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Assessment artificial lighting intensity

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ABSTRACT

Increasing numbers of people work inside buildings under artificial lighting both night and day causes many of diseases ,some of this disease represent as biological hazard include hazard for eye ,skin ,as well as breast cancer, sleep disorders. The current study obtain that human exposure to artificial lighting more than 10 hours daily, man exposure to artificial lighting about 10-17 hours daily . 100% of children exposure to artificial lighting more than 12 hours daily, children exposure about 4-5 hours daily to schools artificial lighting . Teens exposure to artificial light about 11-17 hours daily. 49% of women exposure to artificial lighting low from 12 hours daily, while 51% of woman exposure to artificial light more than12 hours daily. In this study , illumination level of artificial light were measured in many locations include bedroom, living room ,and children room in home as well as offices and lectures room in college . illumination level of light at those locations were similar to international standards.

INTRODUCTION

Light is electromagnetic radiation in the range from 400 to 780 nm that is visible to the intact human eye . Artificial lighting has many benefits for people, it is good for reducing crime and accidents as well as it is a necessity to enhance commerce, social activity, and public safety. On other hand, artificial lighting is effects on human health; In addition , impact of novel light at night on wildlife and vegetation .[1,2]

Some studies indicate that artificial lights are very unlikely to cause any harm, household lighting involves an illumination level which is so low that exposure to potentially problematic radiation is considered negligible [3] .

Another studies show that numbers of people work inside buildings under artificial lighting both night and day an effected by many diseases ,as well as lighting (glare) it present outside the buildings can create hazards ranging from discomfort to frank visual disability.[4,5,6]

Biological hazard of artificial lighting include ultra violet UV-hazard and blue-light hazard ,some lamp may emit blue light and ultra violet (UV) radiation, although at low levels, but highest measured UV emissions from another lamps used typically in workplace and schools . UV radiation can damage in skin cells[7] Common lighting systems in workplace use many sources of lamps which has a long life, good color and low noise levels. Where as, there is an effect of light intensity on the human physiology and behavior[8].

There is evidence that lengthy daily exposure to high lighting leads to diminished sexual performance. Many studies also suggest a link between exposure to light at night and risk of breast cancer, due to suppression of the normal nocturnal production of melatonin.[9,10]

When the body is exposed to low intensity light the body produces a melatonin hormone which is produced at night in the brain by the pineal gland. It has a role in regulating the sleep – wake cycle. Melatonin has been shown to lower blood pressure [11,12].

The aims of this study assessment percentage of adults include men and women , teens and children exposure to artificial lighting daily ,as well as study hour numbers of people exposure to main kind of lamps in Iraq , also luminance level was measured in many locations include bedroom, living room ,and children room in home as well as offices and lecture rooms in college

Types of lamps

There are a wide range of lamps available which used for a variety of applications , include:-

A-Lamps that emit light by heating a tungsten filament like incandescent lights

B-Fluorescent lamps are electrical discharge lamps that contain low-pressure mercury vapor and an inert gas, usually argon ,include:-

i- The fluorescent lamps with single-capped

ii- The fluorescent lamps with double-capped

iii- Fluorescent tubes

v- Compact fluorescent lamps (CFLs)

C- Light-emitting diodes (LEDs) produce light by a process called electroluminescence.

D Field emission devices are based on the same principle as the luminescent material used in TV screens . [13]

Lamps have another classified according to the risk group(RG)

1- RG0 it is exempt from risk

2- RG1 it is minor risk lamps do not pose any hazards during normal circumstances.

3- RG2 it cause medium risk .

4- RG3 it have high risk include only lamps where a short-term exposure poses a hazard. This classification is based on acute exposure responses.[14]

MATERIALS AND METHODS

Research methodology

Collecting data from 100 individual of human include man, woman ,children and teens .

illumination sampling

illumination level were measured at different locations inside buildings include bedroom, living room ,and children room in home as well as offices and lecture rooms in college. luminance has been measured by photometry type Environmental meter (Extec E N 300) .

RESULTS AND DISCUSSION

Most of the lamps used for lighting are considered safe but some emit UV and blue radiation. Under extreme circumstances and over a long period of time, exposure to these lamps could increase the chance of developing negative health impacts in later life.

Humans exposed daily to many sources of artificial lighting, workers in office , factories or large stores are exposed to some UV and blue light from fluorescent lamps and task-lamps, for many hours a day, night drivers are also exposed to glare from headlights but only for a very short time ,and students exposed to artificial lighting from fluorescent lamps ,as well as night reading for one or two hours . Figures 1 represents number of hours which man exposure to artificial lighting daily in workplace and home .The present study reveals man exposure to artificial lighting about 10-17 hours daily.

Many studies show that the low level illumination and sparseness of direct exposure to fluorescent lamps in the homes can reduces the risk of lamps and problematic radiation is considered negligible.[15,16]

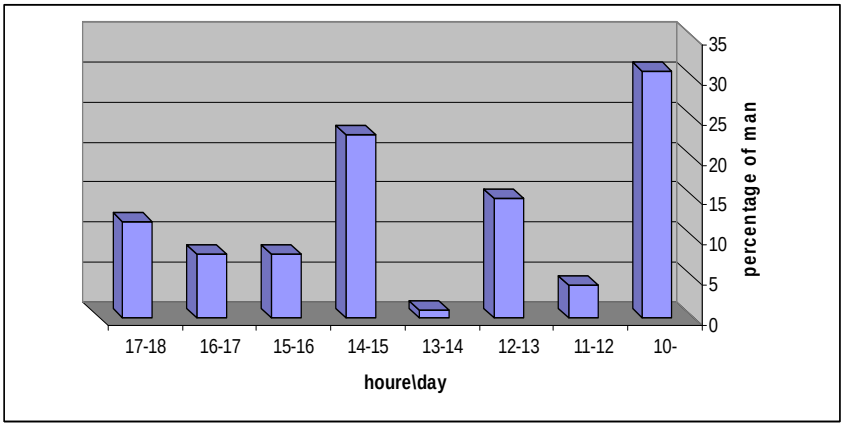

Figure 1: Hours number of man exposure to artificial lighting .

Figure 2 represent the number of hours that children exposure to artificial lighting daily . The current study obtain that 100% of children exposure to artificial lighting more than 12 hours daily, children exposure about 4-5 hours daily to schools artificial light , many investigation show the relationship between artificial light exposure and an effect on alertness [17] , whereas another study showed that exposure to room light suppressed melatonin levels [18] , and damage in the retina [19] .

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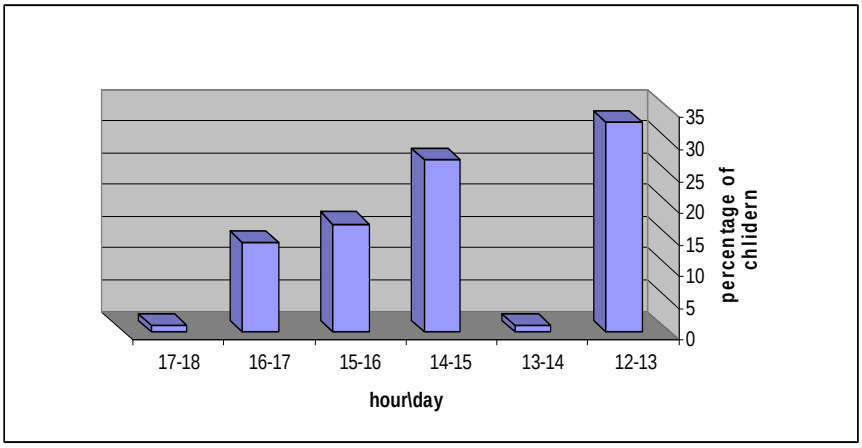

Figure 2: Hours number of children exposure to artificial lighting.

While figure 3 represents the number of hours that teens exposure to artificial lighting daily ,it is about 11-17 hours daily

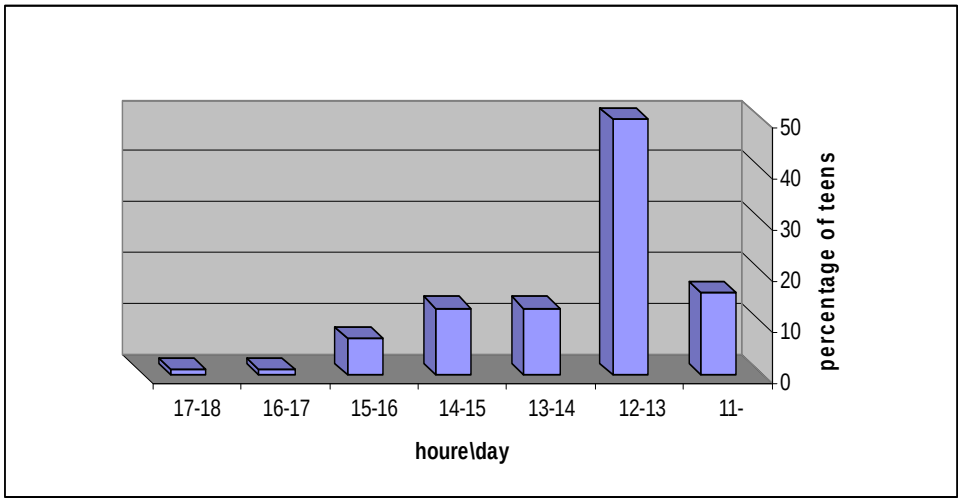

Figure: 3 Hours number of teens exposure to artificial lighting

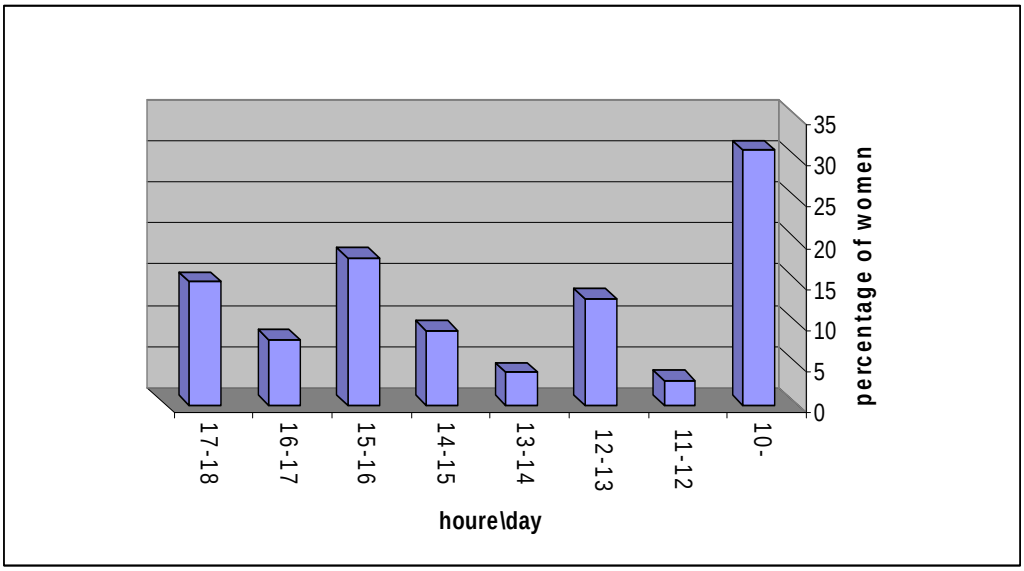

Figure 4: Hours number of women exposure to artificial lighting

In this study , 49% of women exposure to artificial light about 12 hours or low daily, while 51% of woman exposure to artificial light more than12 hours daily. Some study focus on women exposure to artificial light in late evening, or early morning disrupts the circadian rhythm and the production of melatonin is linked to breast cancer ,as well as an effect on sleep, mood and cognition [20] . Light exposure induces advances and delays in the circadian cycle, it is depending on the time during which light exposure occurs (light between 5 a.m.-5 p.m. advances, and light between 5 p.m.-5 a.m. delays the clock)[21]. leading to circadian disruption. Another investigate suggested that melatonin deficits, caused by exposure to light at night, could be part of the etiology of osteoporosis.[22]

The current study obtain that illumination level of light in different rooms of house in table 1 , the rang of illumination level was between (100-350) lux ,it is same with the illumination levels in a living room which would typically be around 500 lux . disruption of circadian rhythms dependent on duration, wavelength and intensity of light exposure[20,23]

Table 1: illumination level in different rooms of house

location	illumination level (lux)
Living room	**250-350**
Bed room before sleeping	**100-120**
Children room	**200-300**

Table 2 :Average illumination level in different office and lecture rooms of college

location	illumination level(lux)
Lecture room	420-500
office	300-400

Illumination level of artificial light in different offices and lecture rooms of college were it is same with[24]. in table 2 , it were similar to international standards an

In actual, most people exposure to the indoor artificial light over 10 h/day, most artificial light indoor in Iraq are depended on Fluorescent lamp and Compact fluorescent lamp. Table 3 show hours number that people exposure to different kinds of lamps.

Table 3: Hours number that people exposure to Fluorescent lamps and Compact fluorescent lamps.

sex	Number of hours exposure to Fluorescent tube \day	Number of hours exposure to Compact fluorescent CFLs\ day
Children	4	10
Teens	3,6	9.3
Man	6.4	8.1
Woman	3.6	9.1

Many studies show that the CFLs, LEDs, halogen lamps, and fluorescent tubes were classified as RG0 ,whereas high pressure mercury lamp intended for industrial lighting was classified as RG1, but some of the high-pressure discharge lamps were assigned to higher RGs at 20 cm [11].On other hands People exposed to lights receive some UV radiation which accumulates over a person's life time and contributes to the risk of developing skin cancer [7].

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