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REVIEW

The epidemiology of Dengue fever in Saudi Arabia: A systematic review



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Risk

Summary Dengue fever (DF) is the most serious mosquito-borne viral disease worldwide. DF is an acute febrile illness caused by *Aedes aegypti* and *Aedes albopictus*, which are endemic in certain cities of Saudi Arabia, such as Jeddah and Makkah (Mecca). An online literature search was conducted using relevant keywords to retrieve DF studies conducted in Saudi Arabia. Forty-five articles were identified initially. After screening for exclusion and retrieving full texts, a total of 10 articles were used for this review. Four studies were cross-sectional, and three observed a seroprevalence ranging from 31.7% to 56.9%, either among clinically suspected cases or among patients visiting the hospital for other reasons. Evidence extracted from risk factors and distribution studies indicated that young males are commonly affected. Fever, vomiting, thrombocytopenia and leukopenia were the common features of the three studies related to clinical presentation of DF. One cross-sectional study concerning an educational program for DF demonstrated that a positive family history of DF, literate mothers, and age over 17 years were the predictors of a high DF knowledge score. However, the paucity of large epidemiological studies limits the generalizability of such evidence. Future studies in Saudi Arabia should focus upon the expansion of DF to other cities in the Kingdom. Larger epidemiological studies are needed for estimating the true burden and incidence of DF in the Saudi population, as they are limited to seroprevalence among clinically suspected cases and hospital-based patients.

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Introduction

Dengue fever (DF) is a mosquito-borne viral illness with 100 million new cases occurring worldwide. DF is an acute febrile illness caused by *Aedes aegypti* and *Aedes albopictus* [1]. DF occurs primarily in tropical areas around the world affecting both children and adults [1]. The symptoms of DF are associated with hemorrhagic complications (DHF) or shock (DSS), as well as depression and fatigue [2]. There are several risk factors, as well, that can lead to DHF, including age, genetic disposition, and immune status. Transmission of the disease occurs primarily in tropical areas with high humidity and a hot climate. The humidity lengthens the mosquito's lifespan and shortens the time required for viral replication. The mosquito incubation period lasts between 3 and 14 days [2].

DF was first discovered in 1779 in Batavia and, a year later, a pandemic of DF occurred in Philadelphia, USA [3]. In 1998, another pandemic of DF occurred in 56 countries, where 1.2 million people were infected [4]. During the past 50 years, DF incidence has witnessed nearly a 30-fold increase. Today, there are approximately 100 countries in the Americas, South East Asia, the Eastern Mediterranean, the Western Pacific and Africa, where 50 million DF occur annually, out of which 22,000 deaths affect mostly children [5].

The spread of DF in traditionally DF-free countries, such as Pakistan, Saudi Arabia, Yemen, Sudan, and Madagascar, between 2000 and 2007 has been alarming. In Saudi Arabia, the first experience of virus isolation during a DF outbreak was in 1994 in Jeddah, where 289 confirmed cases were recorded [6]. The first documented case was caused by DENV-2. During the outbreak, DENV-2 and DENV-1 were isolated during a peak of cases in the summer and in the rainy season at the end of the year. In

1997, emergence of DF occurred with DENV-3 identified during the rainy season in Jeddah. The virus was not isolated in the next seven years until 2004 when DENV-1, DENV-2 and DENV-3 were isolated in Jeddah. During the same year (2004), the first outbreak in Makkah occurred with the isolated DENV-2 and DENV-3 [7]. The next outbreaks occurred in Jeddah in the winter seasons of 2005 and 2006 [8,9]. After another outbreak of DF occurred in 2006, the Saudi Preventive Department in the Ministry of Health (MOH) launched a comprehensive plan to control the disease [10]. In 2008, the first cases were reported from Al-Madinah with DENV-1 and DENV-2 isolated serotypes [11]. In 2009, the Saudi MOH reported a total of 3350 cases of DF in the Kingdom and estimated the case fatality rate to be 4.6 per thousand [12]. The reemergence of DF in Saudi Arabia can be explained by the growing levels of urbanization, international trade and travel [13].

There are currently no review articles summarizing the evidence of DF as it relates to the burden and knowledge of health determinants in Saudi Arabia. The present article summarizes studies on DF prevalence and risk factors that had been conducted in Saudi Arabia.

Methods

An electronic search was conducted by two independent researchers to identify articles in PubMed that met our inclusion criteria. Local journals were also reviewed, but no relevant articles were found for inclusion in the study. Keywords were used in the PubMed's advanced search, and they covered three categories: Disease of interest (Dengue), Epidemiological terms (Distribution or epidemiology or incidence, or odds, or pattern or prevalence or prognosis or risk or trend, or burden or knowledge)

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