

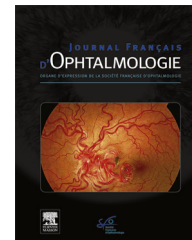


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ORIGINAL ARTICLE

The effects of blood glucose regulation on tear function tests in diabetic patients



Les effets de la régulation de la glycémie sur les tests de fonction lacrymale chez les patients diabétiques

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KEYWORDS

Diabetes mellitus;
Dry eye;
OSDI;
Schirmer;
Tear break-up time;
Tear film osmolarity

Summary

Purpose. – To investigate whether blood glucose regulation in patients with diabetes mellitus (DM) has an influence on the ocular surface disease index (OSDI) score and tear function tests such as tear film osmolarity (TFO), tear break-up time (TBUT) and Schirmer tests.

Methods. – Fifty diabetic patients with a fasting blood glucose (FBG) level greater than 200 mg/dL and HbA1c level greater than 10% were recruited for this prospective study. All of the patients underwent a detailed ophthalmic examination including OSDI questionnaire, TFO test, TBUT test and Schirmer test initially. All tests were repeated after obtaining regulation of patients' blood sugar (approximately 6 weeks later).

Results. – The mean age of the diabetic patients in the study was 54.96 ± 12.48 years. Initially, the mean FBG, postprandial blood glucose (PBG) and HbA1c levels were 301.40 ± 79.11 mg/dL, 431.06 ± 74.47 mg/dL and $12.31 \pm 1.67\%$, respectively. After blood glucose regulation; the levels of all parameters (153.78 ± 59.32 mg/dL, 252.32 ± 88.34 mg/dL and $9.67 \pm 1.60\%$, respectively) statistically significantly decreased ($P < 0.001$). The mean levels of OSDI score, TFO measurement, TBUT test and Schirmer test were 28.38 ± 16.46 points, 349.66 ± 13.09 mOsm/L, 6.44 ± 1.91 s and 8.66 ± 3.57 mm initially, and 17.82 ± 11.70 points, 314.14 ± 12.80 mOsm/L,

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6.62 ± 2.03 s and 9.02 ± 3.68 mm after blood glucose regulation, respectively. Although the improvements in TBUT and Schirmer test values were not statistically significant ($P > 0.05$), statistically significant reduction was obtained in OSDI scores and TFO levels ($P < 0.001$, for each).

Conclusion. – DM, which is a hyperosmolar disorder, appears to cause elevation in OSDI score and increase in TFO level, especially if blood glucose is poorly regulated.

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MOTS CLÉS

Diabète sucré ;
Œil sec ;
OSDI ;
Schirmer ;
Temps de rupture
déchirure ;
Osmolarité du film
lacrymal

Résumé

Objectif. – Déterminer si la régulation de la glycémie chez les patients atteints de diabète a une influence sur le score de symptômes de maladie de surface oculaire (OSDI) et sur les tests de la fonction lacrymale tels que l'osmolalité du film lacrymal, et les tests de Schirmer.

Méthodes. – Cinquante patients diabétiques ayant un taux de glycémie à jeun (FBG) supérieur à 200 mg/dL et un taux d'HbA1c supérieur à 10 % ont été recrutés pour cette étude prospective. Tous les patients ont subi un examen ophtalmique détaillé comprenant le questionnaire OSDI, le test TFO, le test TBUT et le test de Schirmer initialement. Tous les tests ont été répétés après avoir obtenu la régulation de la glycémie des patients (environ 6 semaines plus tard).

Résultats. – L'âge moyen des diabétiques dans l'étude était de 54,96 ± 12,48 ans. Les concentrations moyennes de FBG, de glucose sanguin postprandial (PBG) et d'HbA1c étaient respectivement de 301,40 ± 79,11 mg/dL, de 431,06 ± 74,47 mg/dL et de 12,31 ± 1,67 %, respectivement. Après la régulation de la glycémie, les niveaux de tous les paramètres (153,78 ± 59,32 mg/dL, 252,32 ± 88,34 mg/dL et 9,67 ± 1,60 %, respectivement) ont diminué statistiquement significativement ($p < 0,001$). Les valeurs moyennes des scores OSDI, TFO, TBUT et Schirmer ont été de 28,38 ± 16,46 points, 349,66 ± 13,09 mOsm/L, 6,44 ± 1,91 s et 8,66 ± 3,57 mm initialement, et 17,82 ± 11,70 points, 314,14 ± 12,80 mOsm/L, 6,62 ± 2,03 s et 9,02 ± 3,68 mm après la régulation de la glycémie, respectivement. Bien que les améliorations des valeurs des tests de TBUT et de Schirmer n'aient pas été statistiquement significatives ($p > 0,05$), une réduction statistiquement significative a été obtenue dans les scores OSDI et TFO ($p < 0,001$ pour chacun).

Conclusion. – Le DM, qui est un trouble hyperosmolaire, semble provoquer une élévation du score OSDI et une augmentation du taux de TFO, en particulier la glycémie est mal réglementée.

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Introduction

Dry eye syndrome (DES) is a condition most often encountered in daily practice for the ophthalmologists. DES was defined by International Dry Eye WorkShop (DEWS-2007) as a multifactorial disease which results in discomfort, visual disruption and tear film instability with possible harm to the ocular surface. DES is associated with the tear film hyperosmolarity and ocular surface inflammation [1].

Epidemiology Subcommittee of DEWS-2007 notified the prevalence of DES is varied from 5.5 to 33.7% [2]. As a result of increase rate in the elderly population, it is expected to increase in the future. Diabetic patients commonly have DES and diabetes mellitus (DM) is one of the most frequent causes of DES [3–6]. The main mechanisms of dry eye are induced by tear hyperosmolarity and tear film instability [1]. Lacrimal gland and ocular surface neuropathy, reduction in insulin hormone expression of lacrimal gland, vascular impairment, and systemic hyperosmotic disruption are the

potential mechanisms of DES in patients with DM [7–10]. Although clinical studies reported that the poorly-controlled DM corresponded to increased frequency and severity of DES in the long term [10,11], whether there is a role of blood sugar regulation on condition of DES has not been fully evaluated, yet.

In this study, we aimed to investigate whether the regulation of blood glucose in diabetic patients has an effect on ocular surface disease index (OSDI) score and tear function tests such as tear film osmolarity (TFO), tear break-up time (TBUT) test and Schirmer tests.

Material and methods

Approval of the study was obtained from the Local Ethic Committee of our hospital and all patients signed written informed consent before the enrolment. The study was carried out in accordance with the Declaration of Helsinki.

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