ORIGINAL ARTICLE

DRY EYE PROFILE IN DIABETES MELLITUS PATIENTS

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ABSTRACT

Aim: *To evaluate dry eye syndrome patients based on meibomian gland evaluation, tear break up time test, Schirmer test, and ocular surface disease index form the diabetic mellitus patients.*
Materials And Methods: A Cross Sectional Study used to determine the profil of dry eye Syndrome on 15 diabetic mellitus patients in Eye center Hasanuddin University from December 2019 until February 2020

Results: *15 participants have included in this study. From the meibomian gland evaluation, there are 10 participants with mild dry eye. From the tear break up time test, there are 10 participants with dry eye. From the Schirmer test, there are 8 participants having dry eye on Schirmer 1 test and 8 participants with dry eye on Schirmer 2 test. And, from the ocular surface disease index, 11 participants with severe dry eye disease were identified.*

Conclusion: *Patients with diabetes mellitus have a high potential for dry eye. Dry eye screening examinations such as tear break up time and Ocular Surface Disease Index (OSDI) are recommended to use in patients with diabetic retinopathy.*

Keyword: *Dry eye, Diabetic, Schirmer, Tear Break Up Time, Ocular Surface Disease Index*

INTRODUCTION

Diabetes mellitus (DM) has been identified as one of the highest systemic disease risk factors that cause dry eye. In the reported cases, the prevalence of dry eye in diabetics is 15-33% in patients over the age of 65 years and will increase with age. The prevalence of dry eye in people with diabetes mellitus is 50% more common in women than men. DM patients with good therapy control can reduce the prevalence of dry eye. The dry eye examination can be considered as a routine examination in assessing dry eye disease (DED).[1,2]

Dry eye is a multifactorial disease on the ocular surface that is characterized by the loss of tear film homeostasis and accompanied by ocular symptoms, the etiology of which is the tear film disruption and hyperosmolarity, inflammation and damage to the ocular surface, and the presence of neurosensory abnormalities. DED is one of the most commonly diagnosed eye diseases in primary eye health care communities worldwide and has various symptoms that can affect daily activities and quality of life.[3,4]

Research conducted by A.J. Lee, et al. to determine the prevalence and identify the risk factors of dry eye in a population in Sumatra, Indonesia, in 2002 concluded that the prevalence of DED in a community-based study was 17.5%, lower than that observed in a hospital-based study. The authors also concluded that diabetic patients with poor therapy control were more likely to come to the eye care center with complaints of DED.[5]

In dry eye cases, the meibomian glands or tarsal glands are both sebaceous glands on the eyelids that produce lipids as a superficial tear film to protect against the evaporation of aqueous humour.[3]

Based on the theory above, the authors conducted a study on eye patients at the vitreoretinal polyclinic who were also diagnosed with diabetes mellitus, with the aim to assess the dry eye profile as an independent variable through evaluation of the meibomian gland examination, tear break-up time (TBUT), Schirmer examination, and the assessment of the ocular surface disease index (OSDI) questionnaire, both male and female gender as the dependent variable.

METHODS

The research design was carried out using the Cross-sectional method. The study was conducted in the Eye Polyclinic of Hasanuddin University Hospital Building A. The study began on December 26, 2019 to January 31, 2020. The research sample was set at 15 people with diabetes mellitus who were treated at the Eye Polyclinic in the Vitreoretinal subdivision. Inclusion criteria: All patients with type 2 diabetes mellitus that seek treatment at the eye clinic who are willing to be the study sample. Exclusion Criteria: All patients with diabetes mellitus who seek treatment at the eye clinic who are not willing to be the study sample.

The tools that were utilized are slit lamps, writing instruments (pen, paper), action approval sheets, and data collection forms, whereas the materials used are fluorescent strips, artificial tears with Lyteers brand, topical analgesic eye drops with Pantocain 1% brand.

The operational definition of the meibomian glands evaluation was assessed using a scoring (Meiboscore), namely a score of 0 means no loss of meibomian glands, a score of 1 means loss of area less than one-third of the total meibomian gland area, a score of 2 means loss of one-third to two-thirds of meibomian glands, and a score of 3 means loss of area more than two-thirds of the meibomian glands.[3]

Tear Break-Up Time (TBUT) is a clinical test used to assess evaporation from dry eye disease. To measure TBUT, fluorescence is dropped on the patient's eye, then the patient is asked not to blink, along with an evaluation of the corneal surface using cobalt blue light

illumination. TBUT is recorded as the number of seconds that elapsed between the last blink of the eye and the appearance of the first dry spot on the tear film surface. TBUT under 10 seconds is considered as abnormal.[6]

The diagnosis of dry eye is mainly based on examination of the clinical appearance and several diagnostic tests. Currently, the Schirmer test is starting to be known to assess the number of tears. The Schirmer test examination is divided into 2, without anesthesia (Schirmer 1) and with anesthesia (Schirmer 2), where the research that has been carried out showed that the Schirmer 2 test has higher diagnostic value more than the Schirmer 1 test.[7]

The Ocular Surface Disease Index (OSDI) developed by the Outcome Research Group at Allergan Inc (Irvine, Calif) is a 12-item questionnaire designed to provide a rapid assessment of eye irritation symptoms that are consistent with dry eye disease and its effect on visual function. This OSDI was compiled based on patient comments from several years of research studies, quality of life, and suggestions from researchers.[8]

The research procedure for data collection was carried out through direct dry eye examination in Diabetes Mellitus patients by assessing the evaluation of the meibomian glands through the evaluation of the anterior segment inspection, especially the evaluation of the meibomian glands, with a slit lamp. Then the tear break-up time examination are done by calculating the evaporation time of the tears that had been dripped with fluorescent dye through slit lamp monitoring. Furthermore, the examination with Schirmer paper is inserted in the conjunctiva of the inferior fornices 1/3 lateral of the lower eyelid to assess tear production. Finally, anamnesis is done based on questions from the OSDI questionnaire scoring sheet.

RESULTS

The study was conducted on patients that are diagnosed with diabetes mellitus. From the results of the examination obtained from 15 patients, with the gender details of 10 female and 5 male patients, that are described in the following tables and graphs.

Table 1. Patient examination data based on meibomian gland evaluation grading and OSDI form

No.	Age (y/o)	Gender	Meibomian Gland Examination		OSDI Form
			Oculus Dextra	Oculus Sinistra	
1	64	Female	Score 0	Score 0	54 (Severe)
2	57	Female	Score 0	Score 0	25 (Moderate)
3	69	Male	Score 1	Score 1	25 (Moderate)
4	60	Female	Score 0	Score 0	43 (Severe)
5	58	Male	Score 1	Score 1	47 (Severe)
6	47	Female	Score 1	Score 1	75 (Severe)
7	49	Female	Score 1	Score 1	47 (Severe)
8	42	Female	Score 0	Score 0	47 (Severe)
9	46	Male	Score 1	Score 1	31 (Moderate)
10	59	Female	Score 0	Score 0	27 (Moderate)
11	40	Female	Score 1	Score 1	41 (Severe)
12	49	Male	Score 1	Score 1	41 (Severe)
13	55	Female	Score 1	Score 1	39 (Severe)
14	44	Female	Score 1	Score 1	50 (Severe)
15	44	Male	Score 1	Score 1	54 (Severe)

The data in table 1 regarding the evaluation of meibomian gland examination, 10 patients were discovered with a score of 1 which means they suffer from mild dry eye. Meanwhile, from the evaluation results using the ocular surface disease index form, 11 patients were found suffering from severe dry eye, and the remaining 4 patients suffered from moderate dry eye. From the table of evaluation results, the data is described in a chart as follows.

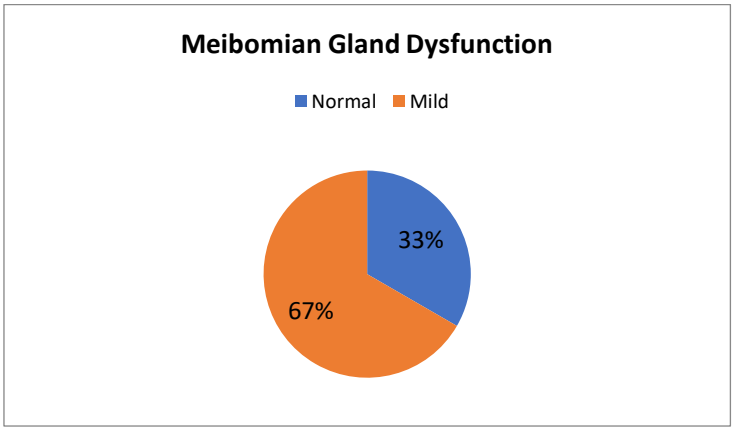


Diagram 1. Meibomian gland evaluation grading which shows greater value of dry eye at a mild degree

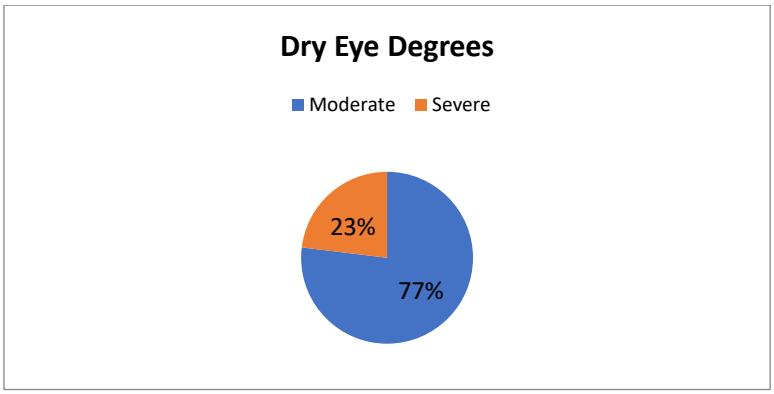


Diagram 2. Examination using the OSDI form showed a greater degree of moderate dry eye

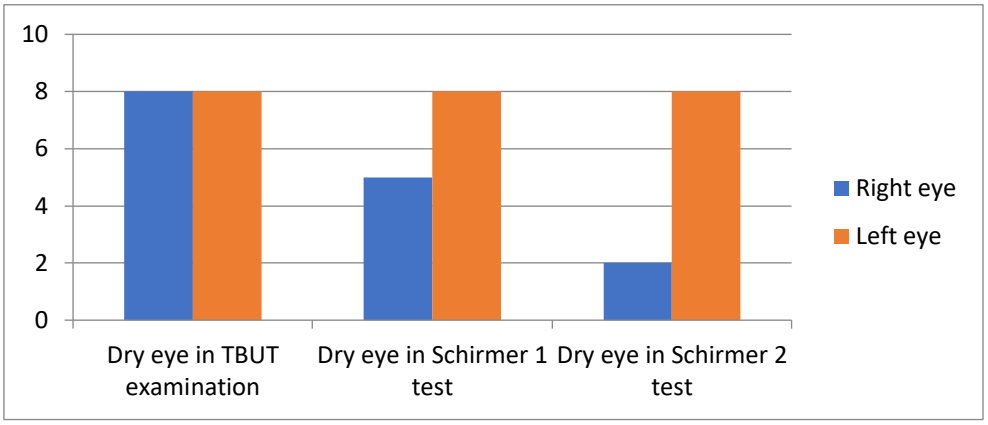
Using a pie chart, it is clearer that the results of dry eye examination based on the evaluation of the meibomian glands indicate a high number of patients with mild dry eye degrees. This is different from the evaluation result using the OSDI form which shows a high number of severe dry eye degrees.

Then from the evaluation based on TBUT examination found 6 patients experienced accelerated evaporation on the corneal surface (<10 seconds) in both eyes and 2 patients in one eye. While the results of the Schirmer 1 test (without topical analgesics), were patients with tear production of less than 10 mm in the indicator that happens to both eyes in 5 patients and in one eye for 3 patients. The examination of the Schirmer 2 test (using topical analgesics) found that 2 patients suffered from dry eye in both eyes and it increased to 6 patients that suffered from dry eye in one eye. (Table 2).

Table 2. Patient examination data result from the TBUT examination and Schirmer test

No.	Age (y/o)	Gender	TBUT		Schirmer 1		Schirmer 2	
			Oculus Dextra (s)	Oculus Sinistra (s)	Oculus Dextra (mm)	Oculus Sinistra (mm)	Oculus Dextra (mm)	Oculus Sinistra (mm)
1	64	Female	10’27”	12’57”	12	5	14	8
2	57	Female	15’99”	15’73”	19	19	23	23
3	69	Male	8’49”	8’74”	3	15	14	14
4	60	Female	11’57”	10’22”	15	12	25	20
5	58	Male	10’39”	9’08”	6	7	10	8
6	47	Female	10’15”	10’59”	3	3	8	5
7	49	Female	6’02”	12’39”	20	18	15	25
8	42	Female	7’26”	8’55”	25	28	24	23
9	46	Male	9’94”	8’67”	19	8	10	8
10	59	Female	7’91”	10’37”	35	6	10	5
11	40	Female	11’11”	13’98”	10	5	15	7
12	49	Male	8’85”	7’97”	15	14	15	14
13	55	Female	10’80”	8’97”	12	13	13	10
14	44	Female	6’03”	6’93”	8	5	10	7
15	44	Male	8’05”	5’03”	7	7	8	8

The data in table 2 is also included in the graph. A clearer picture of the number shows that from the results of the examination evaluation, most of the patients suffer from dry eye.



Graph 1. TBUT examination and Schirmer test which showed a high incidence of dry eye in patients

DISCUSSION

In 15 research samples (10 female and 5 male), showed that the incidence of dry eye at the Eye Polyclinic of the Unhas Hospital was mostly experienced by female patients. This is not much different from the results of previous studies which stated that females were more likely to experience diabetes.[1]

The time range for being diagnosed with diabetes that is known by the patients, ranging from 7 months to more than 20 years. From the patient's medical history, there was 1 patient who was not using therapy, 8 patients were using oral therapy, 4 patients were taking insulin, and 2 patients were currently using a combination of oral and insulin therapy.

In the meibomian glands evaluation in 15 patients, most of the samples suffered from mild dry eye. Blockage of the meibomian gland is the most influential thing in the incidence of meibomian gland dysfunction. Several risk factors for MGD include age, diet, diabetes mellitus, and use of contact lenses. MGD causes changes in the quality and quantity of meibomian which can lead to dry eyes. The effects of evaporation and disturbance of the ocular surface also cause dry eye symptoms in some individuals.[9]

From the evaluation of TBUT examination and Schirmer test, most of the samples showed positive results for suffering from dry eye. The quantitative examinations to assess the tear film on the corneal surface are the TBUT examination and Schirmer test, because both are simple diagnostic tests that is the easiest to perform in a polyclinic examination.[10]

Kesarwani, Divya. et al, in a study that has been carried out, stated that tear film abnormalities are a significant feature of the tear surface layer disorder in diabetics. This

abnormality is probably caused by the poor quality and function of the tear film. Researchers also suggest that all diabetic patients should undergo routine evaluation of tear function.[11]

In the last examination using the ocular surface disease index form, it was found that 11 patients had severe dry eye, and the remaining 4 patients had moderate dry eye. OSDI is a valid indicator tool that can be used to measure the dry eye scale, that is described in the form of a list of questions that is used as an evaluation in clinical trials.[8]

A similar study was conducted by Hina Nadeem, et al. The authors used the OSDI form in their study to determine the grading of dry eye in patients with diabetes mellitus. The results showed that there was a significant relationship between elderly patients that are diagnosed with diabetic retinopathy and dry eye complaints. Diabetic patients who complain of dry eye, have to be referred to an ophthalmologist for a funduscopy examination, for evaluation of diabetic retinopathy.[12]

Of the 4 examinations carried out in this study, there were 2 examinations that did not use intervention on the eyeball surface, namely the assessment of the meibomian gland evaluation and the OSDI questionnaire which was also able to help diagnose dry eye.

However, the tests that are more effective in assessing dry eye syndrome are the tear break-up time test and Schirmer test. Both of these tests require a fluorescent stain material/sheet and a Schirmer examination sheet for the tear production evaluation.

CONCLUSION

Patients with diabetes mellitus at the eye polyclinic of UNHAS Hospital have a high potential to experience dry eye. It is necessary to hold regular check-ups for early detection of dry eye in all patients that are receiving medication so that treatment can be given as soon as possible to avoid further complications. Dry eye screening examinations such as tear break-up time and OSDI are very good and are recommended to be carried out routinely on control patients that are diagnosed with retinopathy diabetic at the Eye Polyclinic of UNHAS Hospital to anticipate the early stage of dry eye. It is important to educate about the disease complication, medication adherence, and therapy control for patients with diabetes mellitus.

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