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Review Article

The Effect of Mobile Phone Use on Pregnant Women: A Comprehensive Review

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ABSTRACT:

The ubiquity of mobile phone usage has sparked widespread interest in its potential health effects, especially among vulnerable populations such as pregnant women. Mobile phones emit radiofrequency electromagnetic fields (RF-EMFs) and are associated with behavioral and physiological changes due to prolonged screen exposure, sleep disruption, and thermal effects. This review examines current human and animal studies related to the effects of mobile phone exposure during pregnancy. Key concerns include increased risk of miscarriage, adverse fetal growth, altered biochemical markers, and potential neurodevelopmental impacts on offspring. While conclusive causal links remain elusive, emerging evidence justifies a precautionary approach, especially during critical windows of fetal development. This article discusses mechanisms, limitations of current research, and practical recommendations for risk reduction.

INTRODUCTION

However, their increasing use has also sparked debates over the possible health consequences associated with long-term exposure to electromagnetic radiation (EMR). Mobile phones emit radiofrequency electromagnetic fields (RF-EMFs) typically ranging between 450 and 3800 MHz. Although these fields are categorized as non-ionizing, meaning they do not directly damage DNA like X-rays or gamma rays, they may influence biological processes through thermal and non-thermal mechanisms.

Pregnant women represent a particularly sensitive population due to the presence of a developing fetus, whose tissues are rapidly dividing and more susceptible to environmental influences. The World Health Organization (WHO) and the International Agency for Research on Cancer (IARC) have classified radiofrequency EMF as "possibly carcinogenic to humans" (Group 2B), indicating limited evidence of potential harm.

In this context, studying the effects of mobile phone use during pregnancy is crucial to determine whether EMR exposure may affect maternal physiology, fetal development, or birth outcomes.

Furthermore, the lifestyle of modern women often includes prolonged mobile phone use for communication, entertainment, and work-related purposes. Pregnant women may keep phones close to their abdomen, talk for extended periods, or sleep with the device nearby, all of which increase exposure levels. This review aims to summarize the current evidence on how such practices may influence pregnancy-related health parameters and suggest preventive measures.

2. Types of Exposure during Pregnancy

2.1. Electromagnetic Field (EMF) Exposure

Mobile phones emit low-level, non-ionizing radiation primarily in the 450 MHz to 2.6 GHz range. During use (especially voice calls), RF-EMFs are absorbed into nearby tissues. If the phone is placed close to the abdomen or pelvis, there is potential for fetal exposure. Devices like Wi-Fi routers, Bluetooth accessories, and even smartwatches also contribute to background EMF exposure.

2.2. Screen Time and Blue Light

Beyond RF, mobile phones are sources of prolonged screen exposure. Excessive use especially at night—disrupts melatonin production, impairs sleep, and may indirectly affect maternal hormonal balance. Studies have associated excessive screen time with increased risk of gestational hypertension and stress-related complications.

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2.3. Behavioral and Thermal Effects

Pregnancy alters thermoregulation, posture, and blood flow. Holding devices near the body or using them for long periods may result in localized heating or discomfort, especially in late pregnancy. Additionally, increased screen use may contribute to reduced physical activity, increased stress, and poorer nutrition—all of which independently affect pregnancy outcomes.

3. Human Epidemiological Evidence

3.1. Fetal Growth and Birth Weight

A 2020 French cohort study examined 1,378 medical records and found that maternal phone use of more than 30 minutes per day was associated with a 1.54 times higher risk of the newborn being in the 10th percentile for weight and size (AUDIPOG score) [1].

While not definitive, this suggests possible effects on fetal growth.

Another multicenter study pooling data from four birth cohorts (in Denmark, the Netherlands, Norway, and Spain) found a weak association between frequent mobile phone use and slightly shorter gestational duration [2].

3.2. Preterm Birth and Miscarriage

A meta-analysis of six studies involving 3,187 women found that high RF-EMF exposure was associated with increased miscarriage risk (RR = 1.70; 95% CI: 1.37–2.10) [3]. Though limited by observational design, the consistency of this finding across diverse studies signals potential concern.

Increased proximity to high-intensity EMF sources (e.g., power lines, base stations) has also been linked with elevated spontaneous abortion rates [4].

3.3. Biochemical Markers in Cord Blood

A Turkish study evaluated biochemical parameters of umbilical cord blood in 149 neonates. Mothers with higher phone use (>60 minutes/day) showed elevated liver enzymes (AST, ALT), CK, and inflammatory markers (CRP, LDH), suggesting subtle physiological stress [5].

3.4. Neurodevelopment and Behavioral Disorders

Large-scale studies like the Norwegian Mother and Child Cohort (MoBa) found weak associations between maternal mobile use and behavioral problems (e.g., inattention, hyperactivity) in children [6]. Conversely, other MoBa analyses found that children of mothers who used mobile phones moderately were less likely to have delayed language or motor development [7]. These mixed results may reflect socioeconomic confounding—i.e., higher phone use correlates with better maternal education or healthcare access.

4. Animal and Mechanistic Evidence

While human data are limited by ethical constraints, animal models provide insight into mechanisms.

4.1. Oxidative Stress and Brain Development

Prenatal RF-EMF exposure in rats has been shown to increase oxidative stress markers and alter antioxidant enzyme activity in fetal brain tissue. One study found that pups exposed in utero exhibited reduced hippocampal neuron density and impaired learning behaviors [8].

4.2. MMP-9 Activation and Ischemic Damage

A 2023 rat study found that mobile phone radiation exacerbated damage in pups after hypoxic-ischemic events, increasing MMP-9 expression and neuronal inflammation [9]. MMP-9 is involved in blood-brain barrier disruption and neuro inflammation.

4.3. Fetal Temperature and Heart Rate

Some human studies using Doppler ultrasound observed transient increases in fetal heart rate and temperature after maternal exposure to mobile phone calls lasting 10–15 minutes [10]. Though not dangerous alone, cumulative effects are unclear.

5. Biological Mechanisms and Plausibility

There are several hypothesized mechanisms linking mobile phone use to pregnancy complications:

5.1. Oxidative Stress

RF-EMFs may increase reactive oxygen species (ROS) production, leading to DNA damage and cellular apoptosis. Oxidative stress is implicated in miscarriage, fetal growth restriction, and preeclampsia.

5.2. Endocrine Disruption

Changes in melatonin, cortisol, and other hormone levels due to light exposure or EMF interference may influence fetal development and placental function.

5.3. Thermal Effects

Although mobile phones emit minimal heat, chronic close-range use (e.g., phone on belly) may create subtle changes in local tissue temperature, with theoretical risk to the fetus.

5.4. Sleep and Circadian Rhythm Disruption

Blue light and notifications from screens can disturb sleep, a critical factor in maternal health. Poor sleep is associated with gestational diabetes, hypertension, and depression.

6. Confounders, Uncertainties, and Study Limitations

Despite concerning findings, many studies are limited by:

- Self-reported exposure (subject to recall bias)
- Confounding (e.g., maternal education, stress, nutrition)
- Short follow-up (few studies track long-term child outcomes)
- Inconsistent EMF measurement (different technologies, durations, intensities)

Studies vary widely in design, exposure categorization (e.g., calls vs. screen time), and population. Some associations (e.g., better language skills with moderate phone use) may reflect unmeasured benefits like maternal engagement or socioeconomic status.

7. Global Health Context

In low- and middle-income countries, mobile phones provide essential health information, telemedicine access, and social support. Any recommendations must be sensitive to equity. For example:

- In parts of Africa, SMS-based prenatal care improves attendance and outcomes.
- In India, mobile health (mHealth) interventions help reduce maternal anemia and neonatal mortality.

Hence, the solution is not avoidance but safe usage.

8. Recommendations for Pregnant Women

While definitive evidence is lacking, a precautionary approach is justified. Key guidelines include:

Do's

- Use hands-free devices or speaker mode to keep phones away from the abdomen.
- Limit call durations.
- Prefer texting or offline usage over long voice calls.
- Use aeroplane mode when not actively using the phone.
- Reduce night-time screen exposure; use blue light filters or night modes.
- Maintain a regular sleep schedule and ensure adequate rest.
- Keep the phone away from the bed while sleeping.

Don'ts

- Avoid carrying phones in pockets near the belly or pelvis.
- Don’t sleep with your phone under the pillow or against the body.
- Avoid binge usage of apps or videos, especially late at night.

9. Tips for Safe Mobile Phone Use During Pregnancy

1.Limit Duration

- Keep phone calls short; use text or voice notes when possible.

2.Use Speaker or Earphones

- Avoid holding the phone close to your head or abdomen.

3.Keep Distance When Not in Use

- Don’t carry your phone directly against your body (like in your pocket or near the belly).

4.Use Airplane Mode During Sleep

- If the phone is near you at night, switch to airplane mode to minimize radiation and avoid sleep disruption.

5.Reduce Screen Time Before Bed

- Stop using screens at least 30–60 minutes before sleeping.

6.Avoid Overuse of Social Media

- Take mental health breaks; use apps that promote calm and relaxation instead.

7.Stay Hydrated and Move Often

- Long periods of sitting while using your phone can reduce circulation; get up and stretch regularly.

10. CONCLUSION

However, emerging evidence from animal studies and limited human research suggests that excessive or prolonged exposure to electromagnetic radiation may contribute to subtle physiological and developmental changes during pregnancy. Although definitive proof of harm remains lacking, the precautionary principle should guide behaviour especially among expectant mothers.

Adopting simple safety practices, such as reducing exposure time and maintaining distance from the body, can significantly minimize potential risks without affecting daily communication needs. Continued research through

well-designed longitudinal studies is essential to clarify the dose–response relationship and to establish clear, evidence-based safety guidelines for mobile phone use during pregnancy.

11. REFERENCES

1. Divan HA, Kheifets L, Obel C, Olsen J. Behavioral problems in children and prenatal exposure to cell phone use. Epidemiology 2008. (PubMed)
2. Divan HA, Kheifets L, Obel C, Olsen J, et al. Cell phone use and behavioural problems in young children: Follow-up study. Epidemiology 2012. (PubMed)
3. Birks L, Guxens M, Papadopoulou E, et al. Maternal cell phone use during pregnancy and child behavioral problems in five birth cohorts. Environ Int 2017. (PMC)
4. Tsarna E, Reedijk M, Birks L, et al. Associations of maternal cell-phone use during pregnancy with pregnancy duration and fetal growth in four birth cohorts. Am J Epidemiol 2019. (PMC)
5. Aldad TS, Gan G, Gao XB, Taylor HS. Fetal radiofrequency radiation exposure from 800–1900 MHz cellular telephones affects adult behavior in mice. Sci Rep 2012. (PMC)
6. International Commission on Non-Ionizing Radiation Protection. Guidelines for limiting exposure to radiofrequency electromagnetic fields (100 kHz–300 GHz). ICNIRP 2020. Available from: https://www.icnirp.org
7. World Health Organization. Electromagnetic fields and public health: Radiofrequency EMF overview and assessments. WHO EMF Programme. Geneva: WHO. Available from: https://www.who.int
8. Cordelli E, et al. Effects of radiofrequency electromagnetic field exposure on adverse pregnancy outcomes: A systematic review and meta-analysis. Environ Res 2023. (PubMed)
9. Johnson EE, et al. Effects of radiofrequency exposure on adverse female reproductive outcomes: A systematic review and dose-response meta-analysis. Reprod Toxicol 2024. (PubMed)
10. Ghazanfarpour M, et al. Effect of electromagnetic field exposure on abortion: A systematic review and meta-analysis. Environ Sci Pollut Res 2021. (PMC)
11. Irani M, et al. Electromagnetic field exposure and abortion in pregnant women: A meta-analysis. J Midwifery Reprod Health 2023. (PMC)
12. Merhi ZO, et al. Challenging cell phone impact on reproduction: A review of human and animal evidence. Reprod Toxicol 2012. (PMC)
13. Shahin S, et al. Mobile phone (1800 MHz) radiation impairs female reproductive performance in mice: Oxidative and nitrosative stress mechanisms. Reprod Toxicol 2017. (ScienceDirect)
14. Aldad TS, et al. Prenatal radiofrequency radiation exposure and later behavioral outcomes in animal models. Sci Rep 2012. (PMC)
15. Li DK, Chen H, Odouli R. Maternal exposure to non-ionizing radiation during pregnancy and risk of adverse reproductive outcomes. JAMA Netw Open 2020. (JAMA Network)
16. Mosayebi-Molasaraie M, et al. Role of cell phone and internet use on miscarriage risk: Case-control evidence. J Midwifery Reprod Health 2023.
17. European Commission, SCHEER. Health effects of exposure to electromagnetic fields: Pregnancy and developmental outcomes. SCHEER Tech Rep. Brussels: European Commission.
18. Australian Radiation Protection and Nuclear Safety Agency. Maternal mobile phone use during pregnancy and child behavioural problems. ARPANSA Review Summary. Available from: https://www.arpansa.gov.au
19. Cordelli E. WHO systematic review protocols on radiofrequency electromagnetic field exposure in experimental human studies. WHO / PMC Protocols.
20. Kenny RPW, et al. Systematic review of RF-EMF exposure effects on male fertility and adverse pregnancy outcomes. Reprod Toxicol 2021–2022. (ScienceDirect)
21. ensh RP. Behavioral teratologic studies using microwave radiation: Experimental evidence and review. Neurotoxicol Teratol 1997. (ScienceDirect)
22. Ghazanfarpour M. Extended systematic reviews on electromagnetic field exposure and miscarriage risk. Environ Health Rev. (PMC)
23. Takei Y, et al. Smartphone radiation exposure during pregnancy and birth outcomes: A systematic review. Environ Int. (ScienceDirect)
24. Cordelli E, et al. Effects of radiofrequency electromagnetic field exposure on birth outcomes in observational studies. Radiat Prot Dosimetry / SFRP 2023.
25. Radiofrequency EMF exposure and mechanisms of toxicity: Oxidative stress, DNA damage and cellular proliferation. Reprod Toxicol; Toxicol Lett. (ScienceDirect)
26. World Health Organization. Environmental Health Criteria: Radiofrequency electromagnetic fields. WHO EHC Monograph (ongoing).
27. Meta-analytic evidence linking maternal RF/MF exposure with neurodevelopmental outcomes in offspring. JAMA Netw Open. (Cohort-based analyses)

28. Experimental prenatal microwave radiation exposure studies in rodents: Histopathological and ultrastructural findings. Reprod Toxicol. (ResearchGate)
29. Fetal radiofrequency radiation exposure and later-life behavioral outcomes: Translational review. Front Public Health / Sci Rep. (PMC)
30. International Commission on Non-Ionizing Radiation Protection. FAQ on protection of specific populations including pregnant women. ICNIRP FAQ. Available from: https://www.icnirp.org