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Are We Safe with our Cellphones/Smartphones? A Comprehensive Study on Evil Effects on Human Health

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Abstract: The smart phone or a mobile phone has become 24hrs "round the clock" companion of most of the users all over the globe. There are actually very few people those who are not using mobile phone. Most of the mobile phone users can not even imagine that the mobile phone goes off even for an hour. Some might even start worrying. The advantage of smartphone or mobile phone is that it keeps users online, connected and entertained. It is important to point out that smart phones have changed the way we access internet and benefit from the mini computers that they are. The people are empowered as they access information and interact with everyone all the time, on the go. Above all its fun playing games, tweeting, managing our mails or Facebook likes, all at the same point of time. However, there is also a negative side to the smart phones or so called mobile phone. It has already been proved that the constant use of mobile phone creates lots of health problem. The mobile towers are much more dangerous for human beings. In the present paper the authors tried to collect various data from different sources and made a systematic study on the evil effects of mobile phones/smartphones on human body.

Keywords: smart phone; mobile phone; internet; computational work; addicted

I. INTRODUCTION

Initially the mobile phones were used by few people across the globe and the people were using only in case of emergency. But in the last 2 decades there is a tremendous change in the network technologies and Internet facilities. The scientists and innovators have join their hands to improve the mobile technologies to make one unique device which can be used to send and receive audio or video message or to use internet facilities or to perform any computational work at a very nominal cost. The mobile phones definitely makes the life very easy but it has many evil effects. In the present study the authors will try to explore the negative side of using smartphone or a mobile phone. Some of the important negative effects are mentioned below:

1.1 Change in behavior :

The smart phone or the mobile phone might be affecting one's thought process, behavior and attitudes in a more negative and faster way. It does that so finely and secretly that it becomes difficult to identify and cope up with. It is not an exaggeration to say that smart phones have the power to influence most important decision making processes and choices. It changes personality, it changes the behavior of a person. Smart Phone addiction is a well-recognized condition, known to cause trauma and high level anxiety pains. Addiction to remain online, compulsion to be active on social sites leads to low productivity and impacts the emotional health of the person. Constantly looking for something interesting on web, social sites and games inhibits ones emotional ability to focus on one topic for long. Its proven now that long hours of gaming makes anyone impatient, addicted and unproductive. Long time effects may be worse, permanent and affecting the more subconscious layer of behavior. So the suggestion is to keep phone away for a while and enjoy all the other good things life has to offer.

a) Affects the eyes.

The abrupt change in graphics, brightness and details while you are gaming is one of the main causes of chronic dry eye syndrome. The eyes bear a tremendous amount of reflexes, stress and dryness. Before the eyes can relax and recover there is a new job ready again within that screen that it's sick of.

b) Problems disconnecting.

Becoming addicted to your phone has become a conditions that experts now call: "Nomophobia" (no-mobile-phone-phobia). It's not limited to the hardcore Wall Street types with their "crackberries" though; it's more used these days than we realized. A recent survey found that 84 percent of the world's population said they could not go one go about in their day without their smartphones, and current research shows that nearly two-thirds of teens and young adults check their phones every 15 minutes or less. The anxiety and stress over missing out on a text or Facebook update can take such a toll on peoples' health that Morningside Recovery Center in California recently founded the first rehab group for nomophobia.

c) Lifestyle diseases.

Hyperactive to hyper stressed takes much less time nowadays, thanks to our phones. It is common to see teenagers and even adults exhausted of the long hours spent on smartphone, be it games or surfing net. It impacts the digestion, breathing rate and heart beat rate. Smart phones have become a new enemy to our sleep in terms of quality and time. Apart from that, the hours that otherwise might have been spent exercising, going out, getting fresh air in parks, interacting with your loved or even pets are all taken up by your smart phones. It's hard to imagine all this making us healthy! Next time when you are consumed by your phone, take a break and breathe, breathe long and easy. You will at once feel the kind of stress it has relieved you from!

d) Problems with posture.

There are many diseases resulting from wrong postures while working for long hours. Gazing into your phone for long time with neck bent and arms in a fixed position pose a serious health risk. Pain, muscle spasms and restlessness are just short term effects. In the longer run permanent or chronic diseases may occur. Cervical spondylitis, golfer elbow, chronic dry eye syndrome, stiffness in thumbs, neck and back are a few diseases occurring from habituated wrong postures of using smart phones. The typical head down and neck bent position while one is engrossed in their favorite games or chat should be consciously avoided.

e) Destroying your focus.

You don't own your phone—it owns you. Researchers in Finland found that most people obsessively check their menu screen, news, e-mail, and apps, even though the likelihood of seeing new and interesting information keeps decreasing. That's very much true. If you are waiting for something and it is very urgent, you will keep refreshing your phone to see if it is there or not.

II. SOME IMPORTANT FINDINGS ON PROLONGED USE OF SMARTPHONES/MOBILE PHONES

The authors have made extensive study on real life data on negative effects of using smartphones/mobile phones. The studies shows that there is a link between prolonged mobile phone use and serious health damage. The evidence is both wide-ranging and compelling. The possible health risks identified include not only brain tumors but also damage to fertility, genes, the blood brain barrier and melatonin production as well as other biological effects thought to have a role in cancer development. The largest body of evidence concerns brain tumors. Almost every study of prolonged mobile phone use – roughly half-an-hour a day for 10 years – has found an increased risk of brain tumors. Several large-scale studies have found a doubling of the risk after only 10 years' use. This evidence contributed to the recent classification of mobile phone radiation as 'possibly carcinogenic' by the World Health Organization's scientific panel. And given the average latency period for brain tumors of about 30 years. This is especially so for children. Not only do their thinner skulls, greater tissue conductivity and

smaller heads increase their radiation absorption when on a phone call, but their cumulative lifetime exposure to the radiation will also be much greater. Despite the accumulating research, the use of mobile phones continues to grow unchanged. In the UK, 90% of secondary-school children and nearly 60% of 8-11's have a mobile phone. The Department of Health's leaflet on children's risks is available only online and children, parents and schools are unaware of the vital guidance it contains. The few manufacturers' warnings that exist are almost impossible to follow and are buried in the small print of user manuals where hardly a customer sees them. Consequently, public awareness of the risks remains minimal. It has suited the mobile phone industry selectively to play up the evidence that argues against a causal link between phone use and health damage. Government agencies and departments similarly seek to relieve public fears by emphasizing the studies (mostly short-term) that appear to give phones the all-clear, thereby down-playing the uncertainty over long-term safety. This was the kind of wishful thinking that cost lives with tobacco and asbestos. The link to cancer was only proven some 25 years after the first studies were published. The fact that the evidence is not conclusive and that there are gaps in our understanding is not justification for inaction. Both the Government and phone companies could very easily do far more to alert the public, particularly children, to the emerging risks and safety measures. Given almost universal use of the technology, waiting for conclusive evidence before action is taken is irresponsible, especially when there are unrestrictive measures that can substantially cut the risks. Safety advice could be widely publicized at relatively little cost. As the Council of Europe has recommended, the Government and phone companies need now to publicize their warnings and provide practical advice, especially for children. Schools, phone shops and the healthcare system should be enlisted into the effort.

2.1 Cancer and other Tumours:

Several studies among sizeable populations have found a doubling of the risk of some brain tumours after 10 or more years' mobile phone use for about half an hour a day. Studies indicate a possible link between mobile phone use and tumours of the parotid gland (a salivary gland in the region normally highly exposed to radiation during phone use). The World Health Organization's International Agency for Research on Cancer (IARC) has classified the radiation emitted by mobile phones as "possibly carcinogenic to humans" (Class 2B).

2.2 Damage to Fertility and Reproduction :

Laboratory and observational studies have found damage to sperm, impaired female fertility and damage to the unborn foetus from exposure to mobile phone radiation.

2.3 Genotoxic Effects :

Laboratory studies from different research groups suggest that even after short periods of exposure to phone radiation, DNA strands can be broken and there are effects on gene expression. Phone radiation is capable of disturbing the DNA repair mechanism, and this can continue for several hours after the phone use.

2.4 Damage to Other Biological Processes:

Laboratory studies suggest that phone radiation can damage the blood-brain barrier, causing a leakage of albumin into the brain. Studies have found significantly reduced levels of melatonin in humans after about half an hour's mobile phone use per day. Effects on heat shock proteins (similar to a stress response), oxidative stress, apoptosis (cell death) and damage to cell membranes have been identified in research. These are thought to have a role in cancer development.

2.5 Children and Young People:

Children's brain tissue is more conductive, radiation penetration is greater relative to head size, and children will have a longer lifetime of exposure than adults: all increase their risk of harm. Laboratory studies have shown consistently that children's heads absorb up to double the energy that a large adult does when making a mobile phone call and that the energy can be concentrated in certain areas of the child's brain, resulting in up to 3 times the absorption in these areas. One study has found

that the risk of brain cancer after prolonged mobile phone use is significantly greater in younger users than in adults. The question of whether mobile phone use can cause cancer is one that is of great public health interest and of scientific debate. The main scientific problem is that cancers take many years to appear after the events that trigger their development. Several studies among sizeable populations have found a doubling of the risk of some brain tumours after 10 or more years' mobile phone use for about half an hour a day. Studies indicate a possible link between mobile phone use and tumours of the parotid gland (a salivary gland in the region normally highly exposed to radiation during phone use). The World Health Organization's International Agency for Research on Cancer (IARC) has classified the radiation emitted by mobile phones as "possibly carcinogenic to humans" (Class 2B). There is, understandably, sparse evidence of raised cancer rates among short-term users of mobile phones, though some studies have suggested just such effects: participants who had used a mobile phone for more than one year had a 30% increased risk of one type of tumour (glioma) when compared with those who had not used a phone. However, when it comes to longer-term use, a number of separate studies have found an increased risk of brain tumours. Several of these have found that using a phone for more than 10 years approximately doubles the risk of being diagnosed with certain brain tumours (glioma and acoustic neuroma). Note that a lower average amount of use has been found in some studies to be associated with an increased risk, as little as a few minutes a day in some cases. IARC classification - Class 2B: "possibly carcinogenic to humans" The World Health Organization's International Agency for Research on Cancer (IARC) has classified the radiation emitted by mobile phones and other wireless devices as "possibly carcinogenic to humans". The largest study yet conducted, the Interphone study, found higher risks of brain cancer among people with substantial cumulative call times and an increased risk of a same-side brain tumour. The Interphone Study was an international multi-centre study carried out by IARC which reported in 2010. The widely reported main conclusion of the study was that there was no overall increase in brain tumours observed with use of mobile phones. However, other findings of Interphone, subsequently highlighted by IARC (see Baan 2011) show an increased risk of some brain tumours after only 7 years' mobile use. It has found that substantial phone users (about 30 minutes a day for 10 years) were twice as likely to suffer from the most frequently malignant type of brain tumour, known as glioma. IARC based its classification 'possible carcinogen' on the Interphone results, on a Swedish study that found that the risk increased with years of use and with total call time, and on a Japanese study which found evidence of an increased risk for acoustic neuroma associated with same side ("ipsilateral") mobile phone use. There is controversy over the methods for gathering data in these studies. Estimates of mobile phone use invariably rely on the memory of individual users and, together with selection bias, this can distort findings. The Interphone researchers have stated that biases and errors limit the strength of their conclusions. There is also a concern that these studies may be a poor guide to the effects of today's phone use. Average call times studied were low compared with today's exposure: some of the subjects in the Interphone study had used a phone for as little as half an hour a week and the old analogue phones didn't use a pulsing field (thought to exacerbate biological effects), though their power output was higher. Interphone did not adjust for cordless phone use, and as cordless phones operate using the same technology as mobiles, this may have resulted in a substantial under-estimate of risk. On the other hand, tumour sufferers might be prone to over-estimating their phone use in retrospect. Some authorities (the UK's Health Protection Agency and World Health Organization, for example) point to the studies that have not identified harmful effects as offering reassurance but these almost exclusively studied short-term use, in some cases as little as 3 years. Only one large study that attempted to investigate the effects of long term phone use failed to find a statistically significant association (Frei 2011). Various problems have been raised by a number of scientists in the way the study was conducted and analysed, which could have severely distorted the findings. Misclassification problems were raised in the published paper itself. The earlier paper reporting on this study (Schuz 2006) was considered to be unreliable by IARC in its review of the evidence discussed above, saying that "In this study, reliance on subscription to a mobile phone provider, as a surrogate for mobile phone use, could have resulted in considerable misclassification in exposure assessment." (Baan 2011). Given that it takes on average about 30 years for brain tumours to develop, we know that any long-term effects have not been fully reflected in the findings, which have generally studied exposure periods of no more than 10 years. For this reason, the true effects may continue to be obscured for

many years. Phones have only been used very widely for 10 or so years, and by children for much less than that. Given a latency lag thought to be at least 30 years (based on the average induction period for brain tumours caused by ionising radiation), a possible association with only some types of tumour and only in exposed parts of the brain, the absence of an obvious increase in overall brain tumour rates tells us little. A rise in malignant brain tumours has been reported in Australia and a recent UK study (de Vocht 2011) has identified a small but potentially significant rise in temporal and frontal lobe tumours - the brain regions most highly exposed to mobile phone radiation. Additionally, a sharp rise in tumours of the parotid gland (a salivary gland) has been reported in Israel, where the majority of adults have been using mobiles for many years: (Baan 2011, Sato 2011, Dobes 2011, Duan 2011, Hardell 1999-2011, Cardis 2011a and 2011b, de Vocht 2011, Duan 2011, Czerninski 2011, Aydin 2011, Frei 2011, Interphone Group 2010, Yakymenko 2010, Khurana 2009, Kundi 2009, Morgan 2009, Myung 2009, Han 2009, Sadetzki 2005, 2008, Bondy 2008, Preston 2007, Schuz 2006, Lönn 2004, 2005). It is of some concern that the trend in cancer of the parotid gland, which is adjacent to the head location of the mobile phone, in Israel is now rising, with the steepest rise after 2000, whilst other salivary gland tumours have remained stable; and the trend of brain cancers in Sweden appears to be rising. Both Israel and Sweden are amongst the heaviest and earliest users of mobile phones. Even those studies that have looked at longer exposures may only hint at the long term risk. Given average cancer latency periods in excess of 30 years, we would not expect the full effect of any link between phone use and cancer to show up for some time yet in the research. Therefore, the doubling of the effect on tumour incidence that we are seeing in some studies after 10 years' phone use could plausibly turn out to be the tip of the iceberg. Many scientists take the view that the evidence doesn't point to a problem, and even the World Health Organization, whose own scientific panel has confirmed the possible link, has sought to allay fears by stating that "an increased risk of brain tumors is not established". But there is now a substantial body of world-class scientists who emphasize the growing evidence of harm. However, one cannot say definitively that "mobile phones cause cancer". It can be confidently said that the evidence puts safety in serious doubt. Given the major implications of this for public health, the issue requires urgent attention by public health agencies. In particular, it justifies efforts to help the public minimize their exposure to phone radiation, particularly to the head. Foetuses and newborns exposed to mobile phone radiation developed more behavioural and emotional problems. Animal studies have found a significantly reduced number of ovarian follicles in female offspring when mothers were exposed to phone radiation during pregnancy. Other biological impacts on the foetus include genetic changes, altered brain development, cell death and auto-immune responses in blood serum.

III. SOME IMPORTANT ISSUES IN CONNECTION TO USE OF MOBILE PHONES/SMARTPHONES

3.1. The Department of Health's leaflet should be re-drafted to provide clear advice and information enabling the public, particularly children, to reduce exposure to phone radiation. This should include steps to reduce harm from exposure to areas other than the head, particularly the projection area and the abdomen of pregnant women. Other communication tools should be developed, such as posters and adverts.

3.2. The leaflet, posters and adverts should be made available in print as well as electronic form. The leaflet should be given to all children in schools and publicized to parents, teachers and healthcare professionals. Posters and adverts should be on display in prominent places in schools, doctors' surgeries, mobile phone shops, libraries and other public areas.

3.3. The recommendations contained in the leaflet should be publicized widely to children, parents and schools through all available low-cost means, such as in leaflets and talks given to children and parents by schools, and in material displayed in phone shops and doctors' surgeries and on government, phone company and advisory websites.

3.4. Phone companies should actively engage in the information campaign, providing customers with clear practical advice in marketing literature, on websites and during conversation. Small-print warnings in phone instruction manuals should be replaced with clear statements in a prominent place on phone packaging.

3.5. Teachers, healthcare professionals and parenting advisers should be informed and educated about the safety measures so they can relay them to children.

3.6. Other initiatives to educate children should be developed to instruct them on safe use, for example in assemblies and relevant lessons (such as PHSE and science). Facilitating exposure reduction

3.7. Schools should be encouraged to adopt policies to discourage phone use by children, for example restrictions on use within school buildings.

3.8. Corded phones should be provided where possible in schools and public places to reduce dependency on mobile phones.

3.9. Schools and parents should encourage children to use low-radiation headsets or speakerphone when using mobile phones for calls and not to carry their phones on their bodies on standby for long periods.

3.10. Parents should be discouraged from providing mobile phones to children before they are genuinely needed. Parents should be given advice by government and parenting advisers on minimum age of use by children. Phone retailers should be encouraged to sell exposure reduction devices, such as low-radiation headsets and belt clips.

IV. HEALTH HAZARDS ARISING DUE TO RADIO FREQUENCY RADIATION FROM MOBILE TOWERS/ ANTENNA

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4.1 “**Fachkrankenhaus Nordfriesland**”; the German hospital dealing with health problem arising from Electro-magnetic fields has come out with its research findings (on their website www.fachkrankenhausnf.de) about E-smog. It is discovered that due to E-smog, there is massive reduction in “Melatonin hormonal levels. Melatonin is an important hormone required for sound sleep & stable immune system. Further it exercises a protective function against neuro – generative diseases like Alzheimer’s & Parkinson’s diseases & multiple sclerosis. It lowers blood pressure & cholesterol. Massive reduction in Melatonin levels of @ 30 % are observed in case studies.

4.2 Dr Vini Khurana, Australian neurosurgeon of Indian origin says, Cell phones are today, what tobacco and asbestos companies were 40 yrs ago. Cell phones cause more cancer than smoking & asbestos.

4.3 Dr. Neil Cherry, biophysicist from Lincoln university of New Zealand, said at Scientific workshop on biological & health effects of RF – EMF held in Vienna in 1999, “Every night, as we go to sleep, our melatonin level rise. Melatonin goes through our blood & clears our cells up, that is to say, scavenges free radicals, which are highly damaging chemicals. If free radicals persist for long, they damage the DNA, cause damaged cells & are shown to be carcinogenic. Melatonin is one of those agents, that cleans us up every night to reduce the possibility that cells will become carcinogenic. Power lines, Radio, TV & Cell phone towers must be kept away from houses, hospitals, schools.

4.4 The earth is fully covered with haze of electro-smog from a host of wire-less radiation devices, which is showing its effect only on human population but plants, animals & climate. We are engaging into a world where biology & physics are co-dependent/ interdependent.

Human brain is tuned to natural background frequencies which exist between earth’s surface & ionosphere. These frequencies are called Schumann resonance frequencies (SR) from 0 – 50 Hz. The brain cells reside in ELF frequency band. Daily cycles & emotional functions of our lives are guided by SR frequencies. Everything from our sleep, wake up cycles to

creative cognitive tasks, relaxation to states of anxiety are activated by this band of frequencies. Recently a few scientists have observed that man kind has altered these frequencies. Once our strongest and base frequency was 7.8 Hz, inside alpha band. It is now rising to 11 Hz, close to Beta band.

This is important, because 7.8 Hz is the centre of brain's alpha wave activity (7 to 12 Hz), where mind generates its capacity of creativity, mental co-ordination, calmness, inner awareness & learning. If the base of SR continues to rise, it will cross in Beta activity. This level is associated with alertness & anxiousness. But at higher levels, it leads to lack of focused attention, concentration.

Scientists are now zeroing on how man made RF/ microwave frequency signal can interfere with the body. The process is called frequency coupling/ resonance. The theory concludes, "When a material (the body) is activated by interaction with another source of energy (RF/MW) at same resonant frequency; a more powerful & intensive response occurs. If frequency is pulse modulated; a significant changes can be created in the codes of DNAs of human body. Scientists have observed how EM-RF radiation alter biological processes. Scientists have shown, that wireless radiation affects everything from cellular functions to general well being to more end point diseases. EM – RF radiations cause increase in micronuclei levels & reduced Melatonin levels. Micronuclei are indicators of compromised immune factors & precursors to cancer. RF radiation impacts & penetrates cellular growth & division processes, which could ultimately be linked with more acute & chronic diseases such as DNA damage, increased micronuclei formation, activation of stress proteins etc. EM-RF frequencies break in the blood – brain barrier, a barrier which keeps toxins from entering the brain. Breaking blood – brain barrier contributes to increase in development of Alzheimer, Parkinson & other neurological diseases; reduced sperm count.

4.5 As per resolution passed in "International Cell tower conference" 2000 held in Salzburg, Austria, in which over 100 physicians & 33 other delegates took part, "A cell tower should be situated no closer than 1500 ft (457 mtrs) to homes". They went a step ahead & declared CELL phone towers as "Public health emergency".

4.6. What the established law in India Says about this issue?

The Telecom commission of India, has approved the adoption of "International Commission recommendations on Non – ionizing Radiation Protection" (ICNIRP) guidelines, recommended by Telecommunications Engineering Centre (TEC), in the Telecommunication Sector in India regarding basic restriction & response levels for limiting Electromagnetic Field exposure

Frequency Range	E- field strength (Volt/meter)	H – Field meter strength (Amp/meter)	Power Density (Watt/m ²)
400 MHz to 2000 MHz	$1.375 f^{1/2}$	$0.0037 f^{1/2}$	$f/200$
2 GHz to 300 MHz	61	0.16	10

V. RESULTS AND DISCUSSIONS

5.1 Case studies: Abroad

In Berkeley House, Staple Hill, Bristol, UK, where Orange mobile mast was erected on roof of 5 story bldg; five out of eight flats on top floor have been affected – 3 have died.

Top floor – 5th floor:-

(i)Llewellin – male –(63) died of bowel cancer.

(ii) Barbara Wood – Female – (70) died of breast cancer.

(iii) Hazel Frapce – Female – (63) fighting breast cancer.

(iv) Phyllis Smith – Female – (89) fighting breast cancer.

Fourth floor

(i) Bernice Mitchel – Female – (69) Womb cancer.

In Warwickshire, 31 cancer patients were detected on a single street & a quarter of 30 odd staff at a special school, within sight of 90 ft high mast, developed brain tumors since 2000. The masts are being pulled down under growing protests of thousands of people. Top floor residents of Melbourne office building were closed down & 100 people were evacuated after 7th worker in 7 years was diagnosed with brain tumor.

5.2 Case studies in India:

(i) Riddhi Park, Thakurlee (West)

A. Mrs Roopa Bhat,

Builder had installed mobile tower before the residents had occupied the building. Within 4 months of occupying the top floor flat, Mrs Roopa Bhat started suffering from “brain tumor”. She used to feel fatigued; and also suffered from white rashes on the body.

B. Mrs Roopa Bhat’s neighbor delivered a baby with cancer of spinal chord name not disclosed at request of the patient’s parents.

C. Another neighbor (name not to disclosed) gave birth to child having “BIRTH DEFECTS”; and the child died immediately after birth.

All the residents of the building are now demanding the demolition of the tower. In spite of these demands by residents, builder has installed another “VODAPHONE” tower. Mrs. Roopa Bhat has left her flat in Thakurlee and she is now staying in Goregaon and spent @ Rs. 10 lakhs for treatment on brain tumor. She has to pay for additional rental money. However her health is now improving.

(ii) Mr. Bhagwant Deshpande, of North Kasba peth, Deshpande galli, Solapur; has come out with an interesting statistics about people staying in 300 ft radius of “Vodaphone” & “Airtel” mobile towers. There has been a death of 9 persons in last four years.

Many persons are facing sleep disorders, restlessness and fatigue due to radiation coming from mobile towers.

Sleep disorders in an individual, if observed after installation of mobile tower on his/ her respective building, in fact violate Section 21 of “Indian Constitution”, which guarantees peaceful living & liberty. If one can’t sleep, how his/ her life would be peaceful?

VI. CONCLUSION AND FUTURE SCOPE

Smartphones and mobile phones are now almost integral part almost every persons in the globe. As it is not good for health so therefore, more research work should be done on prolonged usage of smartphone/mobile phone. The time is coming when most of the household goods will be operated my smart phones. So therefore it must be full proof that there should not be any kind of risk factor of using this small electronic device. Especially the pregnant women and children are in greater danger from cell phone towers than the normal population. A recent study on pregnant women with heavy cell phone use found behavior problems in their children. According to Dr. Om Gandhi, an eminent scientist in the area of bio electromagnetics, cell phone

radiation makes children more susceptible to DNA breakage, genetic damage, and incidence of cancer. It reduces their life span. However, the authors are hopeful that the manufacturer, the big industries must come forward and do extensive research work on effects of usage of smartphone/mobile phone on human health.

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