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Research Article

**ANALYSIS OF MORPHOLOGICAL CHARACTERISTICS
BETWEEN DIABETIC AND NON-DIABETIC POPULATION**¹Dr. Qurrat ul Ain Yousafi, ²Dr. Huma Bashir, ³Dr. Arwa Shahid¹Women Medical Officer DHQ Hospital, Attock²Women Medical Officer at THQ Hospital, Choa Saiden Shah³Women Medical Officer at THQ Hospital, Shakargarh**Abstract:**

Introduction: Diabetes is one of the main problems in health systems in the world. The world prevalence of diabetes among adults was 6.4%, and will increase to 7.7% by 2030. Currently the most common cause of neuropathy in western countries is diabetes. Diabetic neuropathy will develop in 50% of type 1 and 2 patients with diabetes. **Aims and objectives:** The basic aim of the study is to find the morphological characteristics between diabetic and non-diabetic local population of Pakistan. **Material and methods:** This study was conducted at DHQ Hospital, Attock during 2018. Patients with ages between 10 to 80 years of either gender who were diagnosed to have DM were recruited in the study through non probability convenience sampling. Control group comprised of age matched healthy volunteers who did not have DM (subjects with fasting blood sugar of less than 110 mg/dL). **Results:** We collected the data from 100 patients. Mean age of diabetic population was 54.13 ± 9.97 years (range: 30-75 years), while mean age of control group was 52.01 ± 12.10 years (range: 32-80 years). Both groups were matched in terms of age ($p=0.10$) and gender ($p=0.19$). Between group differences in mean average cell size, CV of cell size and hexagonality was statistically not significant. **Conclusion:** It is concluded that CED was found to be significantly lower in diabetic population as compared to healthy controls. Moreover, duration of DM was significantly correlated with type of DR, HbA1c level, CED, polymegethism and hexagonality.

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INTRODUCTION:

Diabetes is one of the main problems in health systems in the world. The world prevalence of diabetes among adults was 6.4%, and will increase to 7.7% by 2030. Currently the most common cause of neuropathy in western countries is diabetes. Diabetic neuropathy will develop in 50% of type 1 and 2 patients with diabetes. Diabetic foot problems are the most common cause of hospitalization in patients with diabetes and it accounts for 2 million patients with diabetes in the United States annually and often need long-term hospital admission. Diabetes is a major factor in half of all lower extremity amputations [1].

Diabetes is one of the main problems in health systems in the world. The world prevalence of diabetes among adults was 6.4%, and will increase to 7.7% by 2030. Patients with diabetes are at greater risk of complications, the most important of them are diabetic neuropathy and peripheral vascular disorders that lead to diabetic foot ulcers. Currently the most common cause of neuropathy in western countries is diabetes [2]. The vast majority of diabetic foot complications resulting in amputation begin with the formation of skin ulcers. Early detection and appropriate treatment of these ulcers may prevent up to 85 percent of amputations [3].

Diabetes mellitus, a metabolic disease, has a population prevalence of about 10-15%. The incidence of foot ulcers range from 8 to 17% in the cohort studies, with varying lengths of follow-up, and cause severe disability and possible hospitalization to patients and considerable economic burden to families [4]. A variety of foot lesions are seen in people with uncontrolled diabetes mellitus namely fissures, abscess, cellulites, ulcers, claw toes and Charcot's joints. There is a risk of developing gangrene and of consequent amputation of the foot especially for people from the lower socioeconomic strata and for those living in rural areas [5].

Aims and objectives

The basic aim of the study is to find the morphological characteristics between diabetic and non-diabetic local population of Pakistan.

MATERIAL AND METHODS:

This study was conducted at DHQ Hospital, Attock during 2018. Patients with ages between 10 to 80 years of either gender who were diagnosed to have DM were recruited in the study through non probability convenience sampling.

Data collection

The diagnosis of diabetes mellitus was based on criteria of the American Diabetes Association (ADA) and included all the patients who were already under treatment of physician. Control group comprised of age matched healthy volunteers who did not have DM (subjects with fasting blood sugar of less than 110 mg/dL). For detailed analysis DR group was further divided into patients with no DR, non-proliferative DR (NPDR) and those with proliferative DR (PDR) based on the diagnosis by a consultant ophthalmologist. Subjects with refractive error of $\geq \pm 1.00$ diopters, history of intraocular surgery / trauma /retinal laser, corneal opacity or dystrophy, glaucoma, pseudoexfoliation, uveitis, use of contact lens, use of topical eye drops and diabetes mellitus were excluded. orneal morphological parameters (CED, Average cell size, CV of cell size and hexagonality) was evaluated in each subject with non-contact specular microscope (SP-3000 P, Topcon Corporation, Japan) by a single experienced examiner.

Statistical analysis

The data of respiratory function were compared between the smoker and non-smoker groups using the independent t-test for normally distributed data or the Mann-Whitney U test for other distributions. Differences were considered statistically significant at $p < 0.05$.

RESULTS:

We collected the data from 100 patients. Mean age of diabetic population was 54.13 ± 9.97 years (range: 30-75 years), while mean age of control group was 52.01 ± 12.10 years (range: 32-80 years). Both groups were matched in terms of age ($p=0.10$) and gender ($p=0.19$) (table 01).

Table 01: Demographic and clinical profile of study population.

<i>Parameter</i>	<i>Diabetic (n=149)</i>	<i>Control (n=149)</i>	<i>P-value</i>
Age (years)	54.13 ± 9.97	52.01 ± 12.10	0.10
Gender			
Male	89 (59.73%)	77 (51.67%)	0.19
Female	60 (40.26%)	72 (48.32%)	
Type Of DM			
Type-1	52 (34.89%)	-	-
Type-2	97 (65.10%)		
Duration of DM			
< 10 years	69 (46.30%)	-	-
> 10 years	80 (53.69%)		
Plasma Glucose (F) mg/dl	180.91 ± 75.67	97.88 ± 12.17	< 0.01
HbA1c Level (%)	6.92 ± 1.26	-	-

Between group differences in mean average cell size, CV of cell size and hexagonality was statistically not significant.

Table 02: Corneal morphological parameters in diabetics and normal subjects.

<i>Parameter</i>	<i>Diabetic Group (n=149)</i>		<i>Control Group (n=149)</i>		<i>P-value</i>
	<i>Mean ± SD</i>	<i>95% CI</i>	<i>Mean ± SD</i>	<i>95% CI</i>	
CED (cells/mm ²) mean ± SD	2494.47 ± 394.10	2430.66 - 2558.27	2574.46 ± 279.97	2,529.13 - 2,619.78	0.044
Avg cell size (µm ²) mean ± SD	415.31 ± 95.34	399.87 - 430.74	398.99 ± 50.78	390.76 - 407.21	0.066
CV of size (%) mean ± SD	36.03 ± 4.26	35.34 - 36.71	35.86 ± 4.39	35.14 - 36.57	0.739
Hexagonality (%) mean ± SD	52.42 ± 6.94	51.29 - 53.54	52.83 ± 7.44	51.62 - 54.03	0.620

DISCUSSION:

Diabetes Mellitus (DM) has become a global epidemic with Pakistan being no exception having 7.0 million patients of DM and the number of diabetic patients is expected to rise to an alarming figure of 14.4 million by the year 2040 making Pakistan the 8th highest country in terms of burden of DM [6]. Ocular manifestations of DM are manifolds with diabetic retinopathy (DR) being the major complication of DM with significant ocular morbidity. Apart from DR, several structural and functional changes in cornea have been associated with DM that include decrease in corneal endothelial cell density (CED) and hexagonality, increase in central corneal thickness (CCT), polymegethism, pleomorphism, higher corneal auto fluorescence and lower corneal sensitivity [7].

Several studies had showed variable results while comparing corneal morphological parameters in diabetics with normal subjects. Lower CED and hexagonality with higher coefficient of variation (CV) and average cell size had been reported by various authors. However, there are studies that showed no difference in corneal morphology between diabetics and normal population [8]. Correlation of

these morphological parameters with duration of DM, type and severity of DR and glycemic control had been studied with variable results. Lee et al. reported patients with DM of > 10 year duration had more corneal morphological abnormalities [9]. However, Choo et al. found the duration of DM, HbA1c level and severity of DR were not significantly correlated with corneal endothelial findings. Available data from Pakistan on the subject is limited. Rizvi et al. in their study reported mean CED in Type-2 diabetics being significantly lower than the healthy adults [10].

CONCLUSION:

It is concluded that CED was found to be significantly lower in diabetic population as compared to healthy controls. Moreover, duration of DM was significantly correlated with type of DR, HbA1c level, CED, polymegethism and hexagonality.

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