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Review

Rates of Amputations Among Diabetics in Saudi Arabia

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Abstract
According to the World Health Organization Saudi Arabia has the second highest diabetes rate in the Middle East and ranks seventh globally. Around 7 million people are diabetic, and almost 3 million have pre-diabetes, according to estimates. Perhaps even more concerning is the recent increase in diabetes cases reported in Saudi Arabia. In fact, diabetes has risen by ten times in Saudi Arabia during the last three centuries. Diabetic foot ulcer is the leading source of morbidity and prolonged hospitalization, with approximately twice the likelihood of amputations compared to ulcers that are not infected. Diabetic foot ulcer affects 6.3% of the world's population, with men being more prone to developing them. The purpose of this research is to review the available information about rates of amputation among diabetics in Saudi Arabia. Even though diabetes is a significant public health concern in the Middle East and North Africa area, with high incidence of diabetic foot problems, data on prevalence and mortality among this high-risk group is scarce. As the prevalence of the diabetes is increasing in Saudi Arabia so are the diabetes related complications and diabetic foot complications are becoming more common as well. To analyse the existing condition and audit the ongoing prevention programs, large community-based surveys must be conducted. Efforts must be made to minimize the risk of amputation as well as fatalities among diabetic foot problems patients.

Keywords: diabetic, foot, ulcer, amputation, Saudi Arabia

Introduction

Diabetes mellitus (DM) is a condition in which blood glucose levels are uncontrollably high. Type 1 and 2 diabetes mellitus are the two most common subtypes, each having its own pathogenesis, presentation, and therapy (1). According to the World Health Organization Saudi Arabia has the second highest diabetes rate in the Middle East and ranks seventh globally. Around 7 million people are diabetic, and almost 3 million have pre-diabetes, according to estimates. Perhaps even more concerning is the recent increase in diabetes cases reported in Saudi Arabia. In fact, diabetes has risen by ten times in Saudi Arabia during the last three centuries. Diabetes has been linked to a higher risk of death, morbidity, and vascular problems, as well as poor overall health and a reduced quality of life (2).

Type-2 diabetes mellitus (T2DM) is among the most common chronic diseases, affecting 422 million people globally. By 2030, T2DM is anticipated to be the world's seventh leading cause of death, owing to its rapid development in middle- and low-income nations. Type 2 diabetes is also a main cause of serious morbidity and disability including blindness, chronic renal impairment, cardiovascular events, and lower limb amputation. The prevalence as well as related risk factors and comorbidities, is among the highest in the world in the Gulf area. T2DM and its concomitant conditions can be reduced with an early screening and prevention program (3).

Over the last two decades, the incidence of T2DM has risen rapidly, owing to an increase in the prevalence of obesity, the key risk factor for T2DM. Diabetes statistics in the Arab region are particularly alarming, with the number of diabetics expected to rise by 96.2% by the year 2035. In the Middle East, genetic risk factors may play a key role in the uncontrolled rise in the prevalence of T2DM. Other significant causes of this rapid growth in the frequency of T2DM with in the Arab world include obesity, increasing urbanization, and a lack of exercise (4). Diabetic patients are more likely to develop diabetic foot ulcers, also with great proportion requiring amputation within four years of diagnosis. Neuropathy, angiopathy, physical stress, and elevated blood glucose levels are all causes of diabetic foot ulcers. Ulcer infection is a leading source of morbidity and prolonged hospitalization, with approximately twice the likelihood of amputations compared to ulcers that are not infected (5-7).

Diabetic foot disease is a group of heterogeneous disorders that cause deformity, ulceration, and infection in the lower extremities due to peripheral neuropathy and vascular disease. It is more common in people with poorly controlled diabetes. Diabetic foot disease is linked to high morbidity and death around the world, as well as being a significant financial burden on both patients and health care systems. A person with diabetes has a 25% likelihood of developing a foot ulcer in their lifetime. Lower limb amputation is one of the most devastating outcomes of diabetes, and foot ulceration raises the chances. Diabetic foot disease is responsible for more than half of all non-traumatic lower limb amputations (8).

Diabetic foot ulcers affect 6.3% of the world's population, with men being more prone to developing them (9). According to one study, diabetic foot syndrome affects 16.7% of type 2 diabetes patients in Saudi Arabia after one year (10). Lower-extremity amputations are frequent in individuals with type 2 diabetes in Saudi Arabia, with the majority of patients receiving minor amputations (11). Amputation has a significant and long-term influence on an individual's financial, psychological, and social standing, and the number of amputations performed is on the rise around the world. The elderly has a 10%–15% lifetime risk of amputation, which is 10–30 times higher than the general population. At least half of all non-traumatic lower-limb amputations occur due to diabetes. Peripheral vascular disease, diabetes, and the number of road traffic accidents are all on the rise in Saudi Arabia. As a result, it's possible that it's contributed to the rise in amputations in this country (12). The purpose of this research is to review the available information about rates of amputation among diabetics in Saudi Arabia.

Methodology

This study is based on a comprehensive literature search conducted on March 29, 2022, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the information rates of amputation among diabetics in

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Saudi Arabia. There were no restrictions on date, language, participant age, or type of publication.

Discussion

Diabetes is a chronic metabolic condition defined by hyperglycaemia, which is caused mostly by insulin resistance or deficiency. The global prevalence of diabetes is continuously increasing, with estimates ranging from 171 million in 2000 to 366 million by 2030. According to a World Health Organization report, DM will be the sixth largest cause of death worldwide by 2030. Diabetic problems affect almost two-thirds of individuals who visit primary health care centres. According to the International Diabetes Federation Atlas, roughly 17.7% of Saudi Arabia's adult population suffers from diabetes. Saudi Arabia has now become the Middle East's first country with a high diabetes prevalence rate. In the long run, DM increases health consequences such as hypertension, cardiovascular disease, retinopathy, and foot difficulties (13).

Diabetes is a global public health issue. A diabetic foot is a consequence of diabetes characterized by peripheral vascular disease and sensory neuropathy affecting the feet of diabetic people. Diabetic foot is a long-term, high-burden consequence of diabetes that has a negative impact on diabetic individuals' quality of life. Diabetic foot syndrome is defined as the presence of numerous common diabetic foot diseases including infection, diabetic foot ulcer, and neuropathic osteoarthropathy. Old age, diabetes duration, and hypertension are just a few of the diabetic foot's risk factors. The primary risk factors for foot ulcers and eventually amputation are peripheral neuropathy involving sensory loss and peripheral vascular disease with ischemia (14).

As the prevalence of the diabetes is increasing in Saudi Arabia so are the diabetes related complications and diabetic foot complications are becoming more common as well. A retrospective study conducted from 2013-2020 at a tertiary care centre Jeddah revealed that amputation was performed on 84.9% of the patients, with 38.2% having minor amputations, 40.1% having severe amputations, and 21.7% having both types of amputations. Infection was the most common reason for amputation accounting for almost 50.3% of the patients. There were 75 deaths, with a 20% mortality rate after seven years. Reduced mean haemoglobin and elevated mean creatinine levels both were linked to a higher risk of death (15).

Findings of another cross-sectional study conducted in Saudi Arabia among 91 participants in 2015 depicted that the frequency of lower extremities amputation (LEA) in the study population was 29.7%. For ulcer size, the odds ratio was 2.42 (95 % confidence interval (CI) = 0.70-8.45; P for trend =.03) and for high-density lipoprotein cholesterol, it was 0.22 (95% CI = 0.06-0.87; P for trend =.03). C-reactive protein as well as homocysteine levels were both positively linked with the risk of LEA, but in multivariable models, the relationships were no longer significant. When compared to those without foot infections, 19.3% (95% CI = 6.0%-32.4%, P =.03), participants with foot infections had a substantially higher adjusted frequency of LEA 40.7% (95% CI = 27.1% -54.3%). Wagner grade 3 participants had a higher prevalence 40.5% (95% CI = 27.8% -53.2%) than Wagner grade 1 or 2 participants 16.4% (95% CI = 2.4% -30.5%, P =.02). The prevalence of LEA was found to be non-significantly greater in participants with peripheral neuropathy and peripheral arterial disease. Wang et.al further stated that among this Saudi population with diabetic foot ulcers, a rather high prevalence of LEA was observed, as well as various clinical indicators and local symptoms associated with LEA (11).

Amputation can result in a longer stay in the hospital, more deaths, and less recovery. According to a retrospective study conducted by Badri et al on 222 patients who underwent a total of 252 amputations, the percentage of patients who were hospitalized for more than 10 days post-amputation ranged from 50% for those who underwent one toe amputation to 91% for those who underwent above-knee amputation. In addition, when compared to the patients who did not have any post-surgical difficulties accounting to almost 16.8%, 57.1% of patients with post-surgical complications spent more than a month in the hospital. Early fatalities were observed in 7.2% of patients who had to have their limbs amputated. Only 8.8% of patients who had significant amputations and had artificial limb fittings were rehabilitated (16).

According to AL Zahrani's findings of two studies, the frequency of amputations in Riyadh, Saudi Arabia's capital, is estimated to be 741, with 3970 across the country. According to studies, the rate of amputations in Saudi Arabia is believed to reach 1647 per year. According to the International Diabetes Federation, the number of diabetics is rising in the Middle East, with high prevalence in the Kingdom of Saudi Arabia (20%), Kuwait (21.1%), Lebanon (20.2%), Bahrain (19.9%), and the United Arab Emirates (19.2%), resulting in

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higher amputation rates (17). Lack of education also unsanitary living situation, and religious and cultural customs are all key causes of diabetic foot issues in Middle Eastern countries. Apart from medical therapy, it is critical to educate individuals about diabetes, diabetes control, and foot care in order to overcome these obstacles (18).

Results of a follow-up cross-sectional study conducted in Jeddah in 2015 reported that peripheral arterial disease, peripheral neuropathy, complicated foot ulcer, and diabetic foot disorder all had a 1-year cumulative incidence of 6.3%, 9.2%, 3.6%, and 16.7%, respectively. Foot ulcers, gangrene, and amputation all had a 1-year cumulative incidence of 1.8%, 1.5%, and 0.6%, respectively. Only one person was diagnosed with several disorders. A higher incidence of peripheral neuropathy and diabetic foot disorder was linked to having had diabetes for a longer period of time. In this Saudi community, high frequencies of diabetes, as well as the duration of diabetes, were revealed to be key risk factors for diabetic foot problems (10). Results of another prospective study conducted in Saudi Arabia published in 2018 revealed that among 82 recruited study participants 33 (40.24%) underwent amputation of whom two patients had Wagner's grade 1, 14 had Wagner's grade 2, 11 with Wagner's grade 3 and remaining 6 were of Wagner's grade 4 initially (19).

Diabetes-related lower-extremity amputation rates are key indications for the effectiveness of diabetes patients' health treatment, including foot ulcer prevention and management, as well as forecasting the scope of the problem. Previous research has found that early detection of persons at high risk for foot disorders, as well as care of risk factors, can help avoid lower extremity amputations and ulcerations. For this purpose , determining the involvement of risk factors in diabetic foot ulceration would allow health care practitioners to build effective prevention programs that will improve patient quality of life while also lowering the financial burden on both the patients and the health care system (20).

Diabetes complications begin to escalate in lockstep with the disease's global prevalence. Among the most common and feared effects of diabetes is foot problems. It foreshadows a high probability of amputation of the lower leg and death. A study conducted in Ghana in 2019 reported that from 0.6% (95% CI:0.21–2.21) per 1000 follow-up years in 2010 to 10.9% (95% CI:6.22–12.44) per 1000 follow-up years in 2015, the average incidence rate of diabetes-related amputation was 2.4 (95% CI:1.84–5.61) per 1000 follow-up years. To stop the tide of the rising incidence of amputation, interventions focused on overcoming systemic and patient-level challenges to excellent vascular risk factor management and proper diabetic foot care should be implemented in healthcare systems (21).

Despite the fact that diabetes is a significant public health concern in the Middle East and North Africa area, with high incidence of diabetic foot problems, data on prevalence and mortality among this high-risk group is scarce. When compared to diabetics without foot issues and the general population, diabetic individuals with diabetic foot difficulties have a higher mortality risk. It was also observed that the overall crude mortality rate between diabetic patients with diabetic foot complications was almost double when compared to a corresponding group of diabetic patients without diabetic foot complications after six years of follow-up, and this rate was nearly three times higher for patients with a history of diabetes-related amputation. All measures for minimizing the occurrence of microvascular and macrovascular problems, as well as early therapies to avoid foot ulceration and subsequent LEA, should be investigated (22). Due to the scarcity in research and limited literature available regarding the prevalence of amputation in Middle East region in comparison to the burden of diabetes, in future more research studies addressing epidemiology and pattern of amputation among diabetics is needed.

Conclusion

The rising frequency of diabetic foot lesions in Saudi Arabia is due to a high prevalence of diabetes and a rising risk of complications for diabetic foot diseases, as well as a lack of well-designed awareness programmes for preventing diabetic foot diseases. To analyse the existing condition and audit the ongoing prevention programs, large community-based surveys must be conducted. Efforts must be made to minimize the risk of amputation as well as fatalities among diabetic foot problems patients. It is critical to discover risk factors early and intervene at specialist centres using a multidisciplinary approach.

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Non applicable.

Data availability

Data that support the findings of this study are embedded within the manuscript.

Authors' contribution:

All authors contributed equally to the drafting, writing, sourcing, article screening and final proofreading of the manuscript.

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