

Effect of Stress on Visual Functions

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Purpose: To find out the effect of stress on visual function.

Study Design: Cross-sectional study.

Duration and Place of Study: Department of Psychology, Fountain house, Lahore and Department of Optometry and Vision Sciences, The University of Lahore from February to May 2017.

Material and Methods: Visual acuity screening, glare sensitivity, contrast sensitivity, color vision and visual field were performed on a sample of 70 patients having stress using Ishihara test, Snellen chart, Pelli-Robson contrast sensitivity test, Snellen chart for Glare sensitivity and confrontation method respectively. Screening tests were carried to measure visual functions in patients with diagnosed stress disorders. Patients diagnosed with stress within the age range of 18 – 40 years were taken into consideration. Data was analyzed using SPSS version 20.

Results: Out of 70 patients having history of stress 47.1% patients showed defects in contrast sensitivity and 42.85% patients showed decrease in visual acuity. There were 35.7% subjects having decrease in glare sensitivity while 99% of patients exhibited no defect in visual field and color vision. The study conducted was unbiased to age, occupation and gender.

Conclusion: Stress affects the visual functions. Visual acuity, glare sensitivity and contrast sensitivity are affected by stress in majority cases. However, stress patients have normal color vision and visual field.

Key Word: Stress, visual acuity, visual field, contrast sensitivity, color vision.

Most cases demonstrate that stress is a diagnosable and quite obvious sickness. Feeling unhappy cannot be usually characterized as stress; there are certain symptoms which exhibit the effects physically. Clinical depression has several names such as unipolar stress, major stress disorder and recurrent stress¹. Underlying cause of stress is mostly mood disorders. Anxiety, extremes and phobia can be a part of an acute attack of stress, but during the stress episode each patient may present with several scenarios. Stress, in general can be explained as low mood in the form of sadness, decreased self-esteem, guilt or reduced interest in things once found pleasurable. The basic symptoms in clinical terms for stress, is deviance in mental abilities, distressful mood, sadness, sense of de-personalization,

reduction and aggravation of motor behavior. Moreover it involves somatic fixation, suicidal thinking, insomnia, loss of weight and appetite loss¹. Anomalies are approximately 50% of psychopathology in stress but prevalence varies with the type of stress².

There are different types of stress including persistent stress disorder, major stress, postpartum stress, bipolar disorder and seasonal affective disorder³. Stress has its several forms, whether it can be seasonal or non-seasonal. It can be due to psychosis or anxiety (neurotic). Individual can have bipolar disorder or a mother can suffer from postpartum stress. Symptoms of stress are intrusive in daily routine activities. Such activities can be very simple as sleeping, eating etc but it just happens once in a

lifetime and an individual can possibly have many cycles⁴. Persistent stress includes patients with symptoms lasting for 2 years. Individuals can have episodes of major stress with major symptoms of less severity⁵. Symptoms of psychotic stress include hallucinations or psychosis of delusions⁵. Postpartum stress happens because of the hormonal and physical changes in women, after giving birth to a new born⁵. With reduced sunlight, seasonal affective stress elevates in winters. One of the treatment is connected with light therapy⁵. Bipolar disorder has two phases. First one is known as maniac phase, the other one is the low extreme, which is very depressive stage. It is less common than persistent depression⁵. In some scenarios, depression can also be related to stress but figuratively not being a type of stress. Depression is known as burden, and in other terms, it would be the lack of ability to cope with the surrounding environment⁶.

Anxiety on other side is the distressing sense of being nervous, panic and fear being its component⁷. Stress is characterized as diminution in gratifications, pessimistic feeling toward self, crying spells, failure of emotional attachments, disconsolate temper and loss of mirth response. We undertook this study to find which component of visual system is compromised due to stress level.

MATERIALS AND METHODS

A cross sectional study was conducted on 70 patients having history of stress with age range of 18 - 40 years. All patients were diagnosed with stress by a psychiatrist. Patients of all other ages or having any other systemic disorders were excluded from the study. The purpose of the study was to find the relationship of stress with visual functionality. Therefore all patients underwent measurement of distance (6 m) and near (33 cm) visual acuity by using near visual acuity charts and Snellen distance charts. Contrast sensitivity was measured by using Pelli-Robson chart. Visual fields were measured by confrontation test and glare sensitivity was measured by photo stress test. Results were obtained by asking the patient to fill a structured proforma. The results were analyzed using SPSS version 20.

RESULTS

Results of Table 1 show that there is an associated effect of stress on visual acuity. In forty subjects visual acuity in both eyes was 6/6 to 6/12 in range. Remaining 30 subjects have visual acuity 6/12 to 6/60.

Table 2 clearly shows that there is relevant impact of stress on contrast sensitivity. Thirty seven subjects were found with contrast sensitivity of 1.25% to 5%. Other 33% had contrast sensitivity from 5% to 25%.

Table 1: Visual acuity and stress cross tabulation.

Count		Stress	Frequency	Percentages
		Yes		
Visual Acuity	6/6 - 6/12	40	40	57%
	6/12 - 6/60	30	30	43%
Total		70	70	100%

Table 2: Contrast sensitivity and stress cross tabulation.

Count		Stress	Frequency	Percentage
		Yes		
Contrast Sensitivity	1.25% - 5%	37	37	53%
	5% - 25%	33	33	47%
Total		70	70	100%

Table 3: Color vision and stress cross tabulation.

Count		Stress	Frequency	Percentage
		Yes		
Color Vision of Right Eye	12/12 - 8/122	70	70	100%
Total		70	70	100%

Table 4: Glare sensitivity a d stress cross tabulation.

Count		Stress	Frequency	Percentage
		Yes		
Glare Sensitivity	6/6-6/12	45	45	64%
	6/12-6/60	25	25	36%
Total		70	70	100%

Table 5: Visual field of right eye and stress cross tabulation.

Count		Stress	Frequency	Percentage
		Yes		
Visual Field	Good	70	70	100%
Total		70	70	100%

Table 3 shows that there is no relevant effect of stress on color vision. All the subjects are found with normal color vision.

Table 4 shows that there is relevant effect of depression on glare sensitivity. In photostress test 45 subjects gives visual acuity after 6/6 to 6/12 and remaining 25% have 6/12 to 6/60. Table 5 shows that there is no relevant impact of stress on visual field.

DISCUSSION

Stress impacts the efficiency and performance of daily tasks, eating habits, sleep cycle, irritability, body aches, intestinal problems, even decision making process slows down. Reasons of stress: is a vast topic with some really adverse debates. Causes of such disease can be related with the age, occupation, gender, and environment. It can be hereditary or idiopathic. Females tend to have more stress than males. Stress may have various causes in adolescence including absence of autonomy, competitive

environment in academia, inability to perform certain tasks which seems quite cool for other age fellows, relationship with sibling and family. They feel very different as compared to others⁸. Relation among stress and vision is complex in a bi-directional way as it can be the root cause or it can be the consequence of the circumstances. It is observed that these patients, if encounter difficulty in vision, they feel reluctant for an eye checkup. According to a study, distress specifically related to vision is an indicator for the precursor of anxiety and stress⁹. Stress impacts body and specifically the general health by altering the typical mind program. Stress has an impact on contrast sensitivity. In both ways, it hinders ocular health. Some facts made it clear that a stressed patient sees the world more in gray tones which is well illustrated with the phrase "feeling blue" as one of the indicators of sense of sadness⁹. Science wonders has also established a statement that a stressed patient focuses on low tones or sad angle of a particular picture for longer than normal human being⁹. Stress is

a mental disease which is significantly related to brain and in some serious way it interferes with the ability of an individual with clear vision. Eye is the intricate neurosensory organ with the basic tenacity to discriminate patterns and differences in light stimuli. One's natural ability to perceive the surrounding is termed as vision but it is a very complex process. It involves optical nerves, tracts to transport these peculiar signals to the visual cortex and the translating brain centers. There are five visual functions which comprise of visual acuity, contrast sensitivity, color vision, visual field and glare sensitivity.

Visual acuity is how clearly we can resolve an object at a specific distance while it forms a particular angle at the eye¹⁰. Visual acuity has established four major components including recognition acuity, detection acuity, hyper acuity and localization acuity. Recognition acuity requires recognition or it can be referred to as discriminating or naming the object. Detection acuity pacts with the consciousness of an object in space whether it is absent or present; it doesn't cope with the discrimination. Hyper acuity is the stereo acuity¹¹. Localization acuity deals with the localizing of targets by discerning the spatial positions of sections of the object. Visual acuity can be measured by Log Mar Chart, Snellen chart and Landolt C etc. A visual acuity of 6/60 means that visual acuity is poor and the lower values lead to the perception of defective visual acuity, having difficulty in reading print of smaller letters or otherwise visual impairment which requires a prescription¹². Color Vision is described as: some delusion characterized by the connections of billions of neurons in the brain. It is crucial for remembering and specifying various areas¹⁵. To look, perceive and interpret depending upon saturation, brightness and hue is defined as color vision. It is probable that a person can suffer from imperfect color vision. With reference to a study males are more prone to color defects than females because it is recessive sex linked trait. In some persons one, two or three of the three cones can be absent or dysfunctional which may lead to monochromacy, dichromacy (protanopia, deutanopia) and trichromacy¹⁶. We have many procedures to check color vision like D-15 photo chromic plates etc. With reference to a study conducted in 2006 thresholds for contrast sensitivity for various types of stress (seasonal affective stress and major stress) were quantified in stress and control patients²⁰. Higher values of contrast sensitivity for definite type of spatial frequencies was noted in seasonally stressed patients compared to

average people. Stressed persons have values for recognition based on luminance at 6.0 cpd and 12.0 cpd. Therefore, clinical stress is associated to contrast sensitivity²¹. Administration of a 25 item visual function test by the National Eye Institute lead us to know that self-reported stress is a vital factor of consideration during assessment of visual functions in Latinos. Measuring the stress was done by a single item on the SF-12. Self-reported visual irregularities were related to stress in Latinos²². Stressed people aged 40 had low values on the NEI VFQ-25. This study was done to see how stress affects vision of individuals of older age using specific set of questions. Stress could be a reason in older individuals due to higher burden of vision related diseases which obstructs their visual functions²³. Research conducted in Britain established the link between stress and ocular health considering parameters such as age, general health and gender. In older people high ratio of vision issues of unknown etiology were detected. It was a vague reason for stress, so it required further questions²⁴. Values of contrast sensitivity have recently been stated to be lower in stressed patients as compared to healthy controls. Graphic illustration strongly supported the conclusion that stressed people have high curve readings of contrast sensitivity but it still needs further examination²⁵.

Significant thrashing of visualization results in a reduced superiority of life. A study conducted in year 2008 reveals that depressed individuals have high values for detection acuity and contrast sensitivity on luminance at 6.0 cpd and 12.0 cpd. It has been determined that clinical stress is related to contrast sensitivity using ERG (electroretinogram) Our study also support the different values of visual acuity and contrast sensitivity along with stress as the collected data was mainly based on screening tests. Thresholds for contrast sensitivity of several types of stress was quantified in normal individuals and stressed patients. It provided an evidence that stress is a major cause of higher values for contrast sensitivity. One of the earlier studies suggested that stress could be a reason in old individuals to perceive higher burden of vision diseases. Data of our research support and provide evidence for the effects of age and anxiety, on vision. Visual Contrast sensitivity has recently been reported to be at low levels in stressed patients in contrast to healthy controls which lead to reduced visual contrast sensitivity but further investigations are still needed to get more details. Research work can provide support data for the stress interference in right hemisphere.

The analysis of our study demonstrates that significance of the visual functions and their related functionality is affected by anxiety, stress, depression or panic attack.

CONCLUSION

Major part of evidence provided in our study shows that stress may be the cause of any ocular anomaly. However it has been made quite a valid fact that increased ocular anomalies lead to stress. This study provides a firm foundation to demonstrate this bi-directional relationship of ocular anomalies and stress.

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