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Research Article

**KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT DENGUE  
FEVER AMONG SUDANESE PILGRIMS DURING HAJJ  
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**Abstract:**

*Dengue fever (DF) seems to be a serious risk and behaves as a severe public health issue. Therefore, this study aims to assess level of knowledge, attitude and practices (KAP) about dengue fever among Sudanese Hajj pilgrims in 2017. Additionally, the study has intended to examine the level of education with knowledge and attitude against dengue fever among Sudanese pilgrims. The KAP of Sudanese pilgrims towards DF was assessed using quantitative research design. Questionnaires were distributed among Sudanese Hajj pilgrims in their residence in Makkah. The collected data was entered in Statistical Software for Social Sciences (SPSS) and analyzed using descriptive statistics and Pearson correlation. The study revealed that fever (78.4%) is the most significant symptom of dengue. Moreover, stagnant water container (91.8%) and the negative behavior towards the lifestyle (92.5%) will lead to the prevalence of dengue fever among the population. 13.5% to 73% prevalence rate is observed among Pakistani pilgrims, 37.5% to 53.5% prevalence rate is observed among Saudi pilgrims, 19.7% prevalence rate is observed among Yemen pilgrims whereas, 9.4% prevalence rate is observed among Sudanese pilgrims. However, the variables associated with the dengue fever are being assessed in terms of spatial and temporal aspects in Jeddah, Saudi Arabia. Thus, the awareness programs and platforms based on scientific discipline are recommended for the Hajj pilgrims.*

**Keywords:** Attitude, Dengue Fever, Hajj Pilgrims, Knowledge, Mass Gathering, Practice, Sudanese.

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**INTRODUCTION:**

Dengue virus (DENV) infection is a major public health concern since the incidence of dengue fever (DF) has increased more than 30-fold over the last five decades. It can be a life-threatening illness as there is no specific therapeutics or licensed vaccines until now [1-3]. According to World Health Organization (WHO), they classify dengue fever as an important disease in public health and it is a mosquito-borne viral disease that has rapidly spread in all regions in recent years [4]. Dengue virus is transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *Ae. Albopictus* [5, 6]. Dengue is widespread throughout the tropics, with local variations in risk influenced by rainfall [7], temperature [8] and unplanned rapid urbanization [9]. The actual numbers of dengue cases are underreported and many cases are misclassified. One recent estimate indicates 390 million dengue infections per year (95% credible interval 284–528 million), of which 96 million (67–136 million) manifest clinically (with any severity of disease) [10]. Another study, of the prevalence of dengue, estimates that 3.9 billion people, in 128 countries, are at risk of infection with dengue viruses, and Sudanese residents in Africa, maybe caught up with increased risk for dengue fever [11].

Hajj is one of the largest gatherings of people from all over the world, and many of standing water where mosquitos may breed also can increases their risk of developing such condition [12]. Among non-Saudi nationals, the occurrence of dengue fever in Saudi Arabia was 11.85/100,000 by 2010 [1]. Makkah province has become a dengue-endemic area with high occurrence of dengue infection during early summer and spring since 1994. After 2001, several dengue outbreaks have been reported in the Makkah region. In hyperendemic dengue areas, millions of Muslims come yearly to Makkah for Hajj with the chances of being reported with dengue fever.

Sudan possesses one of the largest numbers of Hajj pilgrims among Islamic countries. This religious trip is merely possible with appropriate health status for making maximum use of this opportunity to perform worship as possible and to enjoy Hajj. Health plays a major role in accomplishing the Hajj rites. It can be physically relied on conditions prevailing at the time. Similarly, this circumstance is relied on knowledge, attitude and practice (KAP) of Sudanese pilgrims. Public awareness of the dire need is essential to prevent exposure through reducing contact with patients and body fluids, cancelling non-emergency travel to affected countries and using personal protective measures without effective vaccines. In

contrast, Sudanese pilgrims' awareness regarding Dengue fever has neither been assessed nor examined. Therefore, this study evaluated the knowledge, attitude and practice (KAP) against dengue fever of Sudanese pilgrims during Hajj. It is expected that the findings of this study can promote public health, and give an idea about Sudanese vision about dengue fever in future mass gathering. According to the knowledge, this is the first study undertaking Sudanese Hajj pilgrims to assess their KAP towards dengue fever during Hajj season.

**Aim and Objectives**

This study aimed to assess level of knowledge, attitude and practices about dengue fever among Sudanese Hajj pilgrims in 2017. Additionally, the study has intended to examine the level of education with knowledge and attitude against dengue fever among Sudanese pilgrims. Secondly, awareness of Sudanese pilgrims is also assessed regarding dengue fever. Lastly, the study intends to assess the attitude and practice with respect to age against dengue fever.

**Literature Review**

Hajj is the annual mass gathering for the Muslims around the globe and have pilgrims from 185 countries of the world. The mass gathering has a massive amount of pilgrims who along with them bring their country's environment there which can be a reason to spread some of the communicable diseases. The Health authority of Saudi Arabia every year work on the health requirements among the pilgrims. Hitherto, several studies have assessed the knowledge, attitude and practice about dengue fever among pilgrims during Hajj season undertaking different regions. For instance, Alhaeli [12] conducted the study about the prevalence of dengue fever in Saudi Arabia. To conduct the study forty-five articles were initially carried out. After retrieving the full text and screening those total 10 articles were considered useful for the study to review. Among the clinically suspected studies and patients who visit hospital for other reasons, four were cross-sectional and three were identified seroprevalence ranging from 31.7% to 56.9%. Moreover, the study extracted risk factors and found out that male patients are usually affected especially young males. The risk factors such as: vomiting, fever, leucopenia and thrombocytopenia were identified in the studies related to the clinical presentation of dengue fever. However, an educational program related to the dengue fever was identified in one of the cross-sectional studies that found out a positive medical history of family towards dengue fever. Additionally, mothers aged over 17 years and literate mothers are considered to be the predictors of high dengue fever

knowledge.

Alzahrani [1] assessed the attitude and practices of the health care physicians about the prevention and clinical measures of dengue fever in 2013 in Makkah Al Mokarramah. A cross sectional study was carried out, which include health care physicians that are active in the health care centers in Makkah Al Mokarramah. It was revealed that almost 74.2% of the healthcare actively performed the dengue test whereas, some of the participants did not even bother to perform the dengue test. This also resulted that those who did not perform the dengue test lack resources at their clinics and workplace. A total of 61.6% physicians revealed that the center they work in do not offer any type of preventive measure to the patients.

Al-Tawfiq [13] reviewed the responsibilities toward the immunization for the Hajj in 2018. The study revealed the mandatory vaccines that overcome the infections before going on Hajj. The vaccines include: yellow fever vaccine, quadrivalent meningococcal polysaccharide, poliomyelitis vaccine and conjugated vaccine. However, influenza vaccine was recommended but not necessary for the pilgrims. More vaccines include Ciprofloxacin, and chemoprophylaxis should be given to the pilgrims when entering the airport. Additionally, vaccines for diphtheria, tetanus, pertussis, polio, measles and mumps are also recommended.

Al-Shami et al [14] revealed a short report on the updates of dengue and its epidemiology in Saudi Arabia specially Jeddah and Makkah city. The study found out that, around 4411 dengue cases were reported in the year 2013. The study concluded that the current dengue management strategies are inadequate. A serious lacking in the processes involved during the field control management of dengue fever with the materials used is identified by the growing number of dengue cases.

Salmon-Rousseau [15] identified admissions of the patients in the hospitals of the home country of Hajj pilgrims. To conduct this study, researcher has utilized the PubMed based literature reviews from the year 1952 to 2015 about the prevention and epidemiology of the infections prevailed during the Hajj. The study resulted that influenza, whooping cough, ENT infections, pyogenic pneumonia and respiratory tract infections are revealed to be the most frequent infections identified during the Hajj. Moreover, meningococcal meningitis outbreaks have been recognized among the Hajj pilgrims. Waterborne disease such as hepatitis A and gastroenteritis seemed to be common health issues.

Currently, dengue fever has been identified in the Saudi Arabia during the year 2012-2014.

The study has identified the gap regarding the lack of attitude, knowledge and awareness found among Hajj pilgrims. There lacks strengths and weaknesses toward the knowledge and practices of physicians in dengue management. The vaccines are mandatory and continued with the new emerging diseases and infections, but were not previously utilized. Therefore, it is important to draw attention of KSA authorities towards the reasons behind the failure of control results and to recognize the strategies related to the dengue fever control in Saudi Arabia. As per the knowledge, this study is the first to examine the attitude, awareness and knowledge of Hajj pilgrims toward dengue fever with respect to Sudan.

## MATERIAL AND METHODS

### Study design

This study has adopted descriptive cross sectional study to assess the KAP of Sudanese pilgrims. The rationale for using specific research design was to assess the causal relationship between the variables mentioned and research questions formulated.

### Study Population

As mentioned earlier, Sudanese Hajj pilgrims have been selected as study population. The focus on the specific study population was given to the number of pilgrims attending Hajj in 2017 and their prevalence to the dengue fever. A total of 400 Sudanese pilgrims were selected based on the inclusion criteria from Makkah.

### Inclusion criteria

Following inclusion criteria was followed during the selection of participants: (1) Sudanese Hajj pilgrims; (2) living in Makkah from 20<sup>th</sup> of August 2017, to 20<sup>th</sup> of September 2017; (3) pilgrims who give verbal consent to take the questionnaire; and (4) who fulfil the questionnaire.

### Exclusion criteria

Following exclusion criteria was followed for the selection of participants: (1) Non- Sudanese Hajj pilgrims; (2) pilgrims who refuse to take the questionnaire; (3) pilgrims who do not fulfil the questionnaire; and (4) children (below 18 years).

### Data collection

After getting the needed permissions, the questionnaire was distributed among Sudanese Hajj pilgrims in their residence in Makkah. The questionnaire was collected on the same day. The collected records were entered in Statistical Software

for Social Sciences (SPSS). These data include age, gender, nationality, residence, marital status, education, knowledge about Dengue fever and etc. After data collection and data input, data was analyzed using SPSS.

#### Data Analysis

The collected data was gathered in a single document and rechecked by the author to ensure there are no missing, unneeded or mixed data. Statistical analysis

was analyzed by using SPSS. Descriptive statistics and Pearson correlation was used for the analysis.

#### RESULTS:

Table 1 has shown the demographic details of the recruited respondents. Majority of the respondents (23.4%) were between age groups 26-35 years. Majority of the respondents (77.6%) were male pilgrims. Majority of the Sudanese Hajj pilgrims (96.5%) were married and got high school education (22.9%).

**Table 1: Demographics**

	N	%
<b>Gender</b>		
Male	312	77.6
Female	89	22.1
<b>Age</b>		
18-25	21	5.2
26-35	94	23.4
36-45	123	30.6
46-55	78	19.4
56-65	84	20.9
More than 65	1	0.2
<b>Marital status</b>		
Single	9	2.2
Married	388	96.5
Divorced	2	0.5
<b>Education</b>		
Primary	37	9.2
High school	92	22.9
Intermediate school	27	6.7
Post graduate	161	40.5
Uneducated	84	20.7
<b>Nationality</b>		
Sudanese	401	100

Fever was pointed (78.4%) as the highest sign and symptom of dengue virus by Sudanese. However, headache is considered to be the second highest (69.4%) symptom of dengue fever, whereas joint pain (53.2%), muscle pain (49.5%) were also the significant signs and symptoms that cause dengue fever. Moreover, Sudanese pilgrims were unaware

about the pain behind eyes (43.3%) and rashes (44%) (Table 2). The findings have also shown a significant association between Sudanese pilgrims and symptoms of dengue fever. It was clearly examined that these dengue fever symptoms directly affect Sudanese pilgrims during Hajj season.

**Table 2: Symptoms of Dengue Fever**

	Correct Information	I don't know	Not sure	Wrong information	p-value
<b>Fever</b>	315 (78.4%)	73 (18.2%)	7 (1.7%)	6 (1.5%)	0.027
<b>Headache</b>	279 (69.4%)	88 (21.9%)	27 (6.7%)	7 (1.7%)	0.049
<b>Joint pain</b>	214 (53.2%)	117 (29.1%)	37 (9.2%)	33 (8.2%)	0.046
<b>Muscle pain</b>	199 (49.5%)	128 (31.8%)	38 (9.5%)	36 (9%)	0.028
<b>Pain behind eyes</b>	115 (28.6%)	174 (43.3%)	61 (15.2%)	51 (12.7%)	0.025
<b>Rash</b>	74 (18.4%)	177 (44%)	71 (17.7%)	79 (19.7%)	0.050

The findings have indicated that blood transfusion (61.2%), unsealed water, containers, plants and pots (91.8%), lack of mosquito control (82.6%), and negative behavior (92.5%) and lack of vaccines (37.6%) were the major causes of dengue fever during the Hajj season. However, mosquitoes itself and people corresponding with each other are not influential causes of dengue fever as reported by

60.2% and 64.7% respondents. Similarly, the association between Sudanese pilgrims and dengue fever causes has been significantly found. Among these causes, blood transfusion, unsealed water, containers, plants and pots, lack of mosquito control, negative behavior and lack of vaccines were influential causes of dengue fever (Table 3).

**Table 3:** Dengue Fever Causes

	Correct Information	I don't know	Not sure	Wrong information	p-value
By mosquitoes	42 (10.4%)	78 (19.4%)	39 (9.7%)	242 (60.2%)	0.847
By contact	34 (8.5%)	75 (18.7%)	32 (8%)	260 (64.7%)	0.269
By blood transfusion	246 (61.2%)	82 (20.4%)	46 (11.4%)	27 (6.7%)	0.026
By unsealed water containers, plants and pots	369 (91.8%)	22 (5.5%)	9 (2.2%)	1 (0.2%)	0.047
Lack of mosquito control	332 (82.6%)	41 (10.2%)	19 (4.7%)	9 (2.2%)	0.044
Negative behavior	372 (92.5%)	21 (5.2%)	6 (1.5%)	2 (0.5%)	0.028
No vaccines	76 (18.9%)	151 (37.6%)	53 (13.2%)	121 (30.1%)	0.018

Majority of the respondents thought reducing the mosquito habitat (39.8%) can play a vital role in treating the dengue fever. Whereas, window screen and bad net can be another treating aspect of DF

which is (34.3%). The third treatment was high use of mosquito repellent (16.9%), which can effectively eliminate dengue fever from the patients (Table 4).

**Table 4:** Treatment of Dengue Fever

	Frequency	Percent
Reduce Mosquito habitat	160	39.8
Window screen and bad net	138	34.3
Use analgesic acetaminophen	25	6.2
Drink plenty of water	2	.5
Good sleep	8	2.0
Use mosquito repellent	68	16.9
Total	401	99.8

### DISCUSSION:

The current study aimed to identify the knowledge and attitude among Sudanese pilgrims towards dengue fever. The study resulted various causes and symptoms among the Sudanese population. The knowledge, attitude and practices of dengue control were entirely based on different population and the geographical areas [1]. In contrast with the present study, Alhaeli et al [12] found out various dengue fever outbreaks in Jeddah and Makkah city. The humidity and temperature seem to be another reason for dengue outbreak in Makkah and Jeddah. Likewise, Horta et al [16] found out that dengue

transmission is an outcome of the climatic conditions such as: rainfalls, temperature and humidity. Furthermore, Lee et al [17] also identified an association of the climatic factor and population density with the dengue fever transmission. Al-Ghamdi & Mahyoub [18] also revealed climate as a risk factor for dengue virus. According to Obtel et al [19], the prevalence of dengue fever are changed with respect to the region. Therefore, 13.5% to 73% prevalence rate is observed among Pakistani pilgrims, 37.5% to 53.5% prevalence rate is observed among Saudi pilgrims, 19.7% prevalence rate is observed among Yemen pilgrims whereas, 9.4% prevalence

rate is observed among Sudanese pilgrims. However, the variables associated with the dengue fever are being assessed in terms of spatial and temporal aspects in Jeddah, Saudi Arabia. Alkhalidy [20] revealed that the neighbourhood status of Jeddah has a significant association with the dengue fever and cases involved in it, which is negotiated by the non-Saudi immigrants.

Similar to the current study, Tukan et al [21] considered fever as the beginning of dengue fever. According to the study, the presence of the fever in the expected dengue patient is given high values to conduct the case. Lee et al [22] also revealed that the stagnant water and substandard hygiene practices, and sanitary are the reason to breed dengue mosquitoes. However, the current study revealed no association between the climate and dengue fever in contrast with the previous studies [12, 16, 17]. In line with Thanachartwet et al [23], the misdiagnosis of dengue lead to many severe complications among the patients. Similarly, delaying in the treatment also lead to many complexities, which lead to the worse prognosis. Likewise, Al-Ghamdi & Mahyoub [18] revealed that stagnant water placed in an open container results in the occurrence of dengue fever among the Hajj pilgrims coming from the dengue infected countries. Moreover, the eradication of stagnant water will result in the reduction of *Aedes aegypti* in Jeddah, Saudi Arabia.

Leading to the limitations of the current study, pilgrims coming from the rural areas are not being assessed in terms of their diagnostic practices and the healthcare facilities. Moreover, the weather condition plays an important role in the prevalence of dengue fever, which is also not being examined. More diseases like Zika, chikungunya belong to the same family i.e. mosquito borne diseases need to be analysed as well.

### CONCLUSION:

The mass gathering i.e. Hajj is growing in number as well as in magnitude. Thus, it is crucial to evaluate the knowledge and attitude towards the diseases. According to the current study, certain causes are there for dengue fever among the Hajj pilgrims. Therefore, all the pilgrims should be provided with the awareness about dengue fever and how to be safe from its risk factors. Therefore, a platform based on scientific discipline from the mass gathering network is recommended. The platform can provide the knowledge and attitude about the experiences and learning about the diseases and infections such as dengue, chikungunya, Ebola virus, zika, and influenza. The immunization status of the Hajj

pilgrims should be updated about the diseases that are vaccine-preventable. Therefore, international travelling specially Hajj is the best source to identify the immunization status of the pilgrims. Moreover, dengue fever in the patients should not be neglected as this might lead to more severe complications. The study further concluded that the presence of fever in patients with dengue can be a risk factor for progression to a severe disease.

This study provides a useful opportunity to identify strengths and areas in need of improved knowledge and practice in primary-care management of dengue. Therefore, there is a dire need to develop awareness programs to increase the knowledge about dengue fever among the community. For this purpose, social mobilization and interactive activities should be developed. These programs will be a vital source to attain the community support in acquiring the preventive measures for dengue fever, a thorough observation, behaviour towards the disease and controlling its outbreaks. Moreover, DF posters should be posted in public areas to increase the awareness towards the disease. The policies in support of controlling the dengue fever should be highlighted in the future studies.

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