

INTRODUCTION

Good and adequate lighting should be an essential part of our daily living today. It increases work potential and adds to comfort and reduces strain on our vital organ - the eyes - which play a vital role in our activities. Earlier people worked only during the day in the natural light of the sun. Our civilization has advanced considerably and we work both by night and day in fair weather or foul. We do not entirely depend on sun light of the sun. Hence our demand on artificial lighting have increased considerably, therefore it is very essential that we pay great attention and provide adequate lighting conditions in schools, colleges, industrial buildings and residences.

Our daily living consists of performance of many activities requiring vision. Light activates the physiological process in the eye giving rise to sight. According to Hopkinson (30, p.p. 10). "Vision cannot operate without light, and light effect the physiological, psychological and social reactions of individuals."

The effect of light are seen in relation to health, learning efficiency and mental processes longevity and accident prevention, micro eye movement, enzyme production, muscular tension, heart rate and toxic build-up (4, 5, 6, 9, 12, 21, 22, 29, 30, 31, 32, 33, 38, 44, 45, 46, 47, 48, 54, 55, 56, 60, 61, 62, 65, 69, 71, 83, 84, 86, 87).

Lighting is the most important element of man's optimum climate. Lighting has significant role to play in modern buildings which according to Hopkinson and Kay (31p.p.15). "must have commodity, that is it must meet the social and physical requirement of users." Weston(87 p.p.25)states:"Lighting regulates body's visual traffic with its environment, both voluntary, conscious and involuntary traffic".

" Collien (29 p.p.202) explains that light operates sight sense and helps to regulate various physiological operations within the body which affect long term health.

According to Putnam (69) "the greatest percentage of impression reaching brain comes from eyes". Since most of our activities depend on eyes and most of our stimulus to the brain comes through the eyes, good lighting affects all phases of daily living. Since the critical visual tasks are increasing in number and time duration, the need for best seeing condition is greater than ever, and the consequences arising from failure to provide them will be increasingly serious for those who are involved in critical visual tasks.

Light is also an element of design which should be used for visual comfort and to achieve desirable emotional responses from the lighted environment. The I.S.I.(35 p.p.13) handbook on lighting supports this idea by stating that "Light has certain characteristics that affect the mood and atmosphere of space influencing the emotional responses of the people who occupy space".

The I S I hand book on lighting states that (35 p.p.13) Good lighting design in space has three chief aims.

- To promote the work or other activities carried on within the building.
- To promote the safety of people using the building.
- To create pleasing environment conducive to interest and sense of well being.

Lighting is good only when it is suitable both in quality and quantity, for creating good environment, and brightness which is comfortable for user for permitting high degree of efficiency in seeing finer details of interest and importance in any object. According to Peet and Thye(61 p.p.302).

"Desirable illumination implies light of good quality and of adequate quantity so shaded and directed that it is sufficient for carrying on any occupation after dark without strain upon eyes or on nerves".

Light for seeing is necessary for our subsequent action and too little light reduces the information available from our environment and thus limit action. The adaptability of human eye can lead us to be uncritical of shortcoming of which we should be aware. Thus we might often work in inadequate light long after day light has faded.

Visual work requires energy consumption just as physical work. Weston(86 p.p. 205) states "Increased light results in more efficient physiological action, so that less energy is required from body by its external environment and there is lower energy need and slower toxin build up so fatigue is less". Therefore any one who uses eyes extensively should maintain proper illumination level so that visual fatigue can be avoided. On the other hand, increased light results in more efficient physiological action so that less energy is expended to meet demands made on the body by its external environment, and optimum balance is achieved between body's internal economy and the pressure of its own environment.

Logan sates :- (44 p.p. 160)

There is a consumption of quarter of the bodily energy in the processes of seeing when vision is normal and illumination is sufficient. That is, 25% of our calorie intake is used to power our eyes under optimum conditions. Under sub - optimum conditions, more is used. That is oculomotor system has to rob other bodily functions to keep the eyes going and so excess fatigue develops. This causes slower reactions with greater susceptibility to errors and accidents. It also increases the toxins that kidneys have to handle and speeds up their rate of degeneration. The effect can be so great as to force people to give up close work after a few hours of effort per day.

Greater portion of school year's home work must be done under artificial lighting. The hours of home study increases as educational level progresses. Peet and Thye (61 p.p.342) reports that 20% of elementary school children have faulty eye sight and when children reaches college level 40% do not see normally. Luckiesh (47 p.p.7,16) reports marked increase in number of near sighted students as educational level increases.

Department of education and science U.K. in their Building Bulletin Lighting in school states (14) "Poor seeing condition, due to inadequate light and improper lighting are responsible in part for relatively high percentage of eye defectiveness, and eye defect such as near sightedness increases rapidly from grade to grade".

The greater prevalence of eye strain troubles and eye defects in occupation where the tasks of seeing are obviously severe, is a strong indication that magnitude of such defects and possibly their number are preventable to some extent by improving seeing condition.

Justification of Study

It is common knowledge and experience that people in general are not vision conscious and so have not distinguished between mere light and adequate light. People are found not only using their eyes to see fine details under inadequate lighting but also misusing their eyes in many other ways. It has been observed that in our country very little attention is given to special lighting arrangement for work and for studies. Due to poor and vague ideas about requirements of proper and adequate lighting for various purposes, people either flood the work area with unnecessary illumination or have inadequate light. Even where there is awareness about proper lighting, it is generally found that either it is not applied in practical situation due to negligence or due to cost involved in making adequate lighting provision.

Study hours in school and home involves critical eye work, concentration in a fixed posture for a long period of time. Adequate lighting in such conditions will help students to achieve maximum benefit.

It has been observed in the past that some glaring inadequacies are prevalent in basic requisite of lighting for study. Many students are able to obtain but small fraction of recommended amount of light due to the low wattage prevalent in luminaires used for study.

The lag in technological development in the production of good lighting fixtures, the inadequate supply of electricity coupled with the increasing cost of lighting a home and the general lack of vision consciousness among people are probably contributory factors to poor lighting condition in our home and in work situations.

In many cases, students study lying in bed or a divan, or in sitting position at dining table or in other areas of a room, that are not lighted adequately for the purpose of serious study. According to Harmon (27) Lighting has bearing on seeing, postures and attitudes have to be considered as an important element in study.

Considering the importance of lighting in human well being especially for

students, the investigator felt the need to identify the existing lighting conditions for study in the schools and residences of school going children in Bombay city. based on the existing conditions, problems can be identified in relation to the available norms for adequate lighting, and make necessary recommendations

Basic Assumption of study are :

- 1) The performance of visual activities is dependent on adequate lighting conditions.
- 2) Designing building incorporating the natural and artificial lighting needs prior considerations.
- 3) Parents, teachers and authorities need to be aware of children's study lighting requirements.
- 4) Interview cum observation methods provide for careful & authentic scrutiny of given situations.

The objectives of present study are :

- 1) To find out the quantity and quality of lighting available in schools and residences.
- 2) To evaluate the quantity and quality of light available with standards set by Indian Standard Institution.
- 3) To study the incidence of eye defect among students in relation to situational variables like -
 - a) Age
 - b) Dietary pattern
 - c) Heredity and other factors
 - d) Time of study.
 - e) Quantum of work.

- f) Quantity of light (Lumens/sq. mt.)
 - g) Work area and its relation to the source of light.
 - h) Quality of light
 - i) Study habits of child.
- 4) To make recommendations in light of the findings of the present study

The hypothesis of the study are :

I There is a difference in the illumination levels for study purpose in residences and schools and the recommended levels of illumination by the Bureau of Indian standard.

a) There is a difference between illumination level for study purposes in residences of students of municipal schools and private schools for both natural and artificial light.

b) There is a difference between artificial illumination levels of municipal and private schools.

c) There is a difference between illumination levels for study purposes in the natural light available for municipal schools and private schools.

II The incidence of eye defects varies in municipal school and private school children.

a) The incidence of eye defect varies according to grade in which student studies

b) The incidences of eye defect varies according to dietary pattern of children.

c) The incidences of eye defect is related to hereditary factors.

d) The incidences of eye defect is related to time of study.

e) The incidences of eye defect varies according to quantum of studies in terms of hours of study.

f) The incidence of eye defect varies according to quantum of light available for study purpose.

Limitation of Study.

- 1) Study is limited to 20 schools (10 municipal and 10 private) situated between Colaba and Andheri in Bombay City.
- 2) Municipal school situated in their own building was only selected as a sample.
- 3) The residential study was limited to schools which were offering S.S.C.E. course and English as medium of instruction.
- 4) Residence lighting condition of students studying in 3rd, 4th, 6th, 8th and 9th standards of a municipal and a private school was found out.