

# Hypertension and Dry Eye

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## ABSTRACT

*Objective* To evaluate whether systemic hypertension leads to a decrease in tear film level.

*Study design* Observational study.

*Place & Duration of study* Khalid Eye Clinic Nazimabad Karachi, from January 2019 to December 2019.

*Methodology* This study recruited a total of hundred patients with fifty known patients of systemic hypertension between the ages of 25 year to 40 year and fifty normotensive patients of the same age group. Patients with history of co existing diabetes, thyroid malfunction, previous history of chronic ocular allergy, glaucoma, and ocular surface disorders were excluded from the study. Tear film level was assessed by observing the level of tear meniscus height on slit lamp examination and by performing Schirmer test on each patient. Every patient was informed about the study dynamics and consent was taken. Study was approved by the institutional ethical review board.

*Results* Mean tear film level of Schirmer test in Group A patients (Hypertensive group) was  $9.0 \pm 0.58$  mm, whereas  $12.0 \pm 0.60$  mm in Group B (normotensive group). This was found statistically significant with  $p=0.000$ .

*Conclusion* Tear film level in hypertensive patients was slightly diminished as compared to the patients without systemic hypertension.

*Key words* Hypertension, Dry eye, Schirmer test.

## INTRODUCTION:

A uniform and consistent tear film layer is imperative for the healthy maintenance and functioning of the ocular surface. Where there is a lack or disturbance of the tear film layer due to diminished production of tears, amplified evaporation the tear film or irregularity in the tear film spread over the cornea and the conjunctiva, ocular surface disruption occurs such as corneal epithelial disturbance and tear film lipid layer abnormality causing several symptoms and is termed as the dry eye syndrome (DES).<sup>1-4</sup> Conditioned rooms, are more prone to developing dry eye syndrome along with the fact that the same

People living in artificial environments, such as air-people live a sedentary lifestyle leading to obesity and other systemic diseases such as diabetes mellitus and hypertension. This further elucidates the occurrence of DES and unremitting metabolic syndrome among these people. Studies have been conducted which demonstrate the incidence of significantly elevated blood pressure among the adult population leading to an increased risk of suffering from cardiovascular problems, stroke, kidney failure and peripheral vessel disorder along with experiencing dry eyes.<sup>5</sup>

Apart from the aforementioned factors, the use of medication for the treatment of hypertension, also play a major part in the development of dry eyes since various systemically prescribed drugs are found to aggravate the symptoms of DES.<sup>6</sup> Among those medications, beta blockers and diuretics such as ACE inhibitors are known to cause DES. It is therefore important that care is taken while prescribing these

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medications to patients suffering from hypertension who are also known to have dry eyes.<sup>7,8</sup> Furthermore, patients with an elevated blood pressure are also prone to have additional systemic medical diseases like diabetes mellitus, thyroid ailment or experience presence of anxiety or depression, each of which augments the possibility of DES.<sup>9</sup>

Various studies conducted have shown a close association between dry eye and diabetes mellitus (DM) but very few studies are found on dry eye and hypertension. Due to the lack of studies to judge the prevalence of dry eyes syndrome in hypertensive patients, we performed this study with the aim of observing the tear film status in relation to the hypertension.

#### **METHODOLOGY:**

This observational study was carried out at Khalid Eye Clinic Nazimabad Karachi, from January 2019 to December 2019 and recruited a total of hundred patients with fifty diagnosed patients of hypertension for five years with an age range of 25 year to 40 year, and fifty normotensive patients belonging to the same age group. Approval was taken from the Institutional Ethical Review Committee. Any patients with history of co existing diabetes, thyroid malfunction, previous history of chronic ocular allergy, glaucoma, ocular surface disorders were excluded from the study.

Patients were placed in two groups, Group A included patients with history of systemic hypertension, whereas group B included normotensive patients. A pre designed form was used to record information regarding history including duration of hypertension, drug history and complete ophthalmic examination, including visual acuity, refraction, general slit lamp examination for ocular adnexa, anterior segment and fundus examination with slit lamp biomicroscopy using 90 D lens or indirect ophthalmoscope with 20 D lens. Special emphasis was given on inquiring about dry eye symptoms and signs such as feeling of dryness, grittiness, and burning which characteristically worsening by the end of the day, stringy discharge, crusting of the lids and transient blurring of vision. Examination was directed at observing for signs of posterior blephritis, meibomianitis and conjunctival keratinization. Tear meniscus height was evaluated by reading the scale of slit lamp microscope without using fluorescein (in the normal eye meniscus is about 1mm in height while in dry eye it becomes thin or absent). Schirmer test 1 (without anesthesia) and 2 (with anesthesia) in all patients of both groups was done and results noted. Schirmer strip test was carried

out by using no. 41 Whatman filter paper (5 mm wide and 35 mm long). The 5 mm end of the paper was folded and lodged at the central and lateral outer one third of the inferior eyelid avoiding the cornea and the eyelashes followed by closure of the eyelids and subsequently measuring the wetting of the paper from the folded end after a duration of five minutes and documenting it. Data were analyzed in SPSS version 25. Frequency with percentage was calculated for Schirmer test. Independent sample t test was used for statistical analysis and a p value of <0.05 was considered as significant.

#### **RESULTS:**

This study included 100 patients with mean age of  $31.5 \pm 3.21$  year. There were 64 male and 36 female patients. Tear meniscus height was <1mm in group A, whereas =1mm in group B. Results of group A showed  $9.0 \pm 0.58$  mm wetting in Schirmer test 1 (without anesthesia) and  $5.0 \pm 0.70$  mm wetting in Schirmer test 2 (with anesthesia), whereas group B showed  $12.0 \pm 0.60$  mm in Schirmer test 1 (without anesthesia) and  $7.1 \pm 0.63$  mm wetting in Schirmer test 2 (with anesthesia). Considerable difference was observed in the tear film status between the two groups as assessed by the Schirmer test 1 and 2 with  $p=0.000$  for both schirmer 1 and 2. Moreover, subjective complaints of tiredness, grittiness and foreign body sensation were also observed in patients of group A.

#### **DISCUSSION:**

Dry eye occurs due to a lack of tear production or disproportionate evaporation of the tear film with consequent harming of the interpalpebral cornea and the conjunctiva. The leading symptoms include discomfort, dryness, irritation and foreign body sensation among 28% of the general adult population.<sup>11</sup> Prompt identification of the presence of the disease and judicious management prevents the occurrence of related complications such as infection and ulceration of the corneal surface.<sup>12</sup>

Few factors accountable for the development of DES include the ageing process, which results in a diminishing of lacrimal gland function. Hormonal imbalance which is quite widespread among menopausal women can lead to a diminution in the production of tears. Presence of autoimmune disorders like Sjogren's syndrome etc can also effect the production of tears. In addition, medications such as those to treat depression, anxiety, allergy, blood pressure and kidney diseases lead to the formation of DES.<sup>13</sup> Since the production of mucin via the epithelium is dependent on the presence of vitamin A; a deficiency of vitamin A could result in

an inappropriate ocular surface wetting and instability of the tear film.<sup>14</sup>

Hypertensive retinopathy which leaves the tear film layer stability changes is less often recognized. There are a few studies which have evaluated dry eyes in hypertensive patients. It is also a concern that patients often have the disease for a variable duration of time before it is diagnosed. It is difficult to establish the precise disease period among those patients. This study observed decreased tear film in patients with hypertension, which could be either due to the disease itself or use of anti hypertensive drugs. One study observed high incidence of dry eye in hypertensive patients (20%) as compared to diabetic patients (17%).<sup>15</sup> Another study documented the 48% prevalence of dry eye syndrome in hypertensive patients<sup>16</sup>.

Mean age of patients in this study was  $31.5 \pm 3.21$  year whereas it was found to be above 60 year in a study done recently.<sup>16</sup> Another study reported the use of antihypertensive medications such as diuretics had no undesirable consequence on the tear film status, but using medications that include ACE inhibitors may cause dry eye.<sup>8</sup> Lack of studies done previously to evaluate the tear film status in patients with hypertension was a limitation for this study in order to have a comparative arm. In this study we checked the tear film status of diagnosed patients of systemic hypertension irrespective of the fact whether they were taking antihypertensive treatment or not, or if they are taking, whether their decreased tear film level is because of disease itself or the adverse effects of medications.

#### CONCLUSION:

The diagnosed systemic hypertensive patients had reduced tear film levels as compared to the control group as assessed by tear meniscus height and Schirmer test.

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