CHAPTER 1

INTRODUCTION

Today in the era of information and technology, computer and mobile phones have become pervasive around the globe. Already nearly half of the working population uses computer and other visual display terminal (VDT) for their job and recreation [1]. In almost all offices, colleges, universities and homes VDT have become common forms of working utilities. Although, this has enhanced the overall work tasks, but has led to an increased number of subjects complaining of various symptoms of ocular discomforts [2]. Using visual display terminal devices has led to various problems of eyes like dry eye disease (DED), tired eyes, eye strain, redness, sensitivity to light, irritation, blurring of vision, macular degeneration in ageing population etc. All together, these symptoms are referred as computer vision syndrome (CVS) [3, 4, 5].

Abnormality in the layers of tear leads to DED. DED is a condition of multiple etiologies which occur through common mechanism of hyperosmolarity and instability of tear film [6] leading to ocular surface inflammation, corneal epithelial cell damage further causing the above-mentioned symptoms of DED. DED is broadly categorized into two types; aqueous deficient DED and evaporative DED [6, 7, 8]. DED can have effect on one or both the eyes. The most common symptoms of DED are epiphora, irritation, burning, grittiness, soreness and visual disturbances [9]. Further, an abnormal tear film can also compromise corneal epithelium which could be the risk of infection in eye. According to the literature the rate of prevalence of dry eye is reported by various clinical and non-clinical studies is 5% to 35% or more in different age groups with a more prevalence in the Asian, Hispanic and elderly populations [10]. Recent literature shows that DED has imposed a great impact on day to day life of an individual. Subjects are more likely to experience an investigating impact of DED while driving, watching television, professional work, reading and using digital devices [11, 12]. Qualities of vision which include contrast sensitivity, visual acuity dry eye do have impact on all of it [13]. Other risks of DED include environment of less humidity such as cabins in aircraft and office environments [14]. High room temperature and high airflow velocity also causes evaporation of ocular surface which may get worse by indoor pollution and poor air quality. The rate of evaporation from the eyes may get worse in environments where blink rate is reduced due to prolonged concentration on visual terminal devices while in use [15, 16]. In recent years, many
studies have emerged delineating the impact of DED; however, no studies outline the comparative analysis of measuring the impact of DED among visual display terminal users and non-visual display terminal users in different age groups and gender. Various technical as well non-technical methodologies are used to assess DED, however no study extends the prediction method to best assess DED among VDT users. Hence, it becomes important to first assess the impact of DED among VDT users and compare the best and precise method to predict the DED.

The symptoms of dry eyes are becoming worse due to increase in usage of digital devices, indoor pollution and environmental conditions especially in children due to the time spent indoor. It is becoming a mandate to assess factors contributing to the ocular health among populations as the living lifestyle, dietary patterns and other environmental conditions are becoming harsh. Hence indications of dry eye disease prompting computer vision syndrome are found in all age bunches because of professional and non-professional utilization of computers and computerized electronic gadgets including email, Internet get to, excitement exercises, and amusements. VDT use has turned out to be summed up to the whole populace with the presentation of cell phones and advanced mobile phones. VDT use isn't constrained to the working-age gathering; it additionally includes youngsters somewhere in the range of 8 and 18 years old, who go through around 7.5 hours/day utilizing stimulation media, 4.5 hours/day sitting in front of the TV, and 1.5 hours/day on a computer or computer games [17]. This expanded utilization of VDT in both work and diversion exercises have prompted some medical problems including visual issues. Thomson [18] showed that the predominance of eye side effects like eye fatigue, cerebral pains, visual distress, dry eye, and obscured vision may be seen in up to 90% of VDT users. The commonness and seriousness of the manifestations will increment in future as the time spent before VDT is expanding [11].

Socio-economic status (SES) of an individual likewise assumes a significant job in understanding its impact on ailment causing danger factors. It is significant factor to decide the expectation for everyday comforts and wellbeing status of population as it impacts the predominance and rate of different wellbeing conditions. Health status is directly or indirectly impacted by SES of individual or population based on affordability, availability and awareness of various health facilities [19, 20, 21, 22, 23]. Along these lines, socio-economic status can also have significant role in development of CVS or tear film related abnormalities.

SES is characterized as the position of individual, family units and society concerning the ability to make or consume items that are valued in our society [24]. Revised Kuppuswamy socio-economic scale is the mostly utilized scale for deciding the SES. It considers three
parameters like education, occupation, and salary of the person which decides the SES. These scales are vital part in the evaluation of social class of an individual/family, which can have an effect on illness causing factors. It is additionally imperative for thought when redoing wellbeing instruction to the objective audience [22].

Past investigation [25] had appeared with low education and awareness was bound to have diabetes, hypertension, coronary illness, and a sleeping disorder, just as a lower score for general wellbeing. It has been likewise discovered that patients with advanced education are progressively mindful of the different sicknesses, conceivably gives more consideration to their surroundings in day by day life, individual social insurance, cleanliness, and way of life decisions, improved diet and improving personal satisfaction. Consequently, SES is a significant indicator of health [26, 27]. This has been shown from past examination that the higher predominance of ocular problems in the more underdeveloped nation of the world than the developed nations [28, 29]. An ongoing audit of the connection between the pervasiveness of visual impairment and monetary advancement demonstrates a pattern of higher predominance of visual deficiency in creating nations with lower per capita salary [29]. In the poor nations of the world, preventable causes of blindness like corneal scarring, deficiency of Vitamin A, measles, neonatal conjunctivitis and traditional malpractice to treat eye diseases persist in the population of low socioeconomic status having poor income, inadequate education and poor health facilities. Cataract and blindness have been accounted for to be higher in the low SES nation [30].

Trachoma has been accounted for to be a reason for visual impairment in the native populace of Australia, [31] which has a lower financial status. One of the avoidable blindness like trachoma has been mostly related to poor hygiene, low education, awareness and poor sanitation which is common in low socioeconomic population [32]. Numerous investigations around the globe have recognized the gatherings who are probably going to have higher danger of visual impairment- those with lower SES.

Low SES is presently perceived as a hazard factor in the improvement of numerous chronic eye illnesses including age-related macular degeneration, glaucoma, diabetic retinopathy, and cataract. An examination found that low SES is related with advancement of cataract, for example, low eating regimen quality with inadequate admission of cancer prevention agents and vitamins [33]. Diets devoured by people with lower SES status will in general be higher in fats and lower in other balanced supplements, for example, magnesium, Vitamin C, folate, calcium, and iron [34]. Protective impacts of cancer prevention agents on focal point tissue including enhancements of Vitamin C and different cell reinforcements, have
additionally been observed to be related with a diminished danger of waterfall in numerous observational examinations [35, 36, 37]. Another conceivable clarification of the relationship between low SES and the advancement of cataract is that individuals with lower SES may have had more prominent daylight presentation since they are bound to have open air occupations. As broadly perceived, UV-B harm is a built-up humble supporter of age-related waterfall. A noteworthy relationship between outside occupations and lower SES level (such as just essential or lower education) was found in an investigation [38]. SES is one among significant pointers to assess the health status and wholesome status of a family.

The study for the first time unravels the tear film assessment among the VDT with CVS and non-VDT users. The findings also reveal the correct methodology to be employed during tear film assessment for precise diagnosis DED of the syndrome which considered for clinical utility. Therefore, the aim of the study was to achieve following objectives:

1. To assess CVS in VDT users. For this, patient classification was done followed by scoring individual patients with standard questionnaire and calculating extent of damage using CVS scores.
2. To test tear film damage in identified VDT and non-VDT users using standard clinical methods in patients based on OSDI scores.
3. To compare the tear film changes between VDT and non-VDT users using socio-economic classification.

Hence, this study was useful in outlining important finding how standard methodologies can predict tear film assessment for DED patients in VDT with CVS and non-VDT users.