ORIGINAL ARTICLE

Epidemiology of Dupuytren's and Sociodemographic Factors Related to it Among Chronic Diabetic Patients

ALEENA KALSOOM[1], SADIA IFTIKHAR[2], FAROOQ ISLAM[3], TEHREEM IQBAL[4], NAMRA SARWAR[5], AROOJ MALIK[6], ASIM RAZA[7]

[1]Doctor of Physiotherapy, University of Lahore-Pakistan
[2]Lecturer (MS Neuro in Physiotherapy), University of Chenab-Gujrat-Pakistan
[3]HOD Physiotherapy Department, University of Chenab-Gujrat -Pakistan
[4]Department of Medicine, Liaquat national medical college-Karachi-Pakistan
[5]Doctor of Physiotherapy, University of Lahore-Pakistan
[6]Department of Medicine, MBBS (KEMU), MCPS Family Medicine, CHPE-Baqai Medical University, Karachi.
[7]Lecturer, Biostatistician, University of Chenab-Gujrat-Pakistan
Correspondence to Dr.Namra Sarwar, Email: namrasarwar93@gmail.com Cell: 03317600220

ABSTRACT

Background: Dupuytren's disease(DD) is characterized by progressive idiopathic fibrosis of the hand palm and the formation of nodules & contractures. Its prevalence ranges from 3 to 42% worldwide.
Aim: To assess Dupuytren's disease's prevalence, severity and its association with different demographic factors.
Study design: Analytical, Cross-sectional study done using Non-probability convenient sampling.
Method: This study was conducted on 424 diabetic patients of age between 40 and 80. A questionnaire was used to assess different sociodemographic factors among them. Tubiana classification & tabletop test was used to assess the severity of the disease. Chi-square test was applied to find out the p-value for the association between variables.
Results: About 9% of total participants were affected by DD. Most of the affected people were in the nodular stage or stage 1.There was a significant relationship found between DD and different factors like age group (p=<0.01),Family history of DD(p=<0.01), and previous hand injury (p=<0.01)
Practical implication: This study provides us the baseline risk factors leading to the disease for better future interventions. Treatments gets easier when we reach the cause. Because nowadays the widely available treatment is surgical excision which is not a good option for everyone. Also there is a dearth of research on this emerging hand disability caused by diabetes that's why this research is being conducted
Conclusions: The results showed high prevalence of DD in diabetic patients with old age, positive family history of DD disease and previous hand injury. Therapeutic studies are required for the betterment of society and to prevent the disease from causing disability.
Keywords: Contractures, Dupuytren's disease, Dupuytren's nodules, diabetes, personal factors, Family history.

INTRODUCTION

The prevalence of DD ranges from 3% to 42% worldwide. The distribution of DD has been characterized as being geographically unbalanced. One of the most frequent inherited connective tissue illnesses appears to be particularly prevalent in white people from northern Europe. Its frequency has been estimated to be as high as 30% in the over-60 population of Norway. Furthermore, a prevalence of 13.3% was recorded in an Icelandic study, while a prevalence of 9.4% in men and 2.8% in women has been reported in Norway. In populations of Sweden and Iceland, the familial incidence has been observed to be 44% and 74%, respectively.[1] DD affects roughly 8% of the general population in Western populations, where it is most common[2]. Actual prevalence rates differ greatly depending on age group and area[3].

DD is a typical hand fibroproliferative condition[4]. The little and ring fingers are the ones most usually seen with flexion abnormalities due to this condition, which is characterized by fibrosis of the palmar and digital fascia[5].

An autosomal dominant condition also known as Dupuytren's contracture (DC) is defined by the development of a chronic fibrotic palmar contracture that gradually pulls the digits into the palm. The sheaths, tendons, and bones of the hand are covered by skin, subcutaneous tissue, and palmar aponeurosis. A predisposing factor is drinking alcohol. Instead of steadily deteriorating, DC typically progresses in ratchet-like steps. It initially appears as thickening or pitting of the skin over the palm. Later, it may transform into nodules or cords, which serve as the disease's driving force. These may eventually lead to contractures that cause finger flexion abnormalities. The ring and little fingers are most frequently affected, however, the contracture can extend across the metacarpophalangeal and interphalangeal joints[3].

Although various risk factors have been put forth, including smoking, alcohol consumption, hypertension, physical labor, genetic susceptibility and diabetes Mellitus, the exact etiology and pathophysiology of DD are still under controversy. Additionally, many body anthropometrics, such as body mass index, have been explored related to DD, and results showed a decreased risk for DD with a larger BMI[1].

Positive family history is one of the most important common factors in disease recurrence and a component of DD. Before DNA and genes were identified, it was originally realised that some hereditary propensity. The evidence for many of the previously stated environmental factors is either debatable, but over time, evidence supporting the genetic components of DD has grown significantly. Numerous investigations into the genetic causes of DD have been conducted[1].

We have aimed to update and summarize the recent developments in the literature available for DD. Moreover, potential factors were discussed, emphasizing the necessity for more thorough research has been a severe health burden, therefore, in order to improve the patient's care a solid foundation has been laid by our thorough research by assessing the prevalence, severity and its association with different demographic factors

METHODOLOGY

This analytical, cross sectional study was conducted in Med Care Hospital, Gujranwala, Punjab, Pakistan on diabetic patients. Sample size of 424 cases was calculated with 95% confidence level, by using Epitool.
$n=(Z1-\alpha/2)\ 2\ (P)(1-P)/(d)2$. In the formula, $Z_{1-\alpha/2} = 1.96$ at 95% confidence interval, d=0.05 marginal error and anticipated proportion (p= 0.87) was applied. Sampling Technique used was Non-probability Sampling.
Instrument: Goniometer

Data collection procedure: A cross-sectional study was conducted from august to November 2022 on people with age between 40 to 80 suffering from chronic diabetes. Sample size (n=424) was calculated ,people with chronic liver and kidney issues were excluded from the study .Data was collected from the people who visited the diabetic centers or hospitals of Gujranwala for a routine check-up after verbally asking about their consent.We also received permission from our institution's ethics review board to carry out this study.

Firstly, for examination and assessing the DD table top test was performed to confirm the diagnosis of Dupuytren's syndrome in diabetic patients. If the patient was unable to lay their hand flat on a table top then the test was considered positive [6]

In addition to assessing the hands a self-made questionnaire was used to evaluate different sociodemographic factors. Prior to it, a pilot study on 40 patients was done to assess the reliability of questionnaire. Questionnaire was about personal information of patient such as age,gender,occupation marital status, smoking, any previous hand injury, medication intake and family history of Dupuytren.We asked about the individual's smoking habits if he/she smokes regularly then marked as yes in smoking status on the other hand no if they do not smoke, Occupation included housewives, office workers, Manual labours who spent a large portion of their day working with their hands and others doing some other job or jobless Hand injury was considered if they had undergone surgery or injury of hand in the past. The familial incidence of Dupuytren disease was characterised as having a first-degree relative with the condition, and the regular use of medications was also asked about. The questionnaire was distributed among the diabetic patients to find the frequency of Dupuytren's Syndrome in them.

VAS Pain measuring scale was used to obtain intensity and frequency of pain. We used it to grade the hand pain .Its Cronbach is 0.84. In the last, to determine the severity of the illness, we employed the Tubiana classification this division is divided into six groups.

Tubiana classification of Dupuytren's [7]

All the answers were documented.

Stage	Deformity
0	No lesion
N	Palmar nodule without presence of contracture
1	TFD between 0° and 45°
2	TFD between 45° and 90°
3	TFD between 90° and 135°
4	TFD greater than 135°

Ethical consideration: The rules and regulations set by the ethical committee of the University of Lahore were followed while conducting the research. Written consent was taken from all the participants who were willing. Data was kept confidential. The subjects were informed that there are no disadvantages or risks in the procedure of the study and they are free to withdraw.

Statistical analysis: Data were entered with Statistical Package for Social Sciences (SPSS) version 24, IBM Corp. Released in 2016. For descriptive analysis, frequency and percentages were calculated. For the inferential statistics to find significance chi square test was applied. All results were calculated at 95% confidence interval and p-value ≤ 0.05 was considered as a significant value.

RESULTS

Results showed the prevalence of 8.73% ,38 out of 424 patients had Dupuytren's disease indicating a positive table top test ,while the remaining 387(91.27 %) percent do not have.

This figure shows the staging of Tubiana, Most of the participants 371(87.50) had no lesions, 18(4.25%) were having palmer nodules while 10(2.36) were in stage 1, 18(4.25) were in stage 2, 7(1.65%) were in stage 3 and 2(0.47%) were in stage 4.

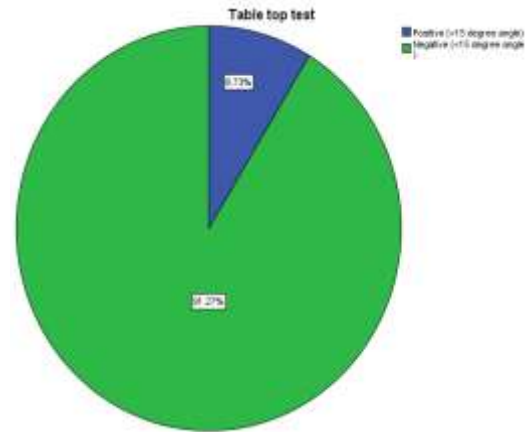Percentage of table top test in participants

Table 1: Severity of pain in relation to Table top test:

Visual analogue scale for hand pain	Table top test		
	Positive (>15 degree angle)	Negative (<15 degree angle)	Total
No pain(0)	19	384	403
Mild pain(1-3)	7	2	9
Moderate pain(4-6)	4	1	5
Severe pain (7-9)	2	0	2
Worst pain (10)	5	0	5
Total	37	387	424

Figure 1: Stages of severity using Tubiana classification:
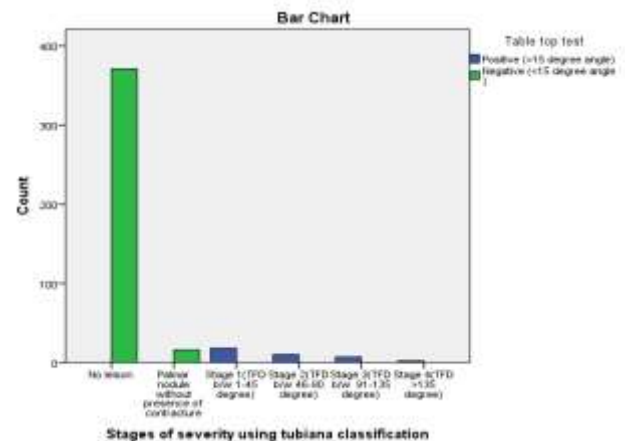
After analysis of the sociodemographic data in relation to Dupuytren's disease we found a significant relation of few factors with Dupuytren's disease which includes age group, Family history of Dupuytren's, marital status and previous hand injury

Most of the participants 13(35%) with age group between 51 and 60 were suffering from Dupuytren's. Numerically according to marital status (62%) of the sufferers were married, 21(56.8) of the participants with family history of Dupuytren's had Dupuytren's disease, 13(35.1) of the participants with previous hand injury had tested positive with table top test. Gender (p=0.17), smoking (p=0.44), taking medication (p=0.24) and occupation (0.29) did not have a significant relation with table top test or having Dupuytren's. There was a significant relationship found between Dupuytren's disease and different sociodemographic factors like age group (p=<0.01), Family history of Dupuytren's (p=<0.01), marital status (p=0.03) and previous hand injury (p=<0.01) (Table 1).

Table 1: Association of Dupuytren's disease with sociodemographic factors

Variables	Responses	Table top test		Total	Chi Square	P- value
		Positive (>15 degree angle)	Negative (<15 degree angle)			
Age Group of Participants in years	40-50	3(8.1)	132(31.80)	135(31.80)	11.03	<0.01*
	51-60	13(35.1)	110(28.4)	123(29)		
	61-70	9(24.3)	57(14.7)	66(15.6)		
	71-80	12(32.4)	88(22.7)	100(23.6)		
Gender	Male	27(73)	239(61.8)	266(62.7)	1.81	0.17
	Female	10(27)	148(38.2)	158(37.3)		
Marital status of participant	Single	5(13.5)	15(3.9)	20(4.7)	13.9	0.03*
	Married	23(62.2)	325(84)	348(82.1)		
	Divorced	7(18.9)	42(10.9)	49(11.6)		
	Widow	2(5.4)	5(1.3)	7(1.7)		
Smoker	Yes	17(45.9)	153(39.5)	170(40.1)	0.57	0.44
	No	20(54.1)	234(60.5)	254(59.9)		
Family history of DUPUYTREN'S	Yes	16(43.2)	9(2.3)	25(5.9)	101	<0.01*
	No	21(56.8)	378(97.7)	399(94)		
Taking any medications	Yes	31(83.8)	291(75.2)	322(75.9)	1.36	0.24
	No	6(16.2)	96(24.8)	102(24.1)		
Previous hand injury	Yes	13(35.1)	4(1)	17(4)	102	<0.01*
	No	24(64.9)	383(99)	407(96)		
Occupation of participant	Housewife	8(21.6)	124(32)	132(31)	3.6	0.29
	Office Worker	11(29.7)	132(34)	143(33.7)		
	Manual Labor	10(27)	79(20.4)	89(21)		

DISCUSSION

In current study we found the prevalence of 8.7%. While another international study reported 17.2% prevalence rate in Africa[8] Geographic differences in prevalence show that Northern European men are more likely to have it[9]. On the other hand, it is uncommon among populations of Asian and Black people. However, a prevalence as high as that of Northern Europe has been observed in several regions of Japan and Taiwan[10,11]. The prevalence of Dupuytren's disease in the study group was 18% when patients were seen by "a physician engaged in diabetes," but it increased to 42% when they were seen by a hand surgeon[12,13].

In Analysis of the sociodemographic data in relation to Dupuytren's disease we found a significant relation of few factors with Dupuytren's disease which includes age group, Family history of Dupuytren's, marital status and previous hand injury.

In our study we found that men were more affected than women. In a study done by Lanting concluded that, Men were more frequently impacted by DD than women; the percentages were 26.4% versus 18.6%, respectively (p=0.007). Other significant risk variables included past hand injuries, excessive alcohol use, the existence of Ledderhose disease, and the prevalence of Dupuytren disease in families[14].

Dupuytren's disease strikes men more frequently and at a younger age than women[15,16]. Postoperative outcomes frequently favour men[17]. Dupuytren's disease affected 9.4% of men and 2.8% of women overall. 43% of women and 59% of men had a bilateral illness. The right hand was afflicted nearly twice as frequently in both sexes if the condition was unilateral[18].

Dupuytren's disease first appears as solid nodules in the palm, which subsequently develop into cords of fibrous collagen that extend into the digits[19]. The cords thicken, develop, and compress as the condition worsens, resulting in irreversible flexion abnormalities of the fingers[4]. In this study we used the Tubiana classification to accurately classify the severity of disease most of the people were in nodular stage or stage 1. A study done by noble explained that when a patient has an established contracture, most writers can agree on the diagnosis, but when a patient just has mild contracture or nodules, the diagnosis is more challenging. Noble developed a four-point pattern a digital contracture, a pretendinous band, a palmar or digital nodule, and palmar or digital skin tethering. To identify Dupuytren's disease in an effort to solve this issue[12,13]. Coulibaly Used the Tubiana classification among different persons of Africa Twelve of the patients had diabetes, 11 smoked, and 22 worked only manual labour. In 14 cases, the disorder was bilateral. The early types are more prevalent, and the lesions are long-lastingly stable [20]

Most of the participants 13(35%) with age group between 51 and 60 were suffering from Dupuytren's. (p=<0.01).While another study concluded that the average age was 57 years (range 21-79). Among the patients, more over half were between the ages of 50 and 69. Two hands 43 people were affected, and the right hand 31 patients were affected, and one patient only had a left hand. [21] According to estimates, the disease is present in 12% of adults 55 yr and older, and 29% of people 75 and older[22].

Age and the trigger finger were substantially linked to Dupuytren's contracture in the multivariate model[23]. Age factor may cause gender tendency to lessen in causing the disease[15].

There was a significant relationship found between Dupuytren's disease and different sociodemographic factors like),Numerically according to our study marital status (62%)of the sufferers were married with p value 0.03 but there is no specific relation was found relevant to this factor in literature this may raise a new question.

Numerous other elements, including heredity, have been linked to the pathogenesis of Dupuytren's disease. Numerous writers have suggested an autosomal dominant pattern of inheritance with variable penetrance. Additionally, the disease is more likely to advance more quickly than usual when a favourable family history is present. [15, 16] In current study, 21(56.8) of the participants with family history of Dupuytren's had Dupuytren's disease (p=<0.01).In another study the prevalence of Dupuytren's disease in families[14]. The occurrence did not correlate with the severity of the diabetes, but it was higher in older patients with a longer history of the disease. With more severe symptoms in males than in women[13].

According to reports, DD patients 65% of the patients had risk factors such diabetes, trauma, epilepsy, alcoholism, and physical labour, and 9% of them had a positive family history. The age of the patients was 67 on average. This analysis reveals a low but significant incidence of DD throughout Asia, which is consistent with the idea that genetic susceptibility is broad. [24] Positive family history is one of the most important common factors in about disease recurrence and a component of the DD. Before DNA and genes were identified, it was originally realised that some hereditary propensity. The evidence for many of the previously stated environmental factors is either scant or debatable, but over time, evidence supporting the genetic components of DD has grown significantly. Numerous investigations into the genetic causes of DD have been conducted[1].

Although the precise causes of DD are still unknown, mounting evidence suggests that it arises from a complex interaction of genetic and environmental factors[19,25]. In the past, suspected risk factors included environmental elements like alcohol, the antiepileptic medication phenytoin, smoking, and hard labour [26]. However, it's still unclear what exactly supports their association. In contrast, research into the genetic causes of DD is

escalating and has been connected to pathogenesis-related molecular mechanisms[25].

A study presented by Lanting he explained previous hand injuries as a significant factor that can lead to DD, also in our study 13(35.1) of the participants with previous hand injury had tested positive with table top test with p value(p=<0.01).

This research was limited to a specific region that's why we cannot generalize the results universally. Because this research was observational in nature, no advice on how to prevent Dupuytren's disease is given. Depending on the severity of the condition as well as the preferences of the patient and the surgeon, many treatments have been suggested for Dupuytren's disease[17]. The major goal of treatment is to enhance hand and digit extension[27].

CONCLUSIONS

The results showed high prevalence of Dupuytren's in diabetic patients with old age, positive family history of Dupuytren's disease and previous hand injury. Therapeutic studies are required for the betterment of society and to prevent the disease from causing disability.

Conflict of interest: There was no conflict of interest.

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