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Occupational Hazards and its Impact on Health of Eyes: A Survey

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***Abstract*—**This research has been undertaken to examine the impact of occupational hazards on health of Computer Professionals, The essential data have been collected using Community-Survey method. Additionally books, journals, and websites have been referred for getting certain conclusions from the collected survey samples. In this survey based descriptive research, Opinions of diverse Computer professionals in pune city, Maharashtra are taken to find out the average health of the eyes. This research also tries to find certain patterns on the usage of electronic gadget in a particular age group and their tendency towards getting a particular eye disease.

***Keywords*—**Carpal Tunnel, Hazards, Health, Syndrome, Repetitive Strain

I. INTRODUCTION

Working conditions and the living style of an individual has strong impact on well-being of health. Non supportive working environment can cause harm if not controlled. This non supportive working environment is termed as occupational health hazards. Occupational health hazards point out to the probable risks to health and safety for those who work outside the home (Maier 2009). WHO (2009) defined hazards as a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impact, property damage, loss of employment and services, social and economic disruption, or environmental damage. The International Labor Organization (ILO) approximated that 6,000 employees around the world die every day from work related diseases and accidents [1].

The objectives of the above study are to examine and differentiate the impact of occupational hazards on general health, to understand and differentiate extent of perception towards impact of occupational hazards on general health. The paper gives brief descriptive study of following health hazards:

1. Computer Vision Syndrome (CVS),
2. Repetitive Strain Injuries (RSI),
3. Carpal Tunnel Syndrome (CTS) &
4. Internet & Social Media Addiction (ISMA)

II. LITERATURE REVIEW

Occupational hazard can be defined as the risk to the health of a person usually arising out of employment. It can also be referred to as impact on health condition of an individual due to uncomfortable working environment. In other words, occupational hazard is like accepting the risk to health as a consequence of an occupation. (Simpson JA and Weiner ESC, 1989) As per the definition of World Health Organization, "Health can be summarized as the state of complete physical, mental and social well being and not merely an absence of disease or infirmity" (Park K 2000) [2].

In the present survey, occupational health hazard can be more precisely viewed as both physical and mental health of the Computer laboratory technicians.

An analysis of the awareness of cement workers related to occupational hazard was examined by Ahmed HO and Mark S Newson Smith in 2010. 153 workers of cement factory in Ras Al Khaimah, UAE were surveyed. Only 52.9% of the people were aware of the hazards associated with their occupation. Hazards such as dust, heat, machines (e.g. milling machine and falling materials), chemicals, fire and smoke were most commonly reported by the workers. Exposure to dust was reported as most hazardous by most of the workers. Most of the respondents reported respiratory problems such as cough, sputum etc. and eye problems causing due to dust. Problems related to heart, liver and stomach were rarely

reported. Majority of the respondents used mask as a safety device. Moreover, for majority of the workers masks proved to be non-interfering in communication as well [3].

Paramedical staffs in public hospitals of Jhelum were surveyed by Javed Sadaf and Tehmina Yaqoob in 2011. The study showed that exposure of females to health hazards was more as compared to males. Females are more exposed to psychological occupational health hazards as compare to males.

Physiological health hazards are more influential as compared to psychological health hazards. The study showed that age played a significant role in the level of exposure to occupational health hazard. There were no significant differences in exposure to occupational health hazards on the basis of experience in different categories. [4].

A detailed examination of impact of occupational health hazards on employee from various sectors was carried out by Saldaria, M. A. M., Susana Garcia Herrero, Javier Garcia Rodriguez and Dale Ritzel in 2012. The study focused global, farming, industry, construction and service sectors.

Following conclusions were drawn from the study:

- 17.5% hazard prevention communication has been given to farming and services sector.
- 16.8% for industry and 14.8% for construction sectors has been provided.
- 43.1% of farmers, 35.8% of construction sector and 32.3% global sector employees were found suffering from musculoskeletal symptoms.
- The musculoskeletal symptoms were found in 31% of people employed in service sector and 30.4% industrial sector workers.
- Psychological symptoms weighed 10.8% of services, 10.2% of industry and 10.1% of global sectors employees.
- Farming and construction sectors experienced 8.6% and 7.1% psychological symptoms respectively.
- Construction and industry sector experienced high level of occupational accidents at the rate of 13.8% and 13.1% respectively.
- A low level of occupational accidents at the rate of 9.9% and 9.2% were found in farming and services sectors respectively [5].

The farm women working in the fields of Lucknow district were interrogated by Pooja Dwivedi and Kiran in 2013. The study dealt with the awareness and existence of occupational health hazards surveyed amongst 120 farm women. The result and statistics of the study found the season to be more stressful and mentally pressurized. Pain in upper arms and lower arms was found in majority of women. The main reason behind such symptoms was the high level of exposure to repetitive task and threshing. Majority of the women were vulnerable to occupational hazards. The life of farm women is indeed stressful as they were involved in many tasks ranging from working in fields to managing household chores [6].

The vulnerability of occupational health hazards of computer laboratory technicians working in private multi specialty hospitals was examined by Rajan D in 2014. The study was carried out under nine factors which are the of occupation health hazards. The dimensions were organization structure and policy, fear and safety, ergonomics, work load and work shift, resources, environment and hygiene, interruption, patient and communication and training related factors.
The result of the study emphasized following sources as the reason behind development of occupational health hazards:

- Strict supervision by higher authorities.
- Spending large amount of time sitting in front of computer.
- Low level of safety in the work place.
- Less number of laboratory technicians and supporting staffs as compared with the volume of patients.
- Irregularity in working in two shifts.
- Compactness in the work place.
- Handling multiple instructions from many authorities.
- Facing and dealing emotionally unstable, angry and blaming nature of the patients and their relatives
- Less awareness amongst employees related to occupational health hazards [7].

III. COMPUTER VISION SYNDROME (CVS)

The symptoms of Computer Vision Syndrome (CVS) or Digital Eye Strains are

- Strain in eyes
- Headaches
- Vision becomes blurred
- Dryness in eyes

These symptoms may be caused by:

- Low light issues
- Glare issues on screen
- Improper viewing distances
- Poor seating posture
- Uncorrected vision problems
- A combination of these factors

The extent of this syndrome mainly depends on the amount of time spent looking at screen. Vision problems

such as farsightedness (hyperopia) or shortsightedness (myopia) may show a gradual increase if not corrected. Persistent looking at digital screen may also lead to increase in these problems.

While some vision problems may be temporary and may be cured if a person lowers down his time spent on looking at digital screen. However some users may experience blurred vision, redness in eyes, headaches etc if they continue using digital screens.

Prevention or reduction of the Computer vision syndrome may involve the use of anti glare screens, using computer glasses with UV protection, working in environment with proper light, adjusting the brightness of screen as per need and minimizing the time spent on staring at digital screens. If the condition gets worse consulting doctor might be the best option.

IV. REPETITIVE STRAIN INJURY (RSI)

Repetitive strain injury is nothing but the pain in muscles, tendons and tissues of body. Due to overuse and repetitive movement the muscles get contract and relaxed which results in pain.
Repetitive Strain Injury can be more precisely termed as Upper Limb disorder as it is mostly experienced in upper parts of the body such as wrists, arms, neck and shoulder.

Symptoms of RSI: The symptoms of RSI can range from mild to severe and usually develop gradually. They often include:

- Pain, aching or tenderness
- Stiffness
- Throbbing
- Tingling or numbness
- Weakness
- Cramp

Initially the symptoms of RSI may cause mild pain, when repetitive actions are performed but with time they increase gradually causing severe pain and prohibition from any movement. Swelling in the affected area might also last for several months.

What to do if you think you have RSI: Developing symptoms of RSI related to job must be addressed as soon as possible. Requesting a change in job environment may be one solution to the problem. If the symptoms are recognized being developed from your daily routine, try to bring some changes in it. Taking short breaks from working on digital screens or changing postures might improve the conditions.

What causes RSI? : RSI is basically the consequence of repetitive contraction and relaxation of muscles and tendons. With the increase in repetitive movement there develops a strain in muscles, which the main cause behind RSI. The reason behind the development of RSI could also be related to the ergonomics. Poor seating postures and comfortless environment may also result in back pain and pain in muscles. Nutrition deficiency also matters the most. Many of the diseases are the consequence of nutritional deficiency. Weaker bones and muscles are the prime factor in developing the symptoms of RSI [9].

V. CARPAL TUNNEL SYNDROME (CTS)

Carpal tunnel syndrome is a common condition with the symptoms of pain, numbness, and tingling in the hand and arm. Carpal Tunnel Syndrome is usually caused due to compression of the median nerve which travels through the wrist.

The syndrome may get worse if not treated at an early stage. In many cases weak grip strength may occur. When the symptoms of the syndrome are noticed, wearing a wrist splint and avoiding certain activities, which cause the compression of nerves, might prove beneficial and reduce the pain.

Continuous pressure may even damage the nerves leaving no option of treatment rather than surgery. In the surgical treatment the traverse carpal ligament is cut. In worst cases surgical treatment is more effective as compared to non surgical options.

A narrow passageway in the wrist, about an inch wide, is known as Carpal Tunnel. Wrist bones known as carpal bones are present on floor and sides of the tunnel. The roof constitutes transverse carpal ligament which is a strong band of connective tissue. Due to rigidness of boundaries, the carpal tunnel has little capacity to "stretch" or increase in size.

The median nerve is one of the main nerves in the hand and originates as a group of nerve roots in the neck. These roots come together to form a single nerve in the arm leading to the formation of median nerve. The median nerve travels down the arm and forearm, passes through the carpal tunnel at the wrist, and finally goes into the thumbs and other fingers. The nerve provides feeling in the thumb and index, middle, and ring fingers and it also controls the muscles around the base of the thumb.
The nine tendons, known as flexor tendons, that bend the fingers and thumb also travel through the carpal tunnel.

The narrowing of the tunnel or swelling of tissues surrounding the flexor tendons swell, putting pressure on the median nerve, are the main causes of Carpal Tunnel Syndrome. The tissues surrounding flexor tendons are

called the synovium. Normally, the synovium acts as lubricant for the tendons, making it easier to move your fingers. The space in the tunnel is occupied by the swelled synovium which over time crowds the nerves thereby putting pressure on them. This abnormal pressure on the nerve can cause pain, numbness, tingling, and weakness in the hand. Most cases of carpal tunnel syndrome are caused by a combination of factors. Studies show that women and older people are more likely to develop the condition.

Other risk factors for carpal tunnel syndrome include:

- Heredity: The syndrome might be heredity. Such conditions might develop in a person with extensively narrow tunnel and the successors might be the victims of Carpal Tunnel Syndrome.
- Repetitive hand use: Prolonged use of hand in certain activities might also be responsible for the cause of Carpal Tunnel Syndrome.
- Hand and wrist position: Indulging in activities that involve extension of the hand and wrist for a prolonged period of time can increase pressure on the nerve.
- Pregnancy: Hormonal changes during pregnancy can cause swelling.
- Health conditions: Diabetes, rheumatoid arthritis, and thyroid gland imbalance are conditions that are associated with carpal tunnel syndrome.

Symptoms of CTS:

Symptoms of carpal tunnel syndrome may include:

- Pain in hand, wrists and forearm.
- Loss of grip strength.
- Numbness or tingling in thumbs or fingers.
- Discomfort during night is most common.

In most cases, there are no specific injuries which signify the symptoms of syndrome. At early stages the pain is also occasional and the patient find not even notice them. However with the time these symptoms get worsen and the frequency of pain in hands, fingers and wrists also increases.

Night time symptoms are very common. While sleeping, an individual usually bends his/her wrist, this might increase the pain and cause disturbance in the sleep.
During the day, symptoms often occur due to prolonged stress on the wrist, with the wrist bent forward or backward such as when using a phone, driving, or reading a book.
Many patients find that moving or shaking their hands helps relieve their symptoms [11].

V. INTERNET &SOCIAL MEDIA ADDICTION (ISMA)

Social Media Addiction, not a formal clinical diagnosis, is the addiction or say overuse of Social Media. The technology of socializing online becomes the habit of some people or say the habit which takes no time in transforming into addiction. In recent years the increase in use of Social Media and the increase in number of Social Media addicts has gain the interest of mental health community. The community is trying to figure out the pros and cons of latest trends and technology on mental health of humans. Although the technologies such as Skype, Instagram, and Facebook, WhatsApp allow us to communicate with family and friends on the other side of the planet, yet they are the root cause of Internet and Social Media Addiction. Unfortunately, people spend large amount of time updating their status, uploading pictures, commenting on walls, playing Facebook games, reading updates from others, and searching for new friends to add.

In the earlier days, when there was no internet, people used to scratch their heads more to find a solution. Any information to be searched wasn't readily available as is the condition today. Books, newspapers, magazines etc. were the sources of the information. With the introduction of the internet the access to every bits of information has become easier. Although this is advantageous to humans but over time humans have become the slaves of the technologies.

Signs of Social Media Addiction:

What can rightly be termed as "Slaves of Social media" has become real when many individuals neglect other important responsibilities, commitments, or their family in favor of social media.
In general, some key signs of Social media addiction could be,

1. An individual spends a lot of time thinking or planning on how and when to use Social media. Although the social media provides a powerful way of communication, a major part of time of an individual is wasted in posting the real time status of his/her activities.

2. A person feels an urge to use Social media more and more. This means checking out for any updates to your newsfeed or responses to posts. In other words, the default choice of utilizing free time is to be active on Facebook, Instagram, Whatsapp or on any other social media. Many times, social media apps/sites are left open in the background and the addict switches between work or class assignments to the page every few minutes. Although social media has connected us with our long distance friends, it does have widened the gap between our close friends.

3. Often the motivation behind use of Social media is to

forget personal problems. One aspect of addiction is the ability to use the behavior as a psychological escape from problems. A person may have job or relationship problems and the addiction becomes a convenient way to temporarily soothe the underlying stress created by the problem. When using Social Media as an addiction, the user is distracted in whatever it is he or she is doing and finds it hard to be fully present at the moment. For addicts, they may take a significantly longer amount of time to complete simple tasks or maybe some of their friends may complain that they don't pay enough attention to what they say. The use of Social Media then becomes a distraction from problems because one's attention is always diverted with its use.

4. Often becoming restless or getting irritated is the frequent consequence of prohibition from use of Social Media. With addiction, there is an element of withdrawal. We associated with withdrawal from drugs and alcohol and not necessarily behaviors but studies show that people can also go through withdrawal from additive behaviors like Pathological Gambling. Lack of network access may often develop a feeling of anxiousness. A person may become prone to depression if forced to live without access to Social Media.

5. Overuse of Social Media may have negative impact on relationships. Communicating on Facebook, WhatsApp, Instagram etc. via messaging, sharing photos and posts, commenting and 'liking' others' posts, may promote your socializing online more than offline. The behavior becomes unhealthy such that you become uncomfortable or fearful with face-to-face communication, which is a far richer experience than communicating online where one cannot actually see non-verbal communication as in the body language, gestures, and voice tones [12].

VI. RESULT AND DISCUSSION

In this survey based descriptive research sampled 322 Computer and electronic gadget users in Pune city, Maharashtra working in private sector using stratified random sampling to examine and differentiate impact of occupational hazards on health of computer and electronic gadget users.

Symptoms of Computer Vision Syndrome (CVS) like Eyestrain, Headaches, Blurred vision, Dry eyes, neck, and shoulder pain were more relevant in age group 26 years to 40 years of electronic gadget users (shown in Fig. 1).

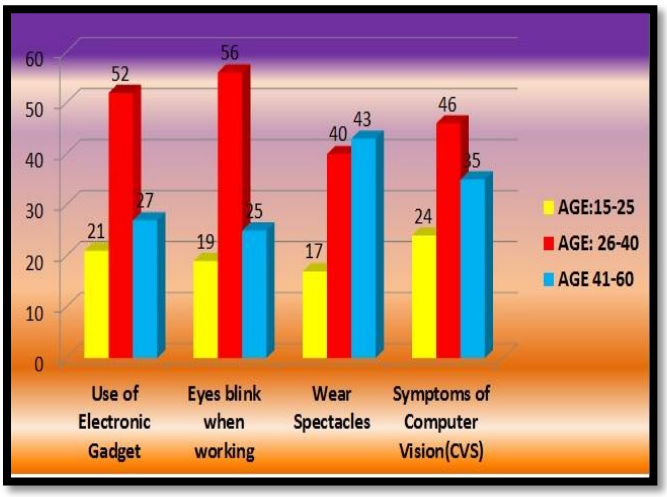

Fig 1: Survey based descriptive research: Symptoms of Computer Vision Syndrome (CVS)

Symptoms of Repetitive Strain Injuries (RSI) like Pain, aching or tenderness, Stiffness, Throbbing, Tingling or numbness, Weakness, Cramp were more relevant in age group 26 years to 40 years of electronic gadget users (shown in Fig. 2).

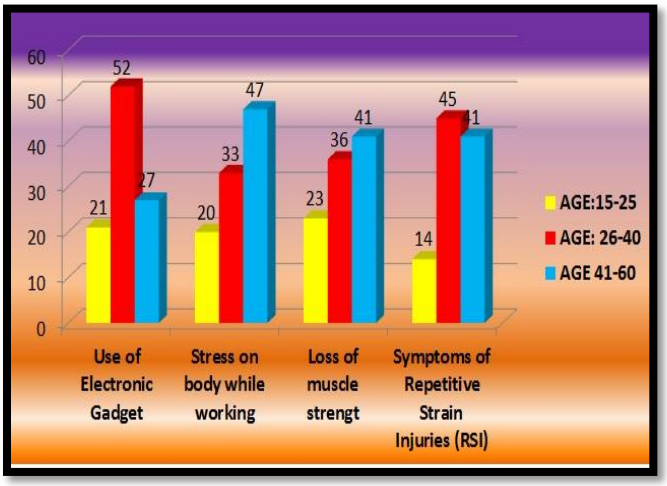

Fig 2: Survey based descriptive research: Symptoms of Repetitive Strain Injuries (RSI)

The relevancy of symptoms of Carpal Tunnel Syndrome (CTS) like Numbness, tingling, burning, and pain primarily in the thumb, Weakness and clumsiness in the hand, weak grip strength etc. are worth noticeable in age group between 26 years to 40 years of electronic gadget users (shown in Fig. 3.)

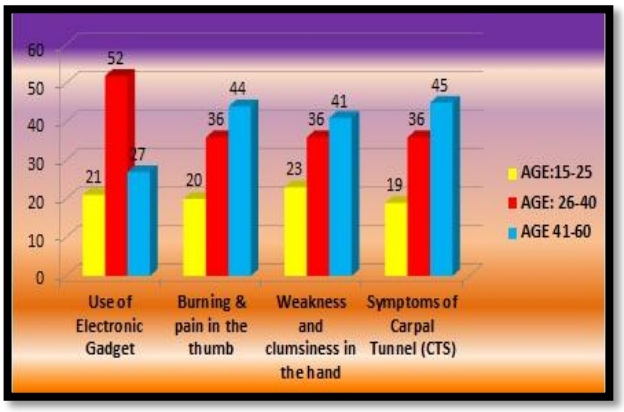

Fig 3: Survey based descriptive research: Symptoms of Carpal Tunnel Syndrome (CTS)

The statistics shown in Fig. 4 show that the symptoms of Internet & Social Media Addiction (ISMA) like spending a lot of time on internet, surfing social media like Skype, Instagram, and facebook, becoming restless or troubled were found more in age group between 26 years to 40 years of electronic gadget users (show in Fig. 4.)

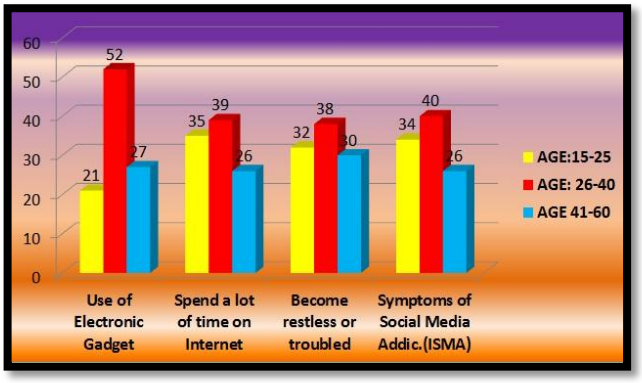

Fig 4: Survey based descriptive research: Symptoms of Internet & Social Media Addiction (ISMA)

Different factors related to the health were examined and differentiated to understand the effect of occupational hazards on health of computer and electronic gadget users in both kinds of organizations. The primary data was collected using questionnaire method from 322 users who are either students or employees. The secondary data were collected from books, journals, and websites.

VII. CONCLUSION

The result of the study proved that pain in neck, shoulder, upper and lower back, waist and leg and joints, eye problem, loss of appetite or changes in appetite, digestive problem, stress and irritation, minute injuries, skin allergy, ear pain due to prolonged exposure to air condition, breathing difficulties due to excessive cold, sleep disorder and menstrual. So we conclude that symptoms of Computer Vision Syndrome (CVS), Repetitive Strain Injuries (RSI), Carpal Tunnel Syndrome (CTS) & Internet & Social Media Addiction (ISMA) are more noticeable in age group between 26 years to 40 years of computer and electronic gadget users with the growing pace of technology and digitalization, these issues need to be addressed on prior basis.

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