

Review Article

Prevention of ill effects of Information technology on health: Early introduction of Technology Etiquettes in Curriculum

Dr. Rita Hajela¹, Dr. Ranjana Srivastava²

¹Assistant Professor M. M Medical College and Hospital, Solan-173229, Himachal Pradesh, India.

²Lecturer, School of education, UPRTOU, Allahabad, Uttar Pradesh-211013, India.

*Corresponding author

Dr. Rita Hajela

Email: hajelarita@gmail.com

Abstract: Computer, mobile and internet, as a package of information technology have entered into the life of 21st century homosapiens. They have become extensions of its body parts, changing its life style in a big way. The impact is enormous on the way it works, the way it socializes, the way it thinks, the way it entertains, even the way it sleeps and awakes, but the boon has not come without a bane. Like effects its side effects are also numerous. It has entered into life of human kind without any experimental and animal trials. Therefore side effects are being realized, right dose and mixture being formulated, recommendations being studied with the growing years of its use in human. The age old sayings prevention is better than cure and forewarned is forearmed are true to their core in reference to this technology. Therefore we have to work in this direction as side effects are numerous and a major pandemic is just waiting to explode in coming years, as with use has come misuse and abuse. The major side effects in form of computer mobile and internet related illnesses (CMIR) identified so far are, skeletomuscular, ocular, psychological, social, mental and addictive. Human being have learnt discipline, defined manners, formulated rules and regulations in different spheres of life but has not introduced any etiquettes in the use of technology. An early introduction of technology etiquettes is the need of hour to prevent the ill effects of information technology on health.

Keywords: Information Technology, Computer related illnesses (CRI), Skeleto muscular injuries, Etiquettes, Curriculum, Internet Addiction, infertility, obesity, videogames, vision disorders, strain, deafness

INTRODUCTION

Information technology in its various forms has become the major preoccupation of human being in modern society. Its use is growing at a tremendous speed. The real world and virtual world are at cross roads and mankind is swinging between the two. The paraphernalia of information technology in form of computer, mobile, laptop and internet is affecting every aspect of life. How much is too much? And what is good and what is bad are yet to be decided scientifically, experimentally and statistically with evidence. But there is no doubt that it is storming the world and has shaken the ground of basic life style. Its ill effects on health are being perceived throughout the globe like aftershocks. Discipline is something which is born with nature, Sun and moon, day and night and is part of nature and this discipline has to be applied to this technology in form of etiquettes and manners to prevent precipitation of any side effects which are increasingly being noticed.

Children are being introduced to not only three 'R's of literacy, i.e. reading writing and reproducing but also to a 4th R, which is revolving around the world of information technology in form of Computer, Laptop,

Mobile and Internet in their formative years at primary and secondary level both from school and from home. The impact of technology is seen in every sphere of our life. Everything seems good, very attractive with its importance unchallenged; but it is not without any side effects on health. Once introduced to it, the ill effects soon start overpowering them. The virtual world is so fascinating that it over takes the real word. Moreover they remain ignorant of its ill effects till it is too late. Therefore it is necessary that along with introduction of information technology the curriculum should also include a chapter on how not to use it, so that they are aware of its side effects misuse abuse and maladjustments and are not caught in the web of ill effects of information technology on health unknowingly.

Ill effects of Information Technology on Health

In medical science we can safely say that information technology is a virtual drug and hence like any other drug it has its side effects. When it becomes the occupation, it is like any other industry and comes in a package of industrial or occupational health hazard. The desired effects of this virtual drug are so many that boundaries between healthy use and unhealthy use is

very blurred, but the 21st century Computer, mobile and internet related illnesses (CMIR) pandemic is ready to engulf the world although as of today terminologies have not yet been standardized, research is lacking, new terms are being coined, but they are being perceived and when extreme forms are precipitated they become headline news.

Standard classifications have not yet evolved, but they can be broadly categorized as

Physical illness

- Self induced
- Over use induced
- Accidentally induced

Mental illness

- Addiction induced
- Deprivation induced
- Stress induced

From Anatomical point of view Physical illnesses can be divided into

- Eye and vision disorders
- Skeletomuscular disorders
- Obesity related disorders
- Sexual disorders
- Deafness disorders

Eye and vision disorders are the commonest ailment afflicting people who use computers for long hours manifesting in form of eye strain, dry eye, feeling of tiredness in eyes, difficulty in vision, development of refractory error, rapid change in power of glasses, watering of eyes, blood shot eyes, burning sensation in eyes, loss of focus, , blurred vision , double vision and even squints if position of screen is too lateral and frontal headaches. Dryness and fatigue occurs due to reduced rate of blinking. Between 64% -90% users are affected [1]. Chronic fatigue due to very high or too low set display unit, poor light arrangement in environment leads to development of dark circles around eyes, itching and redness develops due to oxidation of iron in hemoglobin. If blood flow is also reduced to optic nerve, a person can develop high tension in eyes, loss of peripheral vision, floaters in eyes and glaucoma.

Computer vision syndrome

Our eyes react differently to characters on a computer screen as compared to print leading to blurred vision. Printed material has dense black characters with well defined edges, where as words are formed on computer by tiny points known as pixels, which are brightest at center and diminish in intensity peripherally making it difficult to focus on these images. The natural tendency of eyes is to drift to reduced level of focusing (resting point of accommodation) unknowingly and then again willingly they have to strain back to focus to complete the task in hand. This repeated re-focusing on screen leads to eye strain. That is why many people find

it easier to read, comprehend and understand the printed material better. Our blinking rate is reduced when we work with pixel images and this leads to dryness of eyes. Eye strain causes muscle fatigue and accumulation of lactic acid in muscles [2].

Therefore what is lost unnoticed is to be restored to eyes willingly by practicing giving rest to eyes every 20 minutes so that the accumulation of lactic acid is cleared from the muscles by closing eyes or shifting focus to a distant object about 20 feet away from screen for about 20 seconds, and or frequent blinking of eyes after every 20 minutes for 20 seconds to produce and circulate tears in eyes.

Use of tear drops in day and lubricant gel in eyes at night to restore dryness in eyes is a good practice.

Use of glare screens, use of computer anti glare tinted eye glasses can reduce eye strain significantly. Adjust Position of screen, so that display is slightly below the level of eye and neck remains straight.

At around the age of 40 when natural aging process precipitates presbyopia the computer screen gets fuzzy and reading a fuzzy screen puts too much strain on eyes and causes headaches. People, who use bifocals, try to read screen from the bottom portion of glasses putting additional pressure and awkward position for eyes leading to soreness in eyes. Use of separate reading glasses is recommended for them.

Skeletomuscular

They are the commonest and are induced by overuse in awkward positions with repetitive stroke injuries [3-5].

Tendinitis

Tendons do not stretch with overload; they tear and fray causing inflammation. Pain and swelling commonly in hands, wrist and forearms.

Epicondylitis (tennis elbow)

Due to repetitive stroke injury, pain begins in elbow and spreads to forearm

Tenosynovitis

Tendons are covered with a synovial sheath in fingers; the sheath allows movement of tendon within it by a lubricant fluid known as synovial fluid. When repetitive movements as in typing or keying, are performed too much fluid is produced. This extra fluid causes swelling, pain and inflammation. Repeated forceful strokes are the main causative factor (RSI-repetitive stroke injury) [6].

DeQuervains disease

Too much friction of tendons within synovial sheath in thumb makes it thicker constricting tendon causing pain and swelling, usually precipitated by tight gripping of mouse in awkward position [7].

Ganglionic Cysts

When fluid collected inside a sheath increases so much that it looks like a bump it is known as ganglion commonly occurring on dorsal aspect of wrist precipitated by repetitive strokes with bent wrist.

Carpal tunnel syndrome

The most serious and disabling form of skeletomuscular injury. It is due to pressure on median nerves precipitating pain tingling and numbness, felt in first three fingers, wrist and hand.

Back neck and shoulder problems

Pain in lower back due to long periods of sitting without a proper support puts pressure on spine, slouching in chair increases muscular work, as they will have to work harder to maintain upright position. Tilting head backwards to look at monitor causes pain in neck and shoulder, if it is not kept at proper eye level. Inappropriate placement of work material also causes pain and stiffness in muscles of neck due to repeatedly tilting head to look at paper and then on screen.

Static Posture

Computer work is a static effort where demand of blood supply to muscles is more and supply is less as compared to other two body positions i.e. while resting or lying demand is less and supply is less, while running or playing demand is high and supply is also high, but in static effort like sitting for long hours before computer, supply is less demand is high, and lack of muscular movement causes pooling of blood in legs.

To prevent, it is necessary to take a break every 20-30 minutes, get up stretch and walk, drinking a cup of water from a far off place is a good idea

Obesity and related disorders

Too much involvement in computers not only for work but also for entertainment and socializing leads to less physical activity leading to obesity. People who use internet for long hours spending a lot of time on social sites like face book and on playing games also tend to eat unhealthy junk food leading to obesity. Then in due course of time they develop obesity related disorders also [8].

Male Infertility

Computers and laptops generate heat and this high temperature near testicles damages sperms leading to infertility, as sperms require lesser temperature to survive. Therefore do not keep laptops in lap for long hours. Computer occupation or its use for more than 10

hours per day has been found associated with abnormal semen analysis in terms of its volume, sperm density, vitality and motility and may be one of the factors of male infertility seen among long hours computer users. [9]

Deafness

Listening to music for long hours continuously using ear plugs, ear buds, head phones is becoming common day by day. Poor quality non smooth ear buds may damage ear canal and listening at high volume may lead to deafness. Therefore listen music at low volume and use good quality earphones which are not inserted in ear canal and only for a very limited period of time. Hearing loss, temporary or permanent deafness due to excessive noise exposure is occurring at an alarmingly high rate [10] and it can result into a lifelong hearing loss for children and teens, moreover even a mild hearing loss due to excessive noise could lead to developmental delays in speech and language development in children and teens [11].

Erosions inflammation and infections in ear canal is increasing among ear phone users. Samples from the ear of regular earphone users had thousands of times more bacteria than those from the infrequent listeners probably because plugging the ear makes it warmer and moister making it an ideal place for bacterial growth, it also raises the risk of cuts and grazes that bacteria can use to enter into the body, practice of sharing earphones makes matters worse [12].

Therefore it is recommended that wearing earmuff-style headphones that are "noise-cancelling type, which reduce or eliminate background noise decreasing the need to raise the volume above 50 percent making it possible to listen to music at a softer volume, for a longer time.

Follow the 60/60 rule when wearing ear buds. Keep volume below 60%, and limit listening to under 60 minutes per day.

Educate children and teenagers because they have no idea that hearing doesn't come back once it's gone.[13]

Accidents

Walking and talking, walking on roads while listening to music, driving and talking or texting not only makes one prone to accidents but also it is dangerous for others. People are just attached to their personal portable sound system, tuned in to whatever they are hearing and tuned out of the world around them. They are so many such incidences, which have led enforcement of laws but the menace will continue till self discipline is enforced. Texting or talking diverts attention and one is too engaged to see unexpected things and even when noticed, reactions are slow,

reflexes poor and this leads to accidents, trauma, disability and death [14].

Mental illnesses

Technology is addictive and overindulgence is common. Accessibility availability and absence of accountability are the three A's mainly responsible for technology and internet addiction disorder. It is estimated that 22% population who are using it, is suffering from one or the other problem of the technology addiction [15]. Mobiles have become an extension of our hand, earphones an extension of our pinna, information an extension of our brain and laptop an extension of our body, since they have become extensions of our body adaptation is a necessity. An epidemic is getting ready to explode any time with gigantic proportions. Several terms have been coined as Technology addiction disorder, Internet addiction disorder, problematic internet use, and internet over use, pathological computer use, i disorder but they all are basically the same only varying in degree and depth. We can safely consider them, a problem manifesting over a wide spectrum on a scale of 1-10. DSM manual revised in 2013 as DSM -V has not yet recognized them as separate disorders, they all come under behavioral problems.[16] Properly designed statistically proven data is lacking, as the technology itself is not very old and standardized definitions have not been yet assigned to them.

However a generalization is that a person is very easily trapped in compulsive internet use because of three things:

- It's easy availability and accessibility,
- A person can indulge in such activities without other persons noticing it giving a satisfying feeling of self control and independence,
- Excitement– internet users get a feeling of rush or buzz of excitement or achievement, on winning a game, on crossing a level in a game or on shopping or trading and this feeling traps them into a cycle of wanting for more [17]. Hyper sexuality and compulsive internet pornography is increasing [18].

First IBM computer came in 1984 and Internet addiction disorder was proposed in 1995 i.e. only about 10 years later, as if the problem is trying to keep pace with boom in technology. Habit forming disorders like playing on computer online or offline, watching very large number of internet videos or movies all are troubling as they interfere with other normal activities of life. Even when existence of internet addiction disorder is being questioned, as internet is a medium and addiction is to content only, the truth stands that without medium content is not possible. Therefore defining addiction to a different content for different people they all may be grouped together under one

broad heading of internet addiction disorder. Although they are basically all part of an obsessive compulsive behavior but since it is spreading wide and fast like an epidemic, they need to be addressed and recognized separately. A random analysis puts overall global prevalence of internet addiction as 6% [19]. They can be further subdivided according to the activity or content involved into

- Cyber relationship addiction
- Cyber sex addiction
- Information overload
- Net compulsions
- Gaming addiction
- Music addiction
- Communication addiction (compulsive talking and chatting)
- Gambling addiction
- Shopping addiction
- Stock trading addiction

Cyber relationship addiction

Addiction to social networking sites such as face book twitter, whats app, chat rooms etc. and dating sites are creating a place for communication with known and unknown people, with true and fake identity, merging all ages, all class of sections, all socioeconomic status, all religions on one platform, although in real life this would not have happened. Overtime these virtual friends start gaining more communication, more time and more importance over real life figures, family and friends. Since visuals are removed and most communication is through text only part of a person's personality is displayed or say only idealized personality is displayed. It has a different psychological impact on relationship; people suffering from social anxiety, shame or guilt usually get attracted to this non tactile form of relationship because they cannot be seen. It is a paradox that sometimes it might help these people but mostly it traps them into this transitional space where a feeling of extension of mind and soul is created, which is meeting the mind and soul of other person. Deception is the commonest thing because it is possible to create an entirely different personality online with an entirely different profile and picture, addiction to such relationship ends in psychological trauma. People who do not know how to express themselves in the real world or who do not have someone to talk to are the probable victims. Internet addiction is commonly an expression of some other underlying disease or trauma and hence all such people must be identified and analyzed for underlying issues like depression, anxiety, obsessive compulsive disorder. At present about 25% of users fulfill internet addiction criteria within 1st 6 months of internet use, a 2007 study in china claimed 17% of adolescents were addicted to internet [19]. Internet has a lot of potential to affect emotions, it can alter self image, self perception, self pride, stress and anxiety levels. It has been found that more than half of internet addicts are also addicted to sex, drugs, tobacco, alcohol, smoking,

chronic overeating and junk food overeating, with an increasing school dropout rate and missing classes.

Compulsive internet use can produce morphological changes in structure of brain. A computer use for 10 hours a day 6 days a week, none related to job requirement leads to reduction in size of dorsolateral prefrontal cortex and rostral anteriorcingulate cortex, supplementary motor area and parts of cerebellum [18]. The internet addiction is also supposed to impair short term memory ,and decision making abilities including one that contributes to desire to continue to stay online.

School dropout

The school and college dropout rate increases. In a study it was found that 43% of dropouts were staying up all night on internet [20].

Cyber sex addiction

Too much net surfing of porn sites and its visualization often affects real life sexual and other relationships also.

Gambling compulsion

There is a significant difference between common internet activities and pathological gambling. Internet is seen as a social, interactive and information driven medium while gambling is an antisocial behavior. When internet is used pathologically it leads to complications in life, like failures in school and deterioration in academic performance, loss of job, loss of promotion, strained relationships in marriage or divorce. A study in Korea reported 70% of internet users played online games and 18% filled the criteria of internet addiction utilizing Kimberley young's questionnaire, which was the first instrument to assess internet addiction and it has been validated in many studies done after words.

A study done in 2009 suggests that structural changes in brain were present in those classified as internet addicts similar to those classified as chemically addicted .

Various scales are being developed and validated for its assessment, a few of them are CIUS, compulsive internet use scale developed in Netherlands in 2009,PRUISS, problematic and Risky internet use screening scale in 2012 in University of Wisconsin, Griffiths six criteria for internet addiction which include salience, mood modification, tolerance, withdrawal symptoms, conflict and relapse [21].

Video game addiction

It is a well known issue around the world now, although not yet officially recognized and defined, it afflicts the people of all ages however teenagers and children are the most vulnerable population. Advancement of technology, development of broadband

from 2G ,3G, 4G data transmission rates, three dimensional figures, realistic characters and avatars, second life in games, power boosters, virtual arms and ammunitions MMORG (massive multiplier online role playing games) have increased the addictiveness to online and also offline games. These games not only engage one into a world of fantasy but also taking risks in virtual world game are linked to real life risks and give the player a sense of conquering in real life and this increases addictiveness. Gaming addiction is a conditional behavior and frequency of a given behavior is directly linked to reward and punishment. It is estimated that 40% of war craft players are addicted. Some games are more addictive than others. Studies indicate that overall 10-15% of gamers meet the WHO criteria of addiction. When gaming has crossed the limit of being an entertainment pass time to a full blown picture of obsession and compulsion, it is time to start therapy and see a psychologist or doctor. Candy crush addiction behavior has already captured the news headline in India. Not only affecting children and adolescents but also adults and high officials on responsible positions and as the new facts are emerging problem is more widespread than really thought.

Trading and shopping Addiction

Our brain responds with production of dopamine on an exciting experience. Initial luck and excitement traps them in a world of trading and shopping for want of that excitement again. A lot of money is thus spent on unnecessary items and may lead a person to debts and economic disasters.

Communication addiction disorder

Increasing on line social networking and decreasing off line social relationship phenomenon is a very complex issue but is being perceived globally as a health issue. Updating, commenting and sending likes is a vicious cycle and every activity is an addiction booster and the time spent online keeps on increasing at the cost of other issues and priority changes, having a lot of online friends or followers becomes an ego booster especially in the vulnerable age of adolescence, increasing the chances of getting addicted.

DEPRIVATION INDUCED

Stress and depression

Stress is not only an emotional feeling but it is linked to changes in release of hormones , changes in breathing pattern, increase in heart rate, increased secretion of acid in stomach and many more subtle physiological changes. People who are subjected to repeated , prolonged or continuous pressure start experiencing physical symptoms in form of frequent headache, loss of appetite, short temper, anger, disturbed sleep pattern or sleeplessness, acidity, stomach ulcers, body aches and at later stages high blood pressure and heart diseases also. People spending more and more time on computer to meet targets in job or otherwise experience physical fatigue, mental

exhaustion and stress builds up. It also takes away correspondingly same amount of time from family and real friends who are actually work as stress busters. Lack of this stress bursting mechanism leads to depression and a vicious cycle starts. When a person becomes addicted to social networking, lack of comments and likes also induces depression.

Smart phone abuse

Convenience and capabilities of smart phones has glued the 21st century population to it. When there is use, abuse also creeps in, creating an imbalance in personal, professional and family life and influencing ones productivity also.

Phantom ringing syndrome

Repeated feelings of vibrations in pockets or feeling the phone is ringing where as it is actually not . It is due to misplaced response to a slight scratch or tingling causing a burst of neurotransmitters from brain prompting an action either due to an associated feeling of pleasure or anxiety [22].

Cyberchondria

Some people start believing in diseases they read about on internet, as symptoms are overlapping and at least one symptom which a person is experiencing can be easily associated, it is just like the paraclinical syndrome when medical students start feeling the diseases as they read about them.

Nomophobia

It is the term coined to define stress and anxiety related to smart phone affecting young and old alike. It is pathological fear of remaining out of touch with mobile. Human habits, behavior, communication and conceptualization of reality, all have been affected by technology. But when a person is obsessed with it and cannot put it down, keeps on staring it even without talking, texting or reading, it becomes an addiction. When one cannot take dinner without mobile, when one cannot go to sleep without it, it is time for therapy.

FTAD (face book twitter Addiction disorder)

On Face book /twitter/whats app etc. hours just pass away either on your own or on others timeline unnoticed. When you start feeling empty without it, when you start finding nothing else interesting in real world and try to find ways to get back to these social networking sites, when you are worried about missing on updates you are obsessed with it and you are a case of FTAD /whats app addiction disorder or social networking disorder [23].

Selfietis

Taking too many selfies a day is a mental disorder, it is an obsessive compulsive desire to take photos of self, called selfies and post them on social media, it may be a way to make up for a low self esteem and to fill a lacuna in intimacy. If you are taking more than 2 selfies a day and posting them you have already crossed the limits and entered into the world of selfietis. If you are taking more than six you are certainly suffering from chronic selfietis [24].

Considering all the above facts it is not only a time for introduction of computer literacy but also a time for introduction of technology etiquettes in the curriculum to prevent mankind from Technology related physical and mental disorders and to save the mankind from its addictive effect.

Technology Etiquettes to be followed

Ergonomically designed comfortable chairs with a proper lumbar support adjustable to user's height are best suited, but when it is not within ones reach due to poor socioeconomic status, improvised materials can be utilized to achieve the same results, like putting bricks to gain suitable height, putting cushions to give lumbar support to back. The main points to be considered in computer and technology Etiquettes are

- Do not work with bent wrists - wrists form straight extension of forearms and are supported not hanging
- Do not give repetitive strokes at a high rate , give muscles time to relax
- Use hands arm neck and whole body in a neutral position.
- keep feet flat on ground or on a foot rest
- thighs are parallel to the floor
- hips back and neck form a straight line
- keep display slightly below eye level
- Often Break the static posture – get up stretch and walk every half hour
- Use anti glares glasses and screens to avoid damage to eyes
- Exercise eyes by following the rule of 20:20:20
- Do not keep lap tops in lap for long hours
- limit your time on computer laptop mobile internet
- Make real friends and do not get carried away by virtual socializing
- Play real physical games and do not over indulge in video gaming
- Put limits to your internet use before you are taken away and immersed in virtual world



Fig-1: Your Body and Computer Etiquettes

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