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OCULAR FEATURES AND TEAR QUANTITY OF HYPERLIPIDEMIA

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ABSTRACT

Aim: This study aims to determine ocular features and to evaluate the tear quantity of hyperlipidemia. **Material and Methods:** A descriptive cross sectional hospital based study was done in Khartoum State at Alshaeb Hospital[Governmental Teaching Hospital] in the period from August 2017 to February 2018. The data was collected by interview, observation, clinical examination and also from the files of patients. Clinical examinations included Schirmer test paper to evaluate the tear quantity, stop watch was used to adjust time when assessing the tear quantity, outer eye was examined using hand held Heine ophthalmoscope, and the collected data was analyzed using IBM SPSS[version 24]. **Results:** A total of 100 subjects[100 eyes] were investigated; 43% males and 57% females their ages ranged between[23-80] with mean 51.23 and SD ±11.86 years. Ninety four percent of the patients with hyperlipidemia were complaining from different symptoms and signs[mainly, itching 50%, burning 21%, foreign body sensation 20%, blurring of vision 11%, reflex lacrimation 11%, eye irritation 26%, pterygium 21%, redness 22%, stringy mucous 15% and telangiectasis on the conjunctiva 10%]. There was significance association between tear quantity and hyperlipidemic patients with P = 0.000. There was significance negative correlation between the tear quantity and duration of hyperlipidemia with P = 0.001 and r = - 0.335. **Conclusion:** hyperlipidemia leads to dryness and multiple ocular features rather individual's features so that hence proximate observation is necessary for those patients.

KEYWORDS: Hyperlipidemia, Tear Quantity, Ocular Features and Schirmer test paper.

INTRODUCTION

Hyperlipidemia is a medical condition[a health problem of enormous magnitude that affects many patients] characterized by an elevation of any or all lipid profile and/or lipoproteins in the blood. It is also called hypercholesterolemia /hyperlipoproteinemia.[1] According to guidelines of National Cholesterol Education Program USA[NCEP], concentrations of total cholesterol greater than 200 g/ml are referred to as hyperlipidemic. The presence of hyperlipidemia may also be inferred by observing lipid deposition, which can occur in various organ systems, such as the vascular system, musculo-skeletal system, and eyes.[1,2] It has been associated with lipemic aqueous, which appears as if milk has been poured into the anterior chamber, and peripheral lipid deposits in the cornea near the limbus.[3] Hyperlipidemia is common after eating but should diminish within 12 hours. This form of lipemia is considered normal. Mild elevations in cholesterol may occur in animals on high-fat diets. Persistent hyperlipidemia is abnormal and may be primary or secondary.[4]

The anterior surface of the cornea is covered by the tear film[the precorneal tear film] have roles to protect the cornea from drying to maintain the refractive power of the cornea, to defend against eye infection, to allow gas move between the air and a vascular cornea, to support corneal dehydration, and the posterior surface borders the aqueous-filled anterior chamber.[5,6]

The tears are the mixture of secretions from the lacrimal gland, accessory lacrimal glands, goblet cells and meibomian glands. The average pH is 7.25. The rate of secretion is about 1.2µl/minute.[6] The tear film covers the bulbar and palpebral conjunctiva and cornea.[7] The tear film is considered triphasic, even though the tear film is very thin, it has three layers: mucous, aqueous and outer lipid layer to prevent evaporation of the aqueous layer and maintain tear film thickness so that any deficiency results in evaporative dry eye.[8,9,10]

The lipid layer, secreted by Zeiss, Moll and the Meibomian glands, it prevents skin surface fatty acids from entering and disrupting the tear film at the lid margin, decreased quality or quantity of the tear film

surface lipid as seen in meibomian gland dysfunction promotes the signs and symptoms of dry eye condition.[11,12]

Meibomian gland dysfunction is considered one of the most common causes of the evaporative dry eye which leads to ocular features as itching, eye irritation, stringy mucous, blurring of vision, clinically apparent inflammation, and ocular surface disease.[13,14]

MATERIAL AND METHODS

The study is cross-sectional hospital based. It was done at Al-Shaeb hospital in Khartoum city in a period from August 2017 to February 2018. Prior to start, permission was taken from faculty of optometry and visual science Al-Neelain University, Khartoum state ministry of health research department. Written consent was taken from the patient. Patients were informed that the data will be confidential and only be used for research purpose. Inclusion criteria included: adult Sudanese patients with hyperlipidemia. Exclusion criteria, they should be free from glaucoma and corneal surgery.

Study Population: One hundred adult patients of hyperlipidemia were selected to be full fit the criteria of selection. The aim of the study and examinations were explained for each patient. The participation in this study was voluntary. The collected data was analyzed by using IBM statistical package for social sciences SPSS[version 24].

Methods for data collection included interview, observation, records and special clinical examination. Demographic data[name, age, gender, and history of ocular and general health] were taken from individual[or co-patient]. Patient records were used to detecting the date and type of hyperlipidemia. This paper is considered only part of general study[anterior ocular segment manifestation of hyperlipidemia].

Schirmer paper test[OPTITECH] was used for estimating the tear quantity, this paper consist of a short strip of filter paper 5mm wide and 35mm length. The lower lid was pulled down and the paper was placed at the lower fornix while the patient was look upward to avoid touching the cornea then the lid was released. Stop watch was used to adjust time when assessing the tear quantity the watch was set at zero to be stopped after five minutes. The moisture part of the paper was measured and recorded, <10mm considered dryness 10-15mm normal and >15mm watery.

Heine direct ophthalmoscope was used to evaluate anterior and posterior segment to ensure patient free from ocular disease and surgery. The patient was seated comfortably, and asked to keep fixation at a fixation target, holding the ophthalmoscope in the right hand to see right eye and vice versa.

RESULTS

The study included 100 patients of hyperlipidemia, 43% males and 57% females their ages ranged between[23-80] with mean 51.23 and SD = ±11.86 years[see Figure 1]. Forty percent of the patients were primary hyperlipidemia and 60% were secondary hyperlipidemia, ratio 1:1.5[see Figure 2]. The study showed 94% of the patients with hyperlipidemia were complaining of different symptoms and signs, mainly itching 50%, burning 21%, foreign body sensation 20%, blurring of vision 11%, reflex lacrimation 11%, eye irritation 26%, pterygium 21%, redness 22%, stringy mucous 15% and telangiectasis on the conjunctiva 10%, also the study showed most of the patients had combination of features 47% two, 28% three, 4%four, 15%one features[see Figure 3 and Figure 4]. One sample T-test was applied to study the measuring of tear film with hyperlipidemia which showed the tear quantity with mean=6.82mm and SD = ±2.63, P = 0.000 and 95% confidence interval. The study showed significance correlation between tear quantity and types of hyperlipidemia, primary and secondary, with P=0.001 and P=0.002 respectively[see Table 1]. There was no significance difference present between age groups[less than 40 yrs.] and[40-49 yrs.] with P = 0.686 and mean of tear quantity of the two groups was 8.3mm and 8.0mm, while there was significance difference between age group[more than 49 yrs.] and other groups with P = 0.000 and mean of tear quantity was 5.7mm[see Figure 5]. There was significance negative correlation between the tear quantity and duration of hyperlipidemia with P=0.001 and r = - 0.335.

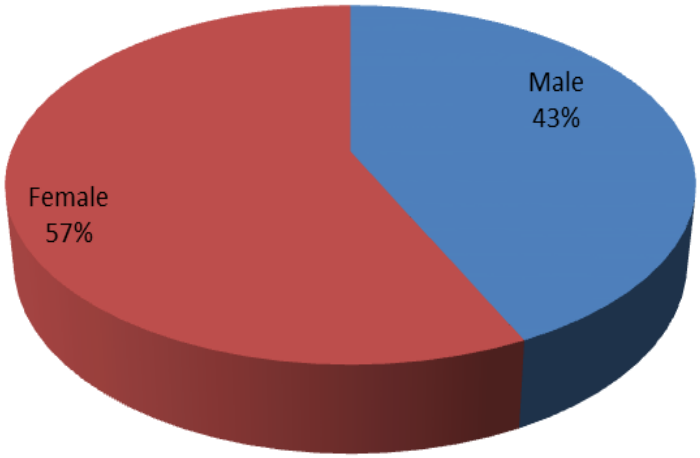

Figure 1: distribution of hyperlipidemia according to gender.

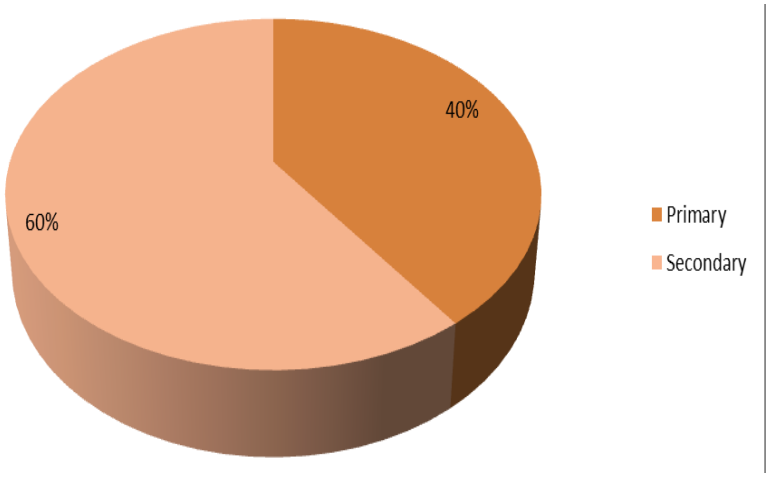

Figure 2: This figure shows the types of hyperlipidemia.

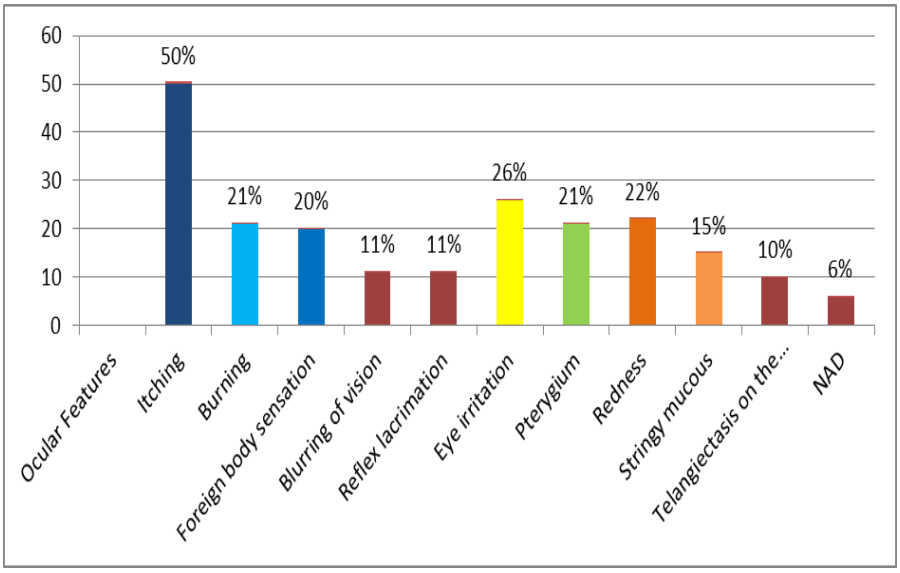

Figure 3: Clinical ocular features (symptoms and signs).

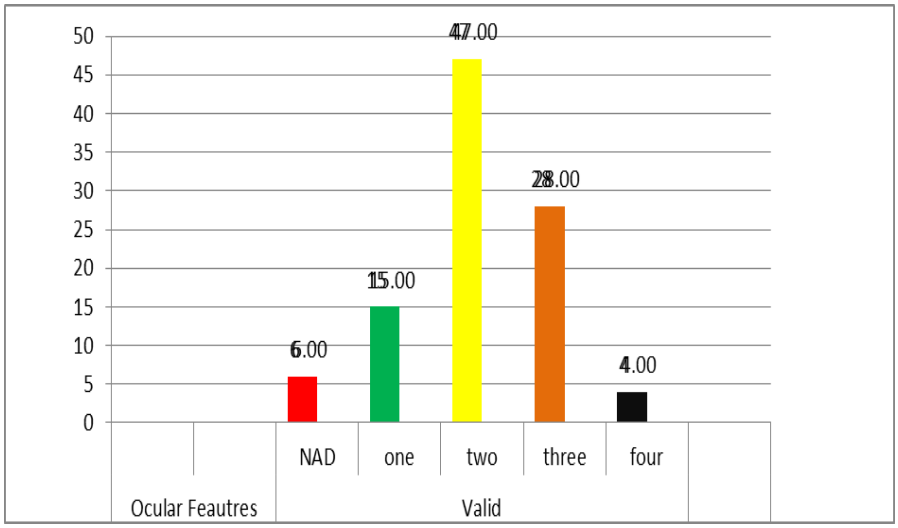

Figure 4: Multiple ocular features.

Table 1: Descriptive Statistic Tear Quantity and Types of Hyperlipidemia (ratio 1:1.5).

Hyperlipidemia	Mean	SD
Tear quantity Primary	7.8750	3.00587
Secondary	6.1267	2.10406

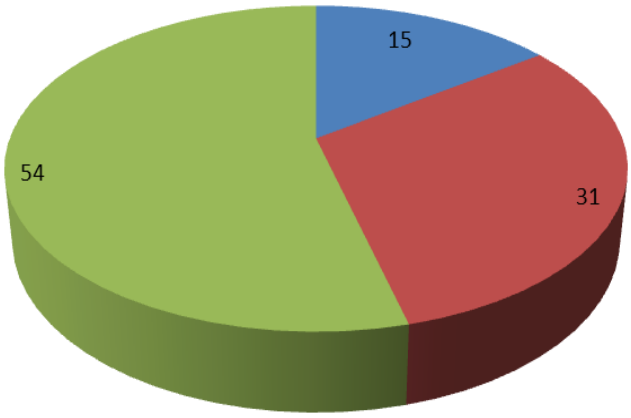

Figure 5: Distribution of hyperlipidemia according to age groups (15% less than 40, 31% 40-49 and 54% more than 49 year).

DISCUSSION

The study was performed to determine the ocular features and to evaluate the tear quantity of hyperlipidemia.

Hyperlipidemia was found in 43% males and 57% females. The prevalence of hyperlipidemic patients were 15% in less than 40, 31% 40-49 and 54% more than 49 years, so that we found more spreading of hyperlipidemia with increasing age, this agrees with Lipmann, 2000 who showed that cholesterol levels rise as the person gets older.

This study showed 40% of the patients were primary hyperlipidemia and 60% were secondary hyperlipidemia. The factors which had contributed to make the patients have secondary hyperlipidemia more than primary, hold include age, obesity, hypertension, diuretic medications and kidney disease, this agrees with Onwe et.al, 2015 who showed the etiology of hyperlipidemia.

The study showed about 94% of hyperlipidemic patients had accompanied various clinical ocular features like itching, foreign body sensation, blurring of vision and redness with decreasing of tear quantity of hyperlipidemia, and this agrees with the ocular features of dry eye.[7,8]

Our findings were 90% of the investigated patients had dryness with mean 6.82mm and *P*=0.000, this agrees with Antonio, 2013 who found association between Meibomian gland dysfunction and hypercholesterolemia which can lead to disturbance of lipid layer of tear film and then evaporative dry eye. However, no previous

study about "measuring tear quantity" of hyperlipidemia to compare it with our study.

CONCLUSION

Hyperlipidemia leads to dryness and ocular features like itching, burning, foreign body sensation, blurring of vision, reflex lacrimation, eye irritation, pterygium, redness, stringy mucous and telangiectasis on the conjunctiva. Secondary hyperlipidemia is more than primary hyperlipidemia, and the tear quantity decreases with increasing the duration of hyperlipidemia. This study was done in one clinic, so that working similar study in other places in order to confirm hyperlipidemia is one of systemic diseases that effect on the tear stability and result dry eye. Study outcome to increase the patient's awareness about the effect of hyperlipidemia on the eye, to review the important ocular features of hyperlipidemia and the current screening guidelines and to increase public awareness about hyperlipidemia, so that hence proximate observation is necessary for those patients.

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