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Original article

Prevalence of trigger finger and carpal tunnel syndrome among diabetic patients and its relationship to hemoglobin A1C.

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ABSTRACT

Objective: The aim of this study is to establish whether or not there is a relationship between prevalence of Carpal Tunnel Syndrome (CTS), as well as Trigger finger (TF) with HbA1C level. Method: The study population consists of 132 diabetic patients (91 females, 41 males). The subjects were assessed using a verbal questionnaire about the symptoms of CTS and TF, after which they were classified as either having the disease or not. This was then compared to HbA1C levels using the Chi-squared test and the independent t test. Results: The mean level of HbA1C was higher regarding the patients who suffered the disease compared to those without it. Conclusion: HbA1C was found to have a significant correlation with the development of CTS and TF in diabetic patients. The two diseases were not affected by age.

Introduction

Long standing hyperglycemia in diabetes mellitus affects almost every system in the human body. The glycosylation of proteins, collagen accumulation and microvascular abnormalities overall, result in pathologic alterations in connective tissue and damage to blood vessels and nerves. These metabolic changes are associated with many musculoskeletal disorders and the hands are a liable target for some or all of these complications [6]. Unlike diabetes related conditions of the foot, hand manifestations are generally less serious.

Two common pathologies that are part of the "diabetic hand" are carpal tunnel syndrome [2] and palmar flexor tenosynovitis, also known as trigger finger [3]. A French study showed a higher incidence of carpal tunnel syndrome and trigger finger in diabetics compared to to non-diabetic patients. Of those who had diabetes, clear evidence of carpal tunnel syndrome was shown in 15%-25% and trigger finger was noted in about a 20% [4]. Even though carpal tunnel syndrome remains idiopathic, it has been proven that type 1 and type 2 diabetes are both risk factors for the disease [5]. Carpal tunnel syndrome pathophysiology is linked to diabetes mellitus in two ways, the changes in connective tissue could contribute to a change in carpel tunnel pressure as well as ischemic injury to the median nerve as a result of diabetic microangiopathy [6]. Some studies have compared diabetic and idiopathic Carpal tunnel syndrome histologically, the diabetic group had a higher rate of synovial edema, vascular wall thickening and proliferation [8].

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On the other hand, palmar flexor tenosynovitis a progressive movement restriction of the flexor tendon due to a hypertrophied retinacular sheath most often affecting the first annular pulley (A1) at the metacarpal head [9]. It is an important aspect of the diabetic hand [1] and According to a research carried out in 2013 involving histological analysis of A1 pulley in diabetic and non-diabetic patients, both groups showed fibrocartilage metaplasia. However, granulation tissue in the middle layer of the A1 pulley was more frequent in diabetics. This suggested the possible existence of a mechanism which stimulates hypercellularity and neovascularization of this layer. These findings were also significantly linked to hemoglobin A1C (HbA1C) value of the diabetic group [10].

The aim of our study is to calculate the prevalence of carpal tunnel syndrome and trigger finger in diabetic patients and compare them to the value of glycosylated hemoglobin (HbA1C) in King Abdulaziz University Hospital, Jeddah, Saudi Arabia.

METHOD

One hundred and thirty two diabetic patients were enrolled in this study, of which 91 were female and 41 were male (see table 5), with a mean age of 58.3 ranging from 19 to 90 years old. The inclusion criteria was a diagnosis of diabetes mellitus and a HbA1C level done in King Abdulaziz University Hospital not more than 3 months back. There was no exclusion criteria. Around three quarters (75.8%) of the participants were outpatients who attended the medical clinic, whereas the rest were patients admitted in the hospital (see figure 1). More than half (56.1%) were reported as having Carpal tunnel syndrome (CTS), while 36.4% of the patients had Trigger finger (see table 1).

The patients were asked about the presence of symptoms regarding Carpal tunnel syndrome (CTS) and Trigger finger (TF), after which they were categorized as either having the disease or not based on clinical judgment. This was then compared to the patient's HbA1C reading (see tables 3 & 4).

The data collected was analyzed using SPSS version 20 statistical software. Mean and standard deviations (minimum and maximum) were used to presented parametric data while numbers (percentages) were used to present non-parametric data. Comparison for categories' variables was done using the Chi–squared test and the independent t test was used for continuous data. Statistical significance was considered at the 0.05 level and extreme significance at the 0.0001 level.

DISCUSSION

A significant relationship between high HbA1c and the hand diseases studied was found. The prevalence of CTS and TF was much higher among subjects with a glycosylated hemoglobin level above 7 (see table 4), which is the average cut-off value in diagnosing diabetes mellitus and proceeding with pharmacological intervention as part of treatment, according to a study done in 1996 [14].

Subjects with CTS had a mean HbA1C value of 8.1, while subjects without the disease had a mean HbA1C of 7.1 (see table 2).This can be compared to a study done in Boston, USA which showed a higher prevalence of clinical CTS in diabetic subjects compared to the reference population who were non-diabetic [13].

A similar pattern was shown with patients who had TF, where their mean HbA1C was 8.6 compared to a mean HbA1C of 7.7 for those who did not have the disease (see table 2). A Japanese study done in 2010 revealed an incidence of TF that was about four times higher in diabetics than in the general population. It also showed the involvement of more digits with longer duration of diabetes mellitus [15].

CTS clearly shows a higher prevalence among diabetic patients than TF, regardless of gender and type of DM (see table 4). A study done in 2011 also stated a higher prevalence of CTS specifically among Insulin independent Diabetes Mellitus [11].

There was no association of the pathologies studied in this research with the patients' age (see table 3). This finding contradicts a previous study that has concluded the significant association in the development of Diabetic Hand Syndrome among older diabetic patients [12].

Binary logistic regression analysis indicated that HbA1C level was a significant predictor for having CTS.

In every study, there are limitations that create a chance of error which prevents researchers from getting real exact numbers. One of the factors faced in this study is that there was no examination done for the subjects, patients were evaluated exclusively according to symptoms. Also, a larger sample size could improve the accuracy of the results. In addition, there were no diagnostic investigations done in the study. Some factors were not taken into consideration that might have affected the study, such as: duration and type of DM.

Similar research can be done with a larger the sample size on a larger scale, taking into account other factors that could also influence the study, further investigating different hand syndromes occurring with diabetic patients. Methods of early detection and prevention modalities for these syndromes should also be investigated to improve quality of life. In conclusion, HbA1C was found to have a significant correlation with the development of CTS and TF in diabetic patients. Although CTS had a higher prevalence among the subjects than TF, the two diseases did not show any relationship to age.

Table (1): Medical characteristics:

Variables	Mean ± SD	Rang (min-max)
HbA1C	**8.1±1.7**	**(5-14)**
Variables	**N**	**%**
CTS		
Yes	74	56.1
No	58	43.9
TF		
Yes	48	36.4
No	84	63.6
Patient		
outpatient	100	75.8
inpatient	32	24.2

Data presented as numbers and percentages / or as mean +/- SD. (minimum – maximum)

Table (2): Relation between HbA1C level and CTS & TF:

Variables		HbA1C	P value
CTS	**Yes**	**8.1±1.7**	**0.0001****
	No	**7.1±1.6**	
TF	**Yes**	**8.6±1.9**	**0.006***
	No	**7.7±1.7**	

Data presented as mean +/- SD. (minimum – maximum)
Significance was made using the independent t test.
*Statistical significance at the 0.05 level
** Extreme significance at the 0.0001 level

Table (3): Relation between age and CTS & TF:

Variables		Age	P value
CTS	**Yes**	**58.2±9.9**	**0.9**
	No	**58.3±15.9**	
TF	**Yes**	**57.9±11.3**	**0.8**
	No	**58.5±13.7**	

Data presented as the mean +/- SD. (minimum – maximum).
Significance was made using the independent t test.
*Statistical significance at the 0.05 level

Table (4): Prevalence of CTS & TF compared to HbA1C level:

Variables	HbA1C ≤ 7	HbA1C>7	P value
CTS (N= 74)	**8 (10.8%)**	**66 (89.2%)**	**p<0.0001****
TF (N=48)	**9 (18.8%)**	**39 (81.2%)**	**P=0.04***

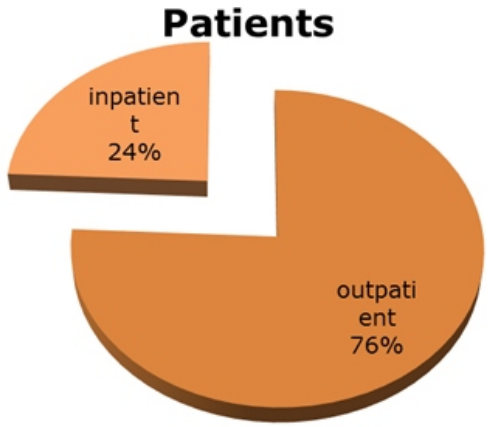
Data presented as numbers & percentages (%)
Significance was determined using the Chi-squared test
*Statistical significance at the 0.05 level
** Extreme significance at the 0.0001 level

Table (5): Demographic and Medical data:

Variables	Mean ± SD	Rang (min-max)
Age	**58.3±12.9**	**(19-90)**
Variables	**N**	**%**
Gender		
Male	41	31.1
Female	91	68.9

Data presented as numbers and percentages / or as mean +/- SD. (minimum – maximum).

Figure (1): Type of patients



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