



## Distribution of Mobile Phone Towers and their effects on Urban and Rural population in Western Rajasthan.

### KEYWORDS

Mobile phone phone, Mobile phone tower, Radiofrequency.

**Mr Raj kataria**

Bsc (economics) Hon. Presidency college, Kolkata

**Jaya purohit**

M.Sc. (Med.) Anatomy Dr. S.N. Medical College, Jodhpur

**Dr. S.K. kataria**

Professor & Head, Department of Anatomy, Dr. S.N. Medical College, Jodhpur

**Dr.Ritu Aggarwal**

Assistant professor, Department of Anatomy, Dr. S.N. Medical College, Jodhpur

**ABSTRACT** *The paper discusses the findings of a primary survey carried out to observe distribution of mobile phone towers and mobile phones in rural and urban areas of western Rajasthan. Mobile has now become as an integral part of our daily life due to which the number of mobile users have been increasing day by day. In India, mobile base stations and their installation are irregular and unregulated. Many studies have been carried out which proves that electromagnetic radiations emitted by mobile phone and mobile phone towers are harmful for the health of human beings. The ongoing use of mobile phones and installation of mobile towers has raised the health effects on humans more in urban than rural areas due to low economic group found in rural areas as compared to urban areas of western Rajasthan. This study is done for the people living in both urban and rural areas who are not aware about these radiations. This study reveals, that electromagnetic radiation emitted by mobile phone and mobile phone towers are harmful for the health of people who are living close to the mobile phone towers, so people should stay away from the mobile phone towers and people should use the mobile phone for less duration of time.*

### Introduction-

In recent years there has been an tremendous growth in the global communication industry, which has resulted in a enormous increase in the number of wireless devices. Introduction of cellular phone systems and the rapid increase in the number of users of cellular phones have increased exposure to electromagnetic fields (EMFs). Various available data indicates that development of nonspecific health symptoms are possible after long term exposure to mobile phones and their transmission towers<sup>[6]</sup>. Mobile services were launched in India in 1995 and it is one of the fastest growing mobile telephony industries in the world. Telecom Regulatory Authority of India, states that the total composition of telephone subscribers using wireless communication in urban area is 63.27% and rural area is 33.20%. This has led to the mushrooming of supporting infrastructure in the form of cell towers which provide the link to and from the mobile phone<sup>[1][2][3]</sup>. In India cell towers are placed too close to schools, public playgrounds, hospitals, college campuses, and building terraces of densely populated urban residential areas without proper regulation. Hence, the public is being continuously exposed to low intensity radiations from these towers<sup>[3][5]</sup>. Since we are not able to see the electromagnetic radiations/ one can not realize their potential harm over long periods of exposure until they manifest in the form of biological disorders.

India has adopted ICNIRP<sup>[1][3]</sup> guidelines as the standard for safety limits of exposure to radio-frequency energy produced by mobile handsets for general public as follows: whole-body average SAR of 0.08 W/kg localized SAR (specific absorption rate) for head and trunk of 2 W/kg, and localized SAR for limbs 4 W/kg [6]. Since data demands have increased on mobile network, cities have seen a number of towers increase sharply including 3G towers which work with larger bandwidths while due to low economy in rural areas 2G towers with smaller band widths are seen.

### Material and methods- Questionnaire -

A questionnaire survey was conducted at the selected sites in urban and rural areas of Western Rajasthan. to study health hazards and problems faced by the inhabitants living close to the base station (within 50 m). The questionnaire was similar to that developed for the study on mobile phone users by Santini et al<sup>[9][10]</sup>. The survey was conducted on 64 persons of urban and rural areas of western Rajasthan on 12 different symptoms. The symptoms include: fatigue, nausea, sleep disruption, discomfort, headache, memory loss, skin problem, hearing problem, dizziness, muscular pain, visual disruption, difficulty in concentration, etc. The level/degree of complaints for the studied symptoms was expressed by the participants using following figures 0, 1, 2 and 3: 0 = never, 1 = sometimes, 2 = often, 3 = very often. Health hazards faced by the inhabitants were analyzed and compared based on residential area (urban or rural).

### Power density measurement

Absolute power density measurement was carried out at different houses in close proximity to the base station. The main purpose of the measurement was to ensure that RF field emission from each site did not exceed the safe public limits and to find whether there was correlation between the health complaints and the measured power densities. Power density can be calculated using following formula-

Power density = { transmission power in watts X Gain of transmitting antenna /  $4\pi \times$  square of distance from antenna meters } Watt/m<sup>2</sup>.

For transmission power = 20 W, gain of transmitting antenna = 17 dB = 50, P<sub>d</sub> for various values of distance from antenna meters.

**Results and Discussion-**

Distance calculated from the residential area to the base station came out to be 50 m in urban and 500 m in rural area of Western Rajasthan. Analysis of questionnaire The response of questionnaires from 64 different inhabitants 32 each from rural and urban areas of Western Rajasthan were analyzed. It is found that from different symptoms studied, Inhabitants of urban area have more complaints than rural area. On scale 2 (often) out of 12 symptoms, urban people have more complaints on 10 symptoms than rural people, on scale 3 (very often), urban people have highest complaints whereas rural people have very few complaints. The complaints with more frequencies are fatigue, dizziness depression and muscular pain.

Power density measurement-Absolute power density of the RF radiation from the selected tower was measured at residential area of both rural and urban areas of western Rajasthan which came out to be 0.0318 W/m<sup>2</sup> for R=50 m and 0.000318 W/m<sup>2</sup> for R=500m. It is further observed that inhabitants of urban area with measured power density equal to 0.0318 W/m<sup>2</sup> complain of fatigue hearing problem, dizziness, and muscle pain more than inhabitants from rural area with measured power density equal to 0.000318 W/m<sup>2</sup>

**Conclusion-**

Although mobile phone towers are advantageous in many ways, it has hazardous effect on human beings and environment. As a whole, the urban residents living within 50 meters from the tower are having more health complaints than those living in rural areas of Western Rajasthan i.e 500metres. It is concluded that although rural people are backward in all aspects than urban people but they are enjoying mobile phone services with less hazards than urban people. It is suggested that mobile phone towers should not be located within 50 metres distance from the residential houses.

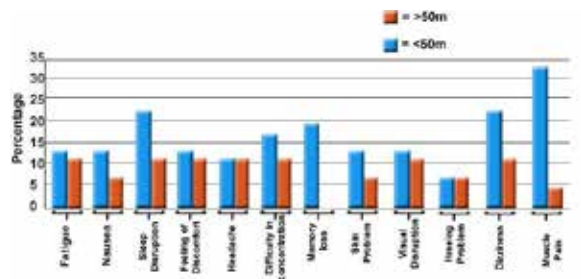
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**Table no 1**

S.NO.	SYMPTOMS	0		1		2		3	
		<50	>50	<50	>50	<50	>50	<50	>50
1.	Fatigue	34.7	78	37	13	13	11	15	6.5
2.	Nausea	39	78	39	13	13	6.5	6.5	0
3.	Sleeping	30.4	67	22	22	22	11	26	0
4.	Feeling of discomfort	50	78	28	13	13	11	6.5	0
5.	Headache	26	72	52	11	11	11	8	0
6.	Difficulty in breathing	28	67	45.6	17.3	17.3	11	6.5	0
7.	Memory loss	28	67	43	19.6	19.6	0	6.5	0
8.	Skin problems	33	72	28	13	13	6.5	13	0
9.	Visual	58.7	61	17	13	13	11	11	0
10.	Hearing problem	63	78	22	6.5	6.5	6.5	6.5	0
11.	Dizziness	28	72	33	22	22	11	15	0
12.	Muscle pain	21	79	26	33	33	4	20	1

**Graph of table no 1**



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