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Research Article

PREVALENCE AND RISK FACTORS OF AMPUTATION IN DIABETIC PATIENTS IN KSA

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Abstract:

Background: Diabetic foot may cause lower extremity amputation (LEA) more often compared to the general population.

Objective: to identify the incidence of diabetes- related lower-extremity complications and amputations and the risk factors which can affect it in diabetic patients attending the health care unites in KSA.

Methods: Medline and PubMed database searches were performed for articles about diabetic septic foot and prevalence of limb amputation in diabetic septic foot patients published in English around the world. References list of each included study were searched for further supportive data.

Results: Incidence of all forms of lower extremity amputation ranges from 46.1 to 9600 per 105 in the population with diabetes. The diabetic patients were found to be 39% of amputees and 42% of operations (all levels). In addition, the incidence of diabetes amputation was 5.7 per 100000 population per year. Fifteen percent of the diabetic patients had diabetes first diagnosed when they were admitted for amputation. Diabetic foot amputation was found to be associated with; gender, age, education, type of diabetes, duration of disease, presence of peripheral neuropathy, peripheral vascular disease, chronic renal diseases, ischemic heart diseases, hypertension, and previous history of diabetic foot.

Conclusion: The worldwide incidence of lower extremity amputation is high and, although variations exist, it is often difficult to directly compare rates as a result of heterogeneity in the populations studied. Good glycemic control, active investigation against PAD, and management of comorbidities such as hypertriglyceridemia and hypertension are considered important to reduce amputation risk.

Keywords: Amputation, Diabetes, Risk Factors, Incidence, Diabetic Foot.

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INTRODUCTION:

Diabetes mellitus is a major health problem in Saudi Arabia [1,2]. The prevalence of diabetes worldwide was estimated to be 2.8% in 2000 and is projected to be 4.4% in the year 2030, with the total number of people with diabetes expected to rise from 171 million in 2000 to 366 million in 2030 [3]. Diabetes continues to be the single most common underlying factor related to many complications all over the world. Those complications arise chiefly from the disruption of the vascular system which can result in inadequate circulation to the peripheral body, which places the limbs and specially the foot at higher risk of ulceration and infection which is mainly the cause of diabetic septic foot [4].

Complications of diabetes, specially diabetic septic foot and limb amputation, have a considerable impact on the quality of life of the patient. It, therefore, becomes imperative to institute effective screening and preventive strategies to detect the early signs of diabetic septic foot. Peripheral arterial disease and infection are the major causes of lower leg amputation in diabetes, and >80% of these amputations are preceded by a foot ulcer and diabetes is a risk factor for peripheral arterial disease and amputation [5, 6]. The prevalence rate of peripheral arterial disease and foot ulcers associating with diabetes was reported to be high in many studies [5].

The best predictors' of lower limb amputation are history of previous foot ulcers, the presence of

neuropathy, peripheral vascular disease and poor glycemic control.

Usually, the patients' presentation to health care centers of diabetic foot is variable ranging from cellulitis, abscess and ulcers, to gangrene [7]. Many studies was done to detect the prevalence and risk factors of amputation in many countries [8, 9]. An amputation of the leg or foot is one of the most feared complications of diabetic septic foot, and it is has been calculated that at this moment, in every 20 s, a leg is lost in our world as a result of diabetes [10, 11]. The studies showed that the incidence of lower-extremity amputation increases with age, amputations are significantly more common in men than in women, and the incidence and proportion of lower-extremity amputations is significantly higher in minorities [12, 13, 14].

The purpose of this article was to identify the incidence of diabetes- related lower-extremity complications and amputations and the risk factors which can affect it in diabetic patients attending the health care unites in KSA.

METHODOLOGY:

Medline and PubMed database searches were performed for articles about diabetic septic foot and prevalence of limb amputation in diabetic septic foot patients published in English around the world. The keyword search headings included "diabetes, diabetic foot and amputation", and a combination of these was used. References list of each included study were searched for further supportive data.

Table 1: The included studies:

Study	Study Design	Country	Participants (n)	Objective	Duration	Outcome and Conclusion
P. W. Moxey et al.	Review article			To quantify global variation in the incidence of lower extremity amputations in light of the rising prevalence of diabetes mellitus.		Incidence of all forms of lower extremity amputation ranges from 46.1 to 9600 per 105 in the population with diabetes compared with 5.8–31 per 105 in the total population. Major amputation ranges from 5.6 to 600 per 105 in the population with diabetes and from 3.6 to 68.4 per 105 in the total population. Significant reductions in incidence of lower extremity amputation have been shown in specific at-risk populations after the introduction of specialist diabetic foot clinics.
Scot E. Moss et al.	Cohort.		Population-based sample (N =1210) of younger-onset diabetic persons (diagnosed before age 30 years and taking insulin) and a stratified random sample (N =1780) of older-onset diabetic persons (diagnosed after age 30 years). Baseline and 4-year follow-up examinations were completed by 996 and 891 younger-onset persons, respectively, and by 1370 and 987 older-onset persons, respectively.	To describe the incidence of lower extremity amputations and sores or ulcers and investigate risk factors for these complications.	1 year	Four-year incidence of amputations was 2.2% in both groups. Several factors offer potential for modification for the prevention of amputations but require further study. These include blood pressure, glycosylated hemoglobin, and smoking
C. Deerochanawong et al.	retrospective	Newcastle		To determine the prevalence of lower limb amputation in diabetic patients.	3 years	The diabetic patients were found to be 39% of amputees and 42% of operations (all levels). Incidence of diabetes amputation was 5.7 per 100000 population

						per year. Fifteen percent of the diabetic patients had diabetes first diagnosed when they were admitted for amputation. For the known diabetes patients, 46% were under diabetes care by general practitioners only. Forty-seven percent of the patients who were under the care of a hospital service for diabetes had incomplete foot examination and assessment. Mortality rate within 30 days after diabetic amputation was 10% and median life expectancy following amputation was 22 months.
Mostafa A Abolfotouh et al.	case-control study	KSA	50 patients with DF, and 50 diabetic controls without DF	To identify the risk factors of diabetic foot (DF) in diabetic patients.		Diabetic foot was significantly associated with: gender, age, education, type of diabetes, duration of disease, level of erythrocyte sedimentation rate (ESR), presence of peripheral neuropathy, peripheral vascular disease, chronic renal diseases, ischemic heart diseases, hypertension, and previous history of diabetic foot. After adjusting for the potentially confounding effects of age and gender by using the logistic regression analysis, independent predictors of DF were: the duration of diabetes, presence of neuropathy, and ESR level. In the prediction of DF, receiver operating characteristic curves (ROC) were applied to identify the most valid cut-off points of the duration of diabetes (11 years), and ESR level (54 mm/hr).
Jørgen Vest i Nielsen et al.	Case control study	KSA	375	To assess the prevalence of Peripheral neuropathy, hypertension, foot ulcers and amputations among Saudi Arabian patients with type 2 diabetes		among the 375 Saudi Arabians was 38% (95% confidence intervals 30–45); hypertension 19% (13–25) current and past ulcers 4.7% (1.3–8); amputations below ankle 3.4% (0.5–6). In the selected 46–69-year-old group prevalence of hypertension (17%), ulcers (2.3%) and amputation (1%) was

						significantly lower in the Saudi Arabian than in the Swedish patients.
Tarik A. Elhadd et al.	Systemic review	KSA		the aim of this study is to get a global picture of the condition at a time when diabetes is having an adverse effect on health care delivery.		there is an epidemic of type 2 diabetes in Saudi Arabia. There is evidence to suggest that this has resulted from significant socioeconomic transformation with significant changes in lifestyle, mainly adoption of a Western lifestyle and abandonment of the more active tribal and nomadic-type of life. The concomitant upsurge of the epidemic of obesity is another irony of these changes. Diabetes in Saudi Arabia is well researched, especially in its epidemiology and clinical aspects. However, with few exceptions, the profile of diabetic complications needs to be better characterized.
Wail A. Tashkandi et al.	multicentre retrospective study	Jeddah KSA	229	To identify the percentage of lower limb amputations in patients admitted with diabetic foot disorders	One year	One hundred and twenty-eight records (the total number of patients who underwent amputations) were reviewed to obtain information about the presentation, associated factors, level of amputations, rates of postoperative complications, re-amputations, mortality, hospital stay and rehabilitation. Ulcer was the most common presentation (85.9%). Sixty percent of patients who were admitted with diabetic foot ended up with lower limb amputation.

RESULTS:

Incidence of all forms of lower extremity amputation ranges from 46.1 to 9600 per 105 in the population with diabetes. The diabetic patients were found to be

39% of amputees and 42% of operations (all levels). In addition, the incidence of diabetes amputation was 5.7 per 100000 population per year. Fifteen percent of the diabetic patients had diabetes first diagnosed

when they were admitted for amputation. Diabetic foot amputation was found to be associated with; gender, age, education, type of diabetes, duration of disease, presence of peripheral neuropathy, peripheral vascular disease, chronic renal diseases, ischemic heart diseases, hypertension, and previous history of diabetic foot. HbA1c $\geq 8\%$, presence of peripheral arterial disease (PAD), hypertriglyceridemia, and hypertension have been recognized as the predictors of LEA in many studies.

DISCUSSION:

The present study was carried out to review the prevalence and the risk factors of diabetic septic foot and limb amputation in diabetic patients. We aimed to update readers with new data published in this topic around the world and to give them adequate information in such important case in an attempt to raise awareness and reduce the incidence of amputation.

The worldwide incidence of lower extremity amputation is high and, although variations exist, it is often difficult to directly compare rates as a result of heterogeneity in the populations studied [15].

Studies that report only rates for all forms of amputation have a dubious value in determining trends and informing practice. The only meaningful use of all lower extremity amputation incidence rates is to represent the burden of amputation on the at-risk population with diabetes.

The clinical distinction and objectives of performing a major and minor amputation are distinct. Minor amputation may be performed as an adjunct to lower limb revascularization in attempted limb salvage. Major amputation represents failed limb salvage.

In Saudi Arabia, diabetic foot was reported to be the major health problem accounting for long hospital stay, more than for any other complications of diabetic and also, it is the most common cause of non-traumatic lower limb amputation and precedes 85% of the cases [16, 17]. Development of DF is significantly associated with the severity of neuropathy, high levels of hemoglobin A1c (HbA1c), high levels of blood sugar, and history of amputation [21, 22].

Studies suggest that 2.5% of diabetic patients develop DF each year, and 15% of them develop DF during their life [18]. Another study in Saudi Arabia showed that DF was prevalent in 13.5% of the diabetic patients referred to the nephrology clinic [19], and 7.7% of the patients undergoing

chronic hemodialysis [20]. It was reported that diabetes, infection and peripheral vascular disease are known

to be the predominant causes of non-healing foot ulcers, which in turn is the principal cause of lower extremity amputation both in the UK and USA [23,24].

A substantial number of individuals with a foot ulcer will therefore have peripheral arterial disease, ranging from relatively mild disease with limited effect on wound healing to severe limb ischemia with delayed wound healing and a high risk of amputation. In several large observational studies, peripheral arterial disease was present in up to 50% of the patients with a diabetic foot ulcer and was an independent risk factor for amputation [25].

Variations in lower extremity amputation rates on a national level may be caused by differences in vascular-diabetic service provision and regional clinical practice [26].

Mortality rate is higher in the patients with DF, and represents approximately twice the number of diabetic patients without DF [27].

In the West, various reports are available on the risk factors related to the complications of diabetes in order to develop strategies for avoiding the expected deterioration in the quality of life following amputation.10-13 However, in the Arab world generally, and in Saudi Arabia particularly, limited data are available on the risk factors of amputation following DF.

In the West, various reports are available on the risk factors related to the complications of diabetes in order to develop strategies for avoiding the expected deterioration in the quality of life following amputation [28, 29]. However, in the Arab world generally, and in Saudi Arabia particularly, limited data are available on the risk factors of amputation following DF.

CONCLUSION AND RECOMMENDATIONS:

The worldwide incidence of lower extremity amputation is high and, although variations exist, it is often difficult to directly compare rates as a result of heterogeneity in the populations studied. Good glycemic control, active investigation against PAD, and management of comorbidities such as hypertriglyceridemia and hypertension are considered important to reduce amputation risk.

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