the study, 74.1% (n = 63) were positive for dengue IgG and 7.1% (n = 6) were positive for dengue IgM. Among all sociodemographic variable, race is the only independent predicator for all KAP levels ($P < 0.05$) (Sivaneswari et al. 2020). As, accordingly for study that implemented in Malaysia, insufficient level of knowledge related to DF transmission and control strategies can promoted the risk of disease infection (Nguyen et al.

2019). A previous study in Malaysia revealed that people who have more knowledge about dengue are more likely more committed to preventive measures of dengue compare with people having less knowledge (ROSLAN et al. 2020). Higher level of awareness and knowledge related to DF prevention measures can lead to reduce transmission of DF (Abir et al. 2021). Thus, assessment of community knowledge, attitude, and practice is of great importance for enhanced integrated control measures, which remain understudied. As there has been no effective vaccine approved so far, vector control and preventing mosquito bites through community empowerment and engagement is an effective option for prevention Rahman (2022); (Abir et al. 2021, Roslan et al.2020 and Van et al. 2019)

## MATERIALS AND METHODS

### 2.1 Study area:

Umm Al-Qura University is a public university in the holy city of Mecca, Saudi Arabia and It is headquartered in Al-Abediyah at latitude46.8 '19°21 "N and longitude 02.1'57°39"E and its other branch is in Al-Aziziya. The university was established as the College of Sharia in 1949 before being joined by new colleges and renamed as Umm Al-Qura by royal decree in 1981. It has 4,999 faculty members, 92,632 students, and 372 educational majors. The university has 6 medicine colleges; it is the College of Medicine, the College of Public Health and Health Informatics, the College of Applied Medical Sciences, the College of Dentistry, the College of Pharmacy and the College of Nursing. Source: The Deanship of students Affairs, (2022).

### 2.2 Data collection:

Questionnaire has been completed to all Students of male medical sector Students at Umm Al-Qura University. This questionnaire consists of 25 questions related to Demographic information and knowledge, attitudes and practices related with prevention of dengue fever.

**Table 1: The distribution of total male students at Um Al-Qura University according to its medical sector departments (2022).**

| Name of department | Number of students |
|---|---|
| Medicine and surgery | 427 |
| Epidemiology | 98 |
| Environmental health | 68 |
| Health promotion and education | 74 |
| Health information technology | 83 |
| Physiotherapy | 104 |
| Laboratory medicine | 100 |
| Nursing | 112 |
| Pharmacy | 159 |
| Emergency medical services | 87 |
| Dental medicine | 78 |
| Total | 1390 |

Source: The Deanship of students Affairs, (2022).

### 2.3 Sample size and sampling techniques:

The study is cross-sectional descriptive study for Knowledge, attitudes and practices associated with prevention of dengue fever among male medical sector students at UQU. The sample size will be calculated according to d = 0.05 at a confidence level of 95%. So, the final study population size will calculate according to the below formula. Stratified random sampling will be used in the selection of the study group.

**The formula is:**

$N=P\ (100-P)\ z^2/d^2$

Where: N= sample size, P= an expected prevalence, Z=1.96, d= degrees of precision.

N= 384

**Table 2: The distribution of groups of students at Um Al-Qura University (2022).**

| Name of Department | Number Of students | % | The sample size |
|---|---|---|---|
| Medicine and Surgery | 427 | 30 | 117 |
| Epidemiology | 98 | 7 | 27 |
| Environmental Health | 68 | 4.9 | 19 |
| Health promotion and education | 74 | 5.7 | 22 |
| Health information Technology | 83 | 6.3 | 24 |
| Physiotherapy | 104 | 7.6 | 29 |
| Laboratory Medicine | 100 | 7.2 | 28 |
| Nursing | 112 | 7.8 | 30 |
| Pharmacy | 159 | 11.2 | 43 |
| Emergency medical services | 87 | 6.3 | 24 |
| Dental medicine | 78 | 5.5 | 21 |
| Total | 1390 | 100 | 384 |

Source: The Deanship of students Affairs, (2022).

### 2.4 Data analysis

The KAP had been measured by carried out using a scoring system and defined as good or bad based on 80% cut-off point. A statistical analysis method to predict a binary outcome, such as good or bad, was used to examine the associated factors, in quantitative analysis after collecting and organizing the data, the SPSS was used to analyze the data obtained in the questionnaire, frequencies and percentages were calculated, and Chi-square was used to compare the variables. P-value

## RESULTS

### Knowledge, practices and attitudes of the medical students toward prevention of dengue fever at Umm al- Qura University KSA

Approximately 98.3% of the infected students with dengue fever who participated in this study had a good knowledge ward prevention of dengue fever, and 11.6% of the uninfected students with dengue fever had a bad knowledge. There was a significant association between knowledge of students and infected with dengue fever (p-value < 0.001) (Table 3.1). (Table 3.1). In addition, the family problems had no consequence on the performance of the student (p-value > 0.05), About 88.3% of infected students with dengue fever had a good practice for prevention of dengue fever while 22.8% of uninfected students had a poor practice. These results revealed significance practices of students toward dengue fever and infected students with dengue fever (p-value < 0.010). (Table 3.1) and about 82.5% of infected students with dengue fever had a good attitude toward prevention of dengue fever. While 17.5% of uninfected students with dengue fever had a bad attitude. No relationship was found between infected students with dengue and attitudes relative to prevention of dengue fever (p-value < 0.998) (Table 3.1).

### 3.2 Medical students' specialization and knowledge, practices and attitudes of prevention of dengue fever at Umm Al Qura University

Out of 13.3% of the students who participated in the current study related epidemiology department had a poor knowledge, and 86.7%of the students a good knowledge. While 31.1% of emergency medical services students had a poor knowledge. There was a significant association between students' specialization and knowledge of prevention of dengue fever (p-value < 0.000) (Table 3.2), All students (100%) at information technology and management department had a good attitude related prevention of dengue fever where 41.4% of students who participated in the current study related medical laboratory department had a bad attitude. There was a significant association between students' specialization and attitudes of prevention of dengue fever (p-value < 0.000) (Table 3.2) and About 91.3% of nursing students department had a good practices related prevention of dengue fever while 23.3% of students who participated in the current study related Physiotherapy department had a bad practice. There was a strong significant association between students' specialization and practices of prevention of dengue fever (p-value < 0.000) (Table 3.2).

### Academic level year of medical students and the knowledge, practices and attitudes toward prevention of dengue fever at Umm Al Qura University

Out of 94%of the students who participated in the current study related second year had a good knowledge, and 6.0% of the students had a bad knowledge. While 85.5% of students at third level year had a good attitude and 14.5% had bad attitude, 83.6% of medical students at the second level year had a good practice while 22.4% of students had a bad practice There was no significant association between academic level year and knowledge, attitude and practice of prevention of dengue fever (p-value < 0.469, 0.234 And 0.573) (Table 3.3),

**Table 3.1:The correlation between infected students with dengue fever and the knowledge, practices and attitudes of the medical student toward control of dengue fever at Umm Al Qura University KSA**

| Infected students | Classification | | Total | P-value |
|---|---|---|---|---|
| | Poor knowledge | Good knowledge | | |
| Yes | 2 (1.7%) | 118 (98.3%) | 120 (100%) | 0.001 |
| No | 35 (11.6%) | 268 (88.4%) | 303 (100%) | |
| Total | 37 | 386 | 423 | |
| Infected student | Classification | Total | P-value | |
| | Poor practices | Good practices | | |
| Yes | 14 (11.7%) | 106 (88.3%) | 120 (100%) | 0.010 |
| No | 69 (22.8%) | 234 (77.2%) | 303 (100%) | |
| Total | 83 | 340 | 423 | |
| Infected students | Classification | Total | P-value | |
| | Poor attitudes | Good attitudes | | |
| Yes | 21 (17.5%) | 99 (82.5%) | 120 (100%) | 0.998 |
| No | 53 (17.5%) | 250 (82.5%) | 303 (100%) | |
| Total | 74 | 349 | 423 | |

**Table 3.2: The correlation between medical students' specialization and knowledge, practices and attitudes of dengue control at Umm Al Qura University KSA**

| Specialization | Classification | | Total | P-value |
|---|---|---|---|---|
| | Poor knowledge | Good knowledge | | |
| Health information technology | 1 (3.5%) | 27 (96.7) | 28 | 0.000 |
| Dental medicine | 2 (9.1) | 20 (90.9%) | 22 | |
| Nursing | 2 (6.3%) | 30 (93.7%) | 32 | |
| Health education and promotion | 0 (0%) | 23 (100%) | 23 | |
| Pharmacy | 3 (6.4%) | 44 (93.6%) | 47 | |
| Emergency medical services | 9 (31.1%) | 20 (68.9%) | 29 | |
| Physiotherapy | 0 (0%) | 32 (100%) | 32 | |
| Medical Laboratory | 6 (20.7%) | 23 (79.3%) | 29 | |
| Epidemiology | 4 (13.3%) | 26 (86.7%) | 30 | |
| Environmental health | 2 (8.0%) | 23 (92.0%) | 25 | |
| Medicine and surgery | 8 (6.3%) | 118 (93.7%) | 126 | |
| Total | 37 (8.7%) | 386 (91.3%) | 423 | |
| Specialization | Classification | Total | P-value | |
| | Poor attitudes | Good attitudes | | |
| Information technology and management | 0 (0%) | 28(100%) | 28 | 0.000 |
| Health information technology | 2 (9.1) | 20 (90.9%) | 22 | |
| Dental medicine | 7 (21.9%) | 25 (78.1%) | 32 | |
| Nursing | 0 (0%) | 23 (100%) | 23 | |
| Health education and promotion | 2 (4.3%) | 45 (95.7%) | 47 | |
| Pharmacy | 10 (34.5%) | 19 (65.5%) | 29 | |
| Emergency medical services | 14 (43.7%) | 18 (56.3%) | 32 | |
| Physiotherapy | 12 (41.4%) | 17 (58.6%) | 29 | |
| Medical Laboratory | 2 (6.7%) | 28 (93.3%) | 30 | |
| Epidemiology | 8 (32.0%) | 17 (68.0%) | 25 | |
| Environmental health | 17 (13.5%) | 109 (86.5%) | 126 | |
| Medicine and surgery | 74 (17.5%) | 349 (82.5%) | 423 | |
| Specialization | Classification | Total | P-value | |
| | Poor practices | Good practices | | |
| Information technology and management | 1 (3.6%) | 27 (96.4%) | 28 | 0.000 |
| Health information technology | 1 (4.5%) | 21 (95.5%) | 22 | |
| Dental medicine | 2 (6.3%) | 30 (93.7%) | 32 | |
| Nursing | 2 (8.7%) | 21 (91.3%) | 23 | |
| Health education and promotion | 25 (53.2%) | 22 (46.8%) | 47 | |
| Pharmacy | 6 (20.7%) | 23 (79.3%) | 29 | |
| Emergency medical services | 2 (6.3%) | 30 (93.7%) | 32 | |
| Physiotherapy | 4 (13.8%) | 25 (86.2%) | 29 | |
| Medical Laboratory | 7 (23.3%) | 23 (76.7%) | 30 | |
| Epidemiology | 5 (20.0%) | 20 (80.0%) | 25 | |
| Environmental health | 28 (22.2%) | 98 (77.8%) | 126 | |
| Medicine and surgery | 83 (19.6%) | 340 (80.4%) | 423 | |

**Table 3.3 :The correlation between academic year of medical students and the knowledge, practices and attitudes of the student toward prevention of dengue fever at Umm Al Qura University KSA**

| Academic year | Classification | | Total | P-value |
|---|---|---|---|---|
| | Poor knowledge | Good knowledge | | |
| Second | 7 (6.0%) | 109 (94%) | 116 | 0.469 |
| Third | 13 (9.4) | 125 (90.6%) | 138 | |
| Fourth | 17 (10.1%) | 152 (89.9%) | 169 | |
| Total | 37 (8.7%) | 386 (91.3%) | 423 | |
| Academic year | Classification | Total | P-value | |
| | Poor attitudes | Good attitudes | | |
| Second | 26 (22.4%) | 90 (77.6%) | 116 | 0.234 |
| Third | 20 (14.5%) | 118 (85.5%) | 138 | |
| Fourth | 28 (16.6%) | 141 (83.4%) | 169 | |
| Total | 74 (17.5%) | 349 (82.5%) | 423 | |
| Academic year | Classification | Total | P-value | |
| | Poor practices | Good practices | | |
| Second | 19 (16.4%) | 97 (83.6%) | 116 | 0.573 |
| Third | 28 (20.3%) | 110 (79.7%) | 138 | |
| Fourth | 36 (21.3%) | 133 (78.7%) | 169 | |
| Total | 83 (19.6%) | 340 (80.4%) | 423 | |

the students.

## DISCUSSION

The study revealed that a significant association between knowledge of students and infected with dengue fever (p-value < 0.001) (Table 3.1). as a measure of students' prevention dengue fever knowledge. This result agrees with a study conducted in Malaysia, a lack of awareness about dengue transmission and prevention strategies can enhance the risk of infection (Van Nguyen et al. 2019)About 88.3% of infected students with dengue fever had a good practice for prevention of dengue fever while 22.8% of uninfected students had a poor practice. These results revealed a significant correlation between practices of students toward dengue fever and infected students with dengue fever (p-value < 0.010). (Table 3.2). This study is compatible with the study done by (Rahman, et al .2022) which showed that fair correlations (p < 0.001) were determined in the KAP domain (Sivaneswari et al. 2020) Moreover, a highly significant association was found between specialization of students and their knowledge, attitudes and practices towards dengue fever control (p-value < 0.000), (p-value < 0.000) and (p-value < 0.000) respectively (Tables, 3.4,3.5 and 3.6).These results related of student's participants can lead to increased incidence of dengue fever which will be a huge burden on the dengue control program in Makkah Al-Mukarramah. Therefore, the dengue fever program should pay attention to the strategy of awareness campaigns among the Makkah community, focusing on students.

## CONCLUSION

It was found that the knowledge, attitudes, and practices of male medical students Relation to the Prevention of dengue was affected with Two variables including infected with dengue fever and specializations of

## CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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Ethical approval was obtained from the Ethical Committee in the Faculty of Public Health & Health Informatics

## AUTHOR CONTRIBUTIONS

MB Prepared of questionnaire, determined sample size, collected data from target group analyzed and interpreted of data and was a major contributor in writing manuscript. all this done by single author MB.



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