Prevalence of dry eye syndrome in diabetic patients attending Kenyatta National Hospital, Kenya

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ABSTRACT

Objective: To determine prevalence and ocular findings of dry eye syndrome in adult diabetic patients at Kenyatta National Hospital (KNH) in Kenya.
Methods: A descriptive cross sectional study that was carried out among diabetic patients attending diabetic outpatient clinic and diabetic eye clinic at the KNH during October 2013-May 2014. All diabetic patients aged 18 years and over were requested to participate. Data on demographic profile, symptomatology, duration of diabetes and medication use of participants was documented. They were subsequently examined and underwent non-invasive tests to determine presence of dry eye syndrome (DES). Data collected was analyzed using the Statistical Package for Social Scientists (SPSS) version 21.0. Descriptive statistics such as frequencies, tables, mode, median and mean were used to summarize the data. Relationship between frequency, presence of dry eye syndrome and age, sex, duration of diabetes was assessed.
Results: Prevalence of DES was 49.8% (CI 0.001-0.568), was more common among females (M:F 1:2.2) and increased with age (p=0.001, peak age 56-65 years) and duration of diabetes (p=0.000454, peak duration after 15-19 years). There was significant association between DES and symptomatology (p<0.00001) , but not between DES and ocular signs (p=0.81) nor DES and TBUT (P=0.082) nor DES and Schirmer test (p=0.454).
Conclusion and recommendation: There is high prevalence of DES among diabetics. Greater emphasis should be placed on symptoms when making a diagnosis of DES.

Keywords: Dry Eye Syndrome, Diabetes, Tear break-up time

INTRODUCTION

The term dry-eye syndrome (DES) has been defined as a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear-film instability with potential damage to the ocular surface[1]. Physiologic conditions such as age, female sex[2] and hormones have been identified as contributing factors to DES. According to De Roeth[3], with increasing age there is decrease in aqueous tear secretion and this may cause the irritative symptoms of DES. The incidence of symptoms related to DES was lower among post-menopausal women receiving oral oestrogen therapy in a study on more than 700 women in Germany: the more time that elapsed since entrance to menopause the more some symptoms increased without oestrogen therapy[4].

Diabetes mellitus (DM) is a syndrome of chronic hyperglycaemia due to relative insulin deficiency, resistance or both. DM is usually irreversible and its late complications result in increased morbidity, reduced life expectancy and major health costs. Ocular manifestation of DM can occur as cataract or blurred vision because of reversible osmotic changes due to hyperglycaemia[5]. Neuropathy could result in ocular palsies and also alter corneal innervation and sensation which could result in DES[6]. In a study to determine whether diabetics indeed have problems with dry eye symptoms, 52.8% complained of dry eye symptoms against 9.3% of controls. Fifty seven percent of type 1 diabetics were found to suffer from DES[7]. The Beaver Dam study also found an association between diabetes and DES[8] and that by Alves Mde *et al*[9] provides data that shows diabetic patients have tear secretion deficiency, peripheral neuropathy and hyperglycaemia that lead to corneal epitheliopathy and consequent hyperosmolarity which can be related to DES.

Reduction in quality of life is inevitable when symptoms of dry eye occur[10,11]. These symptoms range from mild transient irritation to persistent dryness, burning, itchiness, redness, pain, ocular fatigue and visual disturbance. In the United States alone, approximately 7–10 million Americans require artificial tear preparations, with consumers spending over US $100 million/year[12].

This study determined the prevalence of DES among adult diabetic patients attending Kenyatta National Hospital and the association between diagnosis and symptomatology.

MATERIALS AND METHODS

This was a cross-sectional study conducted in the medical outpatient clinic and the eye clinic at the Kenyatta National Hospital, Nairobi, from October 2013 to May 2014. All diabetic patients aged 18 years and above presenting to the Kenyatta National Hospital diabetic clinic were eligible for the study and were requested to participate. Some studies found that prevalence of DES increases with age[2,3]. Eighteen years was selected as the lower limit to determine whether the trend is similar in the diabetic population. Informed consent was obtained from all those who agreed to participate.

The patient demographic characteristics (age and gender) were noted, as were the duration of diabetes, presence of other systemic conditions and use of medication. The participants were questioned as to the frequency of DES symptoms (gritty sensation, burning sensation, redness, itchiness, crusting on lashes, lids stuck together in the morning). The questions related to symptoms were based on the six item questionnaire validated by a large population based study in the United States[13]. An ocular examination was then carried out; best corrected visual acuity, slit lamp examination, Schirmer's test and Tear break-up time. A diagnosis of DES was made if the patient reported presence of at least one of the symptoms often or always and had either one or both of the diagnostic tests being positive.

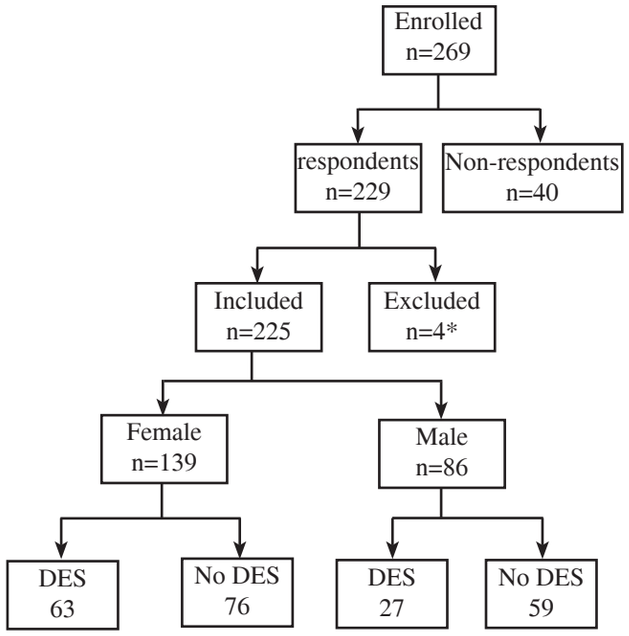
Primary data collection was done on a pre-designed questionnaire that was administered via the open source electronic survey tool LimeSurvey. Data was managed and manipulated via the LimeSurvey interface. Data analysis was done using the Statistical Package for Social Scientists (SPSS) version 21.0. Analysis of frequency and distribution of the six symptoms of DES in the study population was done. The relationship between DES and independent variables (duration of diabetes, age, sex) was also assessed.

Ethical approval was obtained from the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee. All patients found to have DES were commenced on treatment.

RESULTS

The response rate for the study was 83.64%. The study results are based on 225 respondents. Four hundred and forty nine eyes were examined (one patient had a single eye). The diagnosis of DES was made using the initial criteria with the inclusion of those on ocular lubrication: having symptoms but with negative tests. The assumption made was that the diagnostic tests were only negative as a result of the lubrication, therefore they were presumed to have had DES.

Figure 1: Partcipation flow chart



*40 declined to consent, 2-underage, 2-declined to complete

Overall, the majority of respondents were female and the majority of respondents were in the age group 56 to 65 years. Of the respondents who had DES 34.2% were female, (p=0.022, CI 0.01-0.03) while 15.6% were male. Prevalence of DES was determined as 49.8% and was generally found to increase with age (p=0.001).

The most commonly reported symptom was itchiness, reported by 56.4% of respondents and the least reported symptom was lids stuck together in the mornings (24.4%). While the most frequently observed sign was frothy discharge in 67 eyes (7.47%). The diagnostic tests used in this study were Schirmer's and Tear break-up time (TBUT). Schirmer test had a mean result of 17.98 mm (SD 10.43) while that of TBUT was 6.89 seconds (SD 2.88). The majority of respondents who had DES were those who had had diabetes for between 6 months to 5 years. The longer one had diabetes the more likely to have DES (p= 0.000454).

Table 1: Baseline characteristics (n= 225)

Demographic data	Respondents	(%)
Age group (years)		
25 or less	3	1.33
26 - 35	12	5.33
36 - 45	28	12.44
46 - 55	47	20.89
56 - 65	74	32.89
66 or above	61	27.12
Total	225	100
Sex		
Female	139	61.78
Male	86	38.22
Total	225	100

Table 2: Prevalence of DES eye syndrome (n=225)

	Respondents	(%)
With dry eye	112	49.8
Without dry eye	113	50.2
Total	225	100

Table 3: Best corrected visual acuity in 449 eyes

Visual acuity	No. of eyes	(%)
Less than 3/60	24	5.35
3/60 - 6/60	11	2.45
6/36 - 6/18	78	17.37
Greater than 6/18	336	74.83

Figure 2: Prevalence of dry eye syndrome according to sex (n=225)

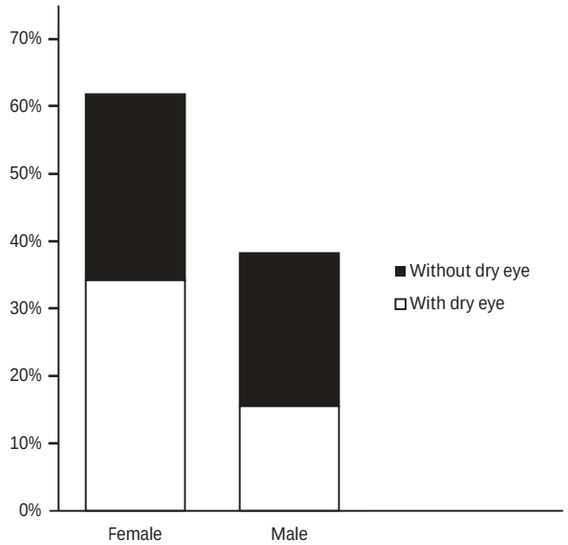


Figure 3: Distribution of dry eye syndrome by age and sex

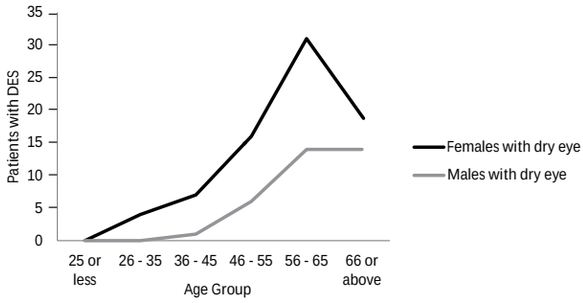


Figure 4: Symptom report (n=225)

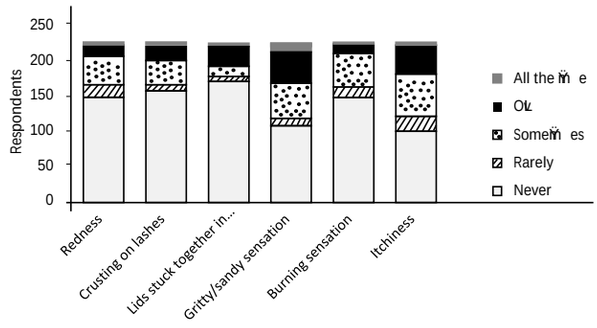


Figure 5: Signs observed (n=225)

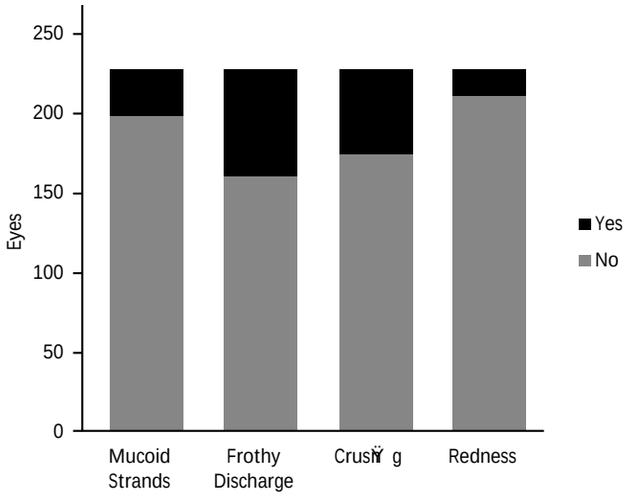


Table 4: Frequency of DES in association with duration of diabetes

Duration of diabetes and dry eye syndrome			
	With dry eye	Without dry eye	(%)
Less than 6 months	5	12	29.41
6 months -5 years	29	36	44.62
6 - 9 years	24	24	50.00
10 - 14 years	24	23	51.06
15 - 19 years	16	6	72.72
20+ years	14	12	53.84
Total	112	113	