


<p>DRY EYE SYNDROME AT DIABETES TYPE2 PATIENTS, RISK AND PREDISPOSING FACTORS <i>one-year retrospective study January 2014 January 2015 Tirana-Albania</i></p>		<p>Healthcare</p> <p>Keywords: Dry eye, H₁Ab₁C level, corneal sensitivity, blepharitis.</p>
<p>MD. Nora Burda</p>	<p>Ophthalmologist Polyclinic of Specialties Nr.2, Ophthalmology Service Kavaja Street, Tirana – Albania.</p>	
<p>Abstract</p> <p>Diabetes is often associated with several significant ocular conditions, such as retinopathy, refractive changes, cataracts, nerve palsies, glaucoma and macular edema. However, one of the most common ocular complications associated with diabetes is Dry Eye. This article traces the complex relationship between diabetes and dry eye, risk and predisposing factors for development of Dry Eye and give us more opportunities to explore several potential management strategies for controlling both conditions.</p>		

Introduction

Diabetes mellitus is a condition when the pancreas no longer produces enough insulin or cells stop responding to the insulin that is produced, as a result glucose in the blood cannot be absorbed into the cells of the body. Symptoms include frequent urination lethargy, hunger, thirsty sensation, weight loss. [6] The treatment includes changes in diet, oral medications, and when are needed daily injections of insulin [4]. We all are asking: Are we seeing more patients with diabetes today than two decades ago? Yes— no doubt on it. Now it is an epidemic condition. Diabetes is quickly emerging as one of the biggest health-related site-threatening condition, the world has ever witnessed [2]. The World Health Organization (WHO) estimates that there will be 370 million people with diabetes on the planet by 2030. "Dry Eye Syndrome, is one of the most common conditions diagnosed by eye doctors, and people with diabetes have a significantly increased risk for this disorder {5}. Symptoms include a scratchy sensation – like fine grains of sand are in the eyes, burning, itching, blurred vision, photophobia, redness, increased tearing in the eyes.

Dry eye is a condition affecting both eyes. The studies linking dry eye to diabetes are highly conclusive [13]. One study indicated that nearly 53% of people with diabetes suffered from dry eye symptoms. [9] The authors of another study noted that 54.3% of patients with diabetes suffered from ocular surface dryness [5].

Normal tears consist of three layers: outer oil layer that prevents evaporation from the surface of the eye, middle layer made of water- mostly, inner mucus layer that allows the middle watery layer to adhere to the naturally water tissue on the eye's surface. (photo 1) [9]. A quantitative shortage or qualitative abnormality or pathology's in any of these three layers can result in symptoms of dry eye [11], though effective treatment depends by making the correct diagnosis which layer(s) are deficient. Most cases of dry eye disease are thought to be due to an insufficient quantity of the middle, water layer, which is normally secreted by a large tear gland (the lacrimal gland).

Most cases of dry eye associated with diabetes are caused by insufficient production of tears due to 'autonomic neuropathy' affecting the nerves that control the lacrimal gland production is been showed in different research [15]. That is, the same process leading to diabetic peripheral neuropathy can affect the involuntary (autonomic) nerves, including those that normally sense dryness and produce moisture to keep the eyes well lubricated.

When the cornea, the transparent and extremely sensitive, is no longer adequately lubricated, the cells of the cornea become damaged and free nerve endings are exposed – leading to typical symptoms of dry eye, including pain, foreign body sensation and reflex tearing [7].

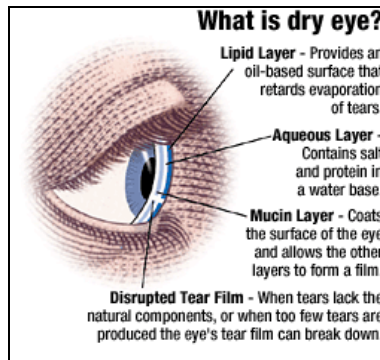


Photo 1

Purpose

Although our knowledge about its pathogenesis, the classification, and characteristics has grown considerably over the decades, there are still debates and discussions on diagnostic approach.

This study traces the complex relationship between diabetes and dry eye, risk and predisposing factors also explores several potential management strategies for controlling both conditions to prevent further complications and to preserve the life quality of those patients.

Methods

82 non selective type 2 Diabetes patients were examined by the ophthalmologist team, aged from 49-82 years old 38 male and 44 female diagnosed with Dry Eye Syndrome of different degrees (photo 7) according to Dry Eye classification. All the patients went under investigations responding to specific form questionnaire about the age, sex, smoking if they were smokers and for how long exposure to flat screen of PC and for how long during the day. H₁Ab₁C levels measured by him / herself or from the Endocrinologist team, duration of primary disease Diabetes. The patients were asked about the presence of any inflammation of Meibomian Glands and if yes did they treated or not.



Photo 2



Photo 3

The females were asked if they had the menopause or not. The fundus ophthalmoscopy showed the stage of Diabetic Retinopathy starting from non – proliferative to proliferative, records also were taken by asking the patients for accompanying diseases like HTA, Glaucoma, Arthritis or other.

The positive likelihood ratio for the OSDI questionnaire (photo 5) was the highest (1.69). Investigations were made testing the peripheral secondary neuropathy of the ocular surface by passing a cotton swab at cornea, the patients were seen for any lachrymal gland inflammation and the insulin deficiency.

Objective examination included: VA, BCVA, biomicroscopy, eyelid inflammation investigation, dyeing the cornea with fluorescent dye to detect any corneal punctate defect or corneal ulcer.

The Schirmer test (photo 2) to measure the production of tear film by lacrimal gland was done for 5 min each patient both eyes and TFBUT analysis. Schirmer test, tear film break-up time (TFBUT) analysis, fluorescent staining (photo 3) are the most well-known objective tests used for diagnosis of Dry Eye (photo 4).

The patients complain like: foreign body sensation, excessive tearing, photophobia, discomfort, gritty eyes itching, burning, red eye (photo 5) and blurring of vision were observed.

Test	Normal Values
TBUT	>10 seconds
Schirmer test with anesthesia	>5 mm in 5 minutes
Phenol red thread test	>10 mm ²
Tear meniscus height	0.1 to 0.6 mm
Tear film osmolarity	<312 mOsm/L; ≤316 mOsm/L ²
Tear film matrix metalloproteinase-9 concentration	<40 ng/mL ³



Photo 4

Photo 5

Results

All patients had the H₁Ab₁C levels ≥6.2-7.2%, the duration of diabetes was higher at age of 63-79 was been seen in 20 patients. The open angle glaucoma association was observed in 18 patients worsening the signs and symptoms of DES as result of side effects of anti-glaucoma topical drops use daily. The menopause in sex females showed aggravation of DES as a result of estrogen levels diminution, the age ≥47 aggravate more the DES is been seen at 43 patients as result of ageing process. The Proliferative Diabetic Retinopathy was associated with severe degree of DES and has been reported at 18 patients, the presence of chronic Blepharitis grade 1-2 was seen at 21 patients worsening the signs of DES as result of evaporative DES and inflammation. Peripheral secondary neuropathy was noticed in 19 patients as result of hyperglycemia with reduction of corneal sensitivity. Smokers was being recorded 30 patients worsening the DES. The insulin deficiency effect the corneal and lacrimal gland metabolism witch disrupts the biomechanical balance of these tissues and results in ocular dryness was seen in 16 patients. Ocular inflammation by release of inflammatory factor such as cytokines as result of insulin deficiency was noticed at 28 patients. Corneal ulcers as result of diabetic neuropathy and hyperglycemia was seen in 13 patients worsening the DES the exposure for a long period daily at PC workers was seen at 21 patens worsening the DES.

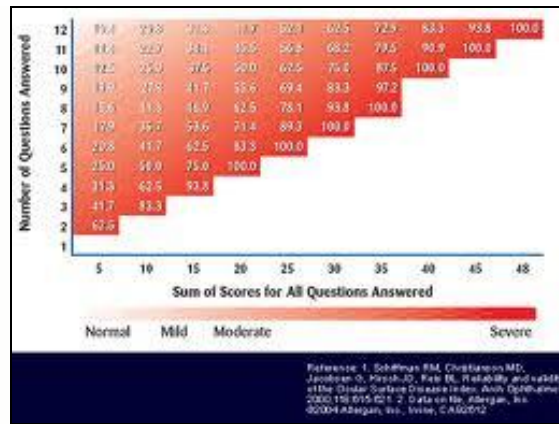


Photo 6

Conclusion

In this study we receive information and the link between DES and DM type 2 and the predisposing & risk factors that trigger the DES, by knowing all this conditions we can develop several strategies to manage both conditions. In Diabetes Mellitus corneal and conjunctival epithelial alterations, persistent epithelial defects, and potential visual impairment due to corneal scarring have been observed.

Damage to the microvasculature of the lacrimal glands accompanied with autonomic neuropathy could diminish the lacrimation production in long standing diabetes. To achieve a pleased patient outcome, both conditions must be managed concurrently with a combination of therapeutic intervention, nutritional supplementation and lifestyle alteration. All above must be achieved by heaving firm collaboration with endocrinologist team and also the patient compliance as well.



Photo 7

Discussions

Referring to the studies at Diabetes patients [2] aldose reductase, the first enzyme of the sorbitol pathway, is thought to be involved on development of Dye Eye [14]. The oral administration of aldose reductase inhibitors has been shown to improve the tear dynamics significantly. In one study a correlation was found between the glycated hemoglobin (HbA1C) and the presence of dry eye syndrome [5].

The higher the HbA1c values, the higher the rate of dry eye syndrome. In another study founded that diabetic patients had lower values of tear secretion and values of tear break up time test (TBUT) than control group. Jin et al showed that patients with type 2 diabetes tend to develop tear film dysfunction. This study suggests that TBUT should be a routine ophthalmologic test in diabetic patients. Dry eye disease can lead to vision deficit, scarring, secondary bacterial infections, corneal ulceration, anterior uveitis, perforation of the cornea [10]. If this syndrome is diagnosed at first stage and treated, would be easy to prevent the complications. Early diagnosis of dry eye syndrome in diabetic patients is important for beginning of treatment in very early stages if is possible [8]. Nevertheless, studies to evaluate the prevalence of dry eye syndrome in type 2 diabetic patients are lacking. In our study we evaluated prevalence of dry eye syndrome in type 2 diabetic patients.

References

1. Ghasemi H, Gharebaghi R, Heidary F. Diabetes as a possible predisposer for blepharitis. *Can J Ophthalmol.* 2008 Aug;43(4):485.
2. World Health Organization. Diabetes. Available at: www.researchandmarkets.com/reportinfo.asp?report_id=228279 (Accessed August 30, 2010).
3. First Look. American Optometric Association. Electronic newsletter. October 29, 2009.
4. Buse JB, Caprio S, Cefalu WT, et al. How do we define cure of diabetes? *Diabetes Care.* 2009 Nov; 32(11):2133-5.
5. Manaviat MR, Rashidi M, Afkhami-Ardekani M, Shoja MR. Prevalence of dry eye syndrome and diabetic retinopathy in type 2 diabetic patients. *BMC Ophthalmol.* 2008 Jun 2; 8:10.
6. Knowler WC, Fowler SE, Hamman RF, et al. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet.* 2009 Nov 14; 374(9702):1677-86.
7. Seifart U, Stempel I. The dry eye and diabetes mellitus. *Ophthalmologie.* 1994 Apr;91(2):235-9.
8. Cousen P, Cackett P, Bennett H, et al. Tear production and corneal sensitivity in diabetes. *J Diabetes Complications.* 2007 Nov-Dec; 21(6):371-3.
9. Alves Mde C, Carnevalheira JB, Módulo CM, Rocha EM. Tear film and ocular surface changes in diabetes mellitus. *Arq Bras Oftalmol.* 2008 Nov-Dec;71(6 Suppl):96-103.
10. Hom M, De Land P. Self-reported dry eyes and diabetic history. *Optometry.* 2006 Nov;77(11):554-8.
11. The definition and classification of dry eye disease: report of the Definition and Classification Subcommittee of the International Dry Eye WorkShop (2007). *Ocul Surf.* 2007 Apr; 5(2):75-92.
12. Schönlau F, Rohdewald P. Pycnogenol for diabetic retinopathy: a review. *Int Ophthalmol.* 2001;24(3):161-71.
13. Research in dry eye: report of the Research Subcommittee of the International Dry Eye WorkShop. *Ocul Surf.* 2007; 5: 179–193. [[PubMed](#)]
14. Massingale ML, Li X, Vallabhajosyula M, Chen D, Wei Y, Asbell PA. Analysis of inflammatory cytokines in the tears of dry eye patients. *Cornea.* 2009. ; 28: 1023–1027. [[PubMed](#)]