ORIGINAL ARTICLE

Mobile Phone and Infertility: Analysis of different Parameters of Semen in Infertile Males Using Phones versus Non. Mobile Phone Users

Anwar Ali Jamali[*], Tabinda Taqi[**], Hajra Naila Rahu[***], Ghulam Mustafa Jamali[****], Ashok Kumar Lohano[*****], Bhojo Mal Tanwani[******]

ABSTRACT

Objective: To investigate the effects of mobile phone use on semen parameters, particularly quantity, motility and morphology of sperms in subjects using mobile phones and controls not using mobile phones with infertility.

Methods: This was a cross-sectional research, performed in the department of Medicine PUMHS, Nawabshah, during January 2015 to December 2017. A total of 385 male subjects of young age group, age ranging from 20-40 years were included. The subjects were categorized as mobile phone users and non-users. After taking consent, a structured proforma was filled by the researcher, including demographic and clinical information and two questions related to research. All the data collected was statistically analyzed.

Results: There were total 385 males included in study. Different groups were assessed for semen analysis. Abnormal Semen parameters regarding sperm count and motility were more common in infertile males using mobile phones in comparison to non mobile phone users.

Conclusion: A relationship occurs among mobile phone usage, sperm count and decreased sperm motility.

Key Words: Male Infertility, Mobile Phones, Semen, Sperm Count, Radiofrequency.

Article Citation: Jamali AA, Taqi T, Rahu HN, Jamali GM, Lohano AK, Tanwani BM. Mobile Phone and Infertility: Analysis of different Parameters of Semen in Infertile Males Using Phones Versus Non. Mobile Phone Users. J Peoples Uni Med Health Sci. 2018;8(3):209-23.

INTRODUCTION:

Use of mobile phone and computer / laptop with Wi-Fi or blue tooth devices is very much common in our setup. Male uses more mobile phones than females in our social, cultural, ethical and religious setup. Usage of mobile phone has been correlated with male infertility worldwide. The impact of cell phone radiation on male fertility is the focus of current attentiveness and surveys.

Mobile phones are a comparatively new and developing technology. Cell phone communications now basically govern our day-to-day events through enhanced connectivity and intellectual smart phone facilities. Although the impending aids of current technology persists to arise, eventual community health hazards are also emerging. The utmost delicate tissue that has a destructive effect by use of cell phones is testicular tissue, which increases oxidative stress, heat and radiation. Mobile phone radiations may have a negative impact on male sperm quality by reducing semen volume, concentration, quantity, motility and viability of sperms, thereby damaging male fertility[1].

In the past two decades, the use of mobile

* *Associate Professor, Deptt. of Medicine, PUMHS, Nawabshah*
** *Assistant professor, Deptt. of Physiology, PUMHS, Nawabshah.*
*** *Associate professor, Deptt. of Physiology PUMHS, Nawabshah.*
**** *Senior Registrar Deptt. of Medicine, PUMHS, Nawabshah.*
***** *Assistant Professor Deptt. of Medicine, PUMHS, Nawabshah.*
****** *Lecturer Department of Physiology, PUMHS, Nawabshah.*

Correspondence to:
Dr. Anwar Ali Jamali
Assoicate Professor Deptt. of Medicine, PUMHSW-SBA
Email: jamalianwarali@gmail.com

phones worldwide has increased dramatically. The impact of mobile radiation on sperm parameters and fertility in healthy men is a recent interest and subject of research. Male Infertility in male subjects is the existing problem. The infertile male subjects are well characterized by unusual semen features. It is observed that on general the quality of sperms has deteriorated throughout the world in recent years. Most infertile or sub-infertile male are subjects whose sperm activity is violated and/or DNA is damaged[2]. At the same time, constant electro-magnetic radioactivity from cell phones, by the oxidative stress and DNA disintegration, signifi-cantly may progress to diverse pathological abnormalities including growths, and process of spermatogenesis may be violated[3,4]. It was observed that the progressive movement and the number of spermatozoa were less in subjects affected by the electromagnetic emission in comparison to those without the influence of electromagnetic radiation, in the same way the quantity of spermatozoa with non-progressive movement and DNA fragmentation were higher in group affected by the electromagnetic radiation in comparison to the group not affected by electromagnetic radiations[5].

Current research was aimed to observe the influence on semen parameters particularly sperm quantity and progressive movement in subjects prone to radiation from mobile phone usage and in subjects without mobile phone use in infertility. We evaluate the relationship among cell phone use with Sperm count in Pakistani infertile males. We also compared semen parameters in mobile phone users and non-user's infertile males and controls.

METHODS:

After ethical consideration and permission, this tudy was conducted in the department of edicine, PUMHS Nawabshah. Current research (cross-sectional) was performed on 385 male subjects who attended the clinic for evaluation of infertility from January 2016 to December 2018.The participants were categorized into two groups; mobile phone users and non mobile phone users' semen parameters were analyzed according to WHO (World Health Organization) 2010 criteria. Semen analysis was examined after 25 days of sexual abstinence based on World Health Organization (WHO) (2010)[6].

Data was collected on predesigned proforma; well-versed agreement was obtained from all the contestants before induction of study. Two common questionnaires regarding the nutritional status of subjects were fulfilled. All statistic parameters of semen and demographic variables were obtained.

The semen was collected and analyzed for gross and microscopic examination for different parameters of semen. Semen analyses results and mobile phone use/no use results were entered in proforma simultaneously to check the relation of sperm count and mobile use.

Quantitative and qualitative variables were calculated for example Mean ± SD and median frequency and percentages for sperm count. Statistical software SPSS 20 was practiced for statistical analyses. The *t*-test, one-way anova, were used to compare among two groups, and the associations among different parameters of study were analyzed through Pearson correlation.

RESULTS:

A total of 385 subjects were included in the study, out of them 287 (74.5%) were patients and 98 (25.5%) were controls, 256(66.5%) were mobile phone users while 129(33.5%) non users, 241(62.6%) with normal sperm counts, 96(24.9%) low sperm counts and 48(12.5%) with azoospermia (table-I).

We found that 67.9% of patients and controls were using mobile phones while 32.1% were not using mobile phones. From total patients 287 (mobile phone users and non-users), normal sperm count (sperm count >15M/ml) was found in 181(63.1%), oligospermia (sperm count <15M/ml) in 58 (20.2%) and azoospermia (sperm count 00M/ml) was found in 48 (16.7%) patients. Percentage of within remarks regarding level remarks was 100.0% with normal sperm count, 100.0% in oligospermia and 100.0% in azoospermia. In total patients % age with normal

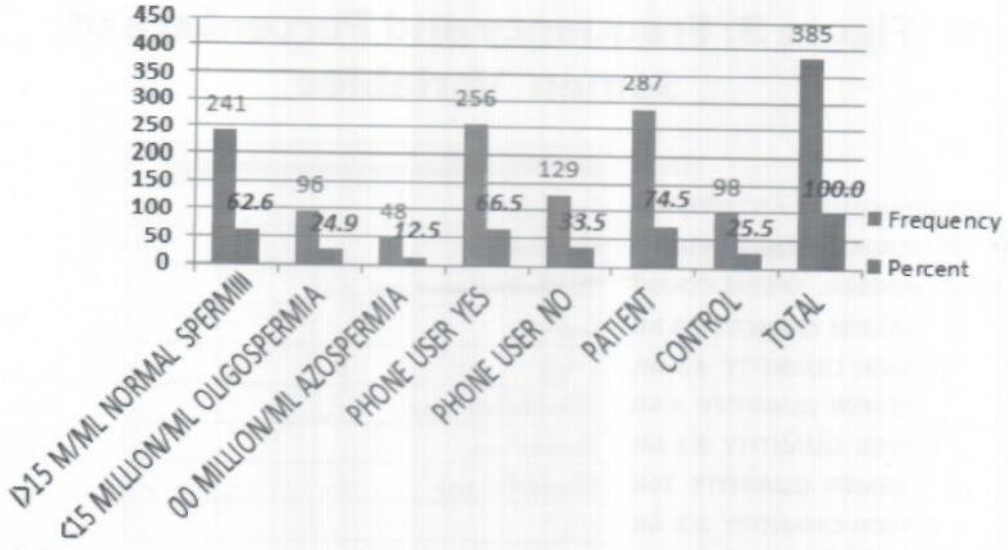

Figure I: Frequency and Percentage of Patients and Control Semen Profile Mobile Phone User and Nonusers.

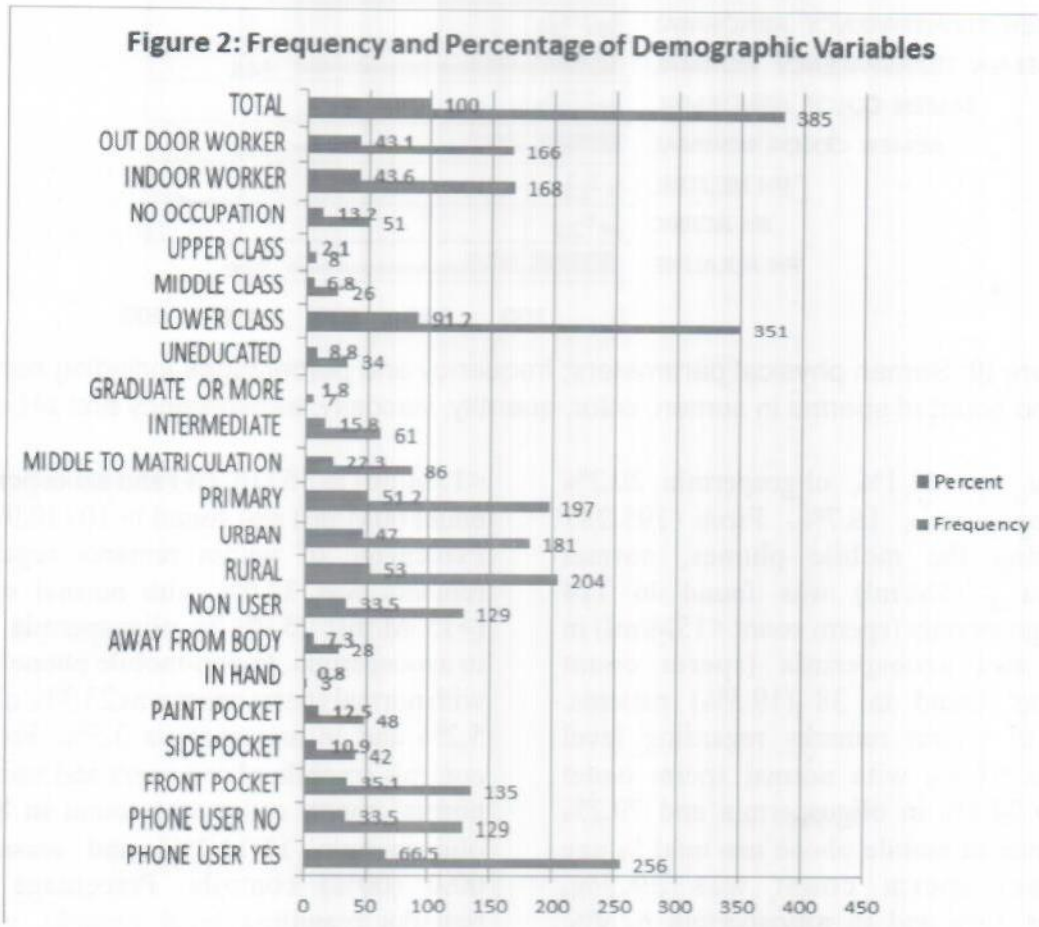

Figure 2: Demographic data of the subjects including using mobile phone or not using, keeping mobile at different areas, belonging to urban and rural areas, their educational, economical and occupational profile, including frequency and percentages.

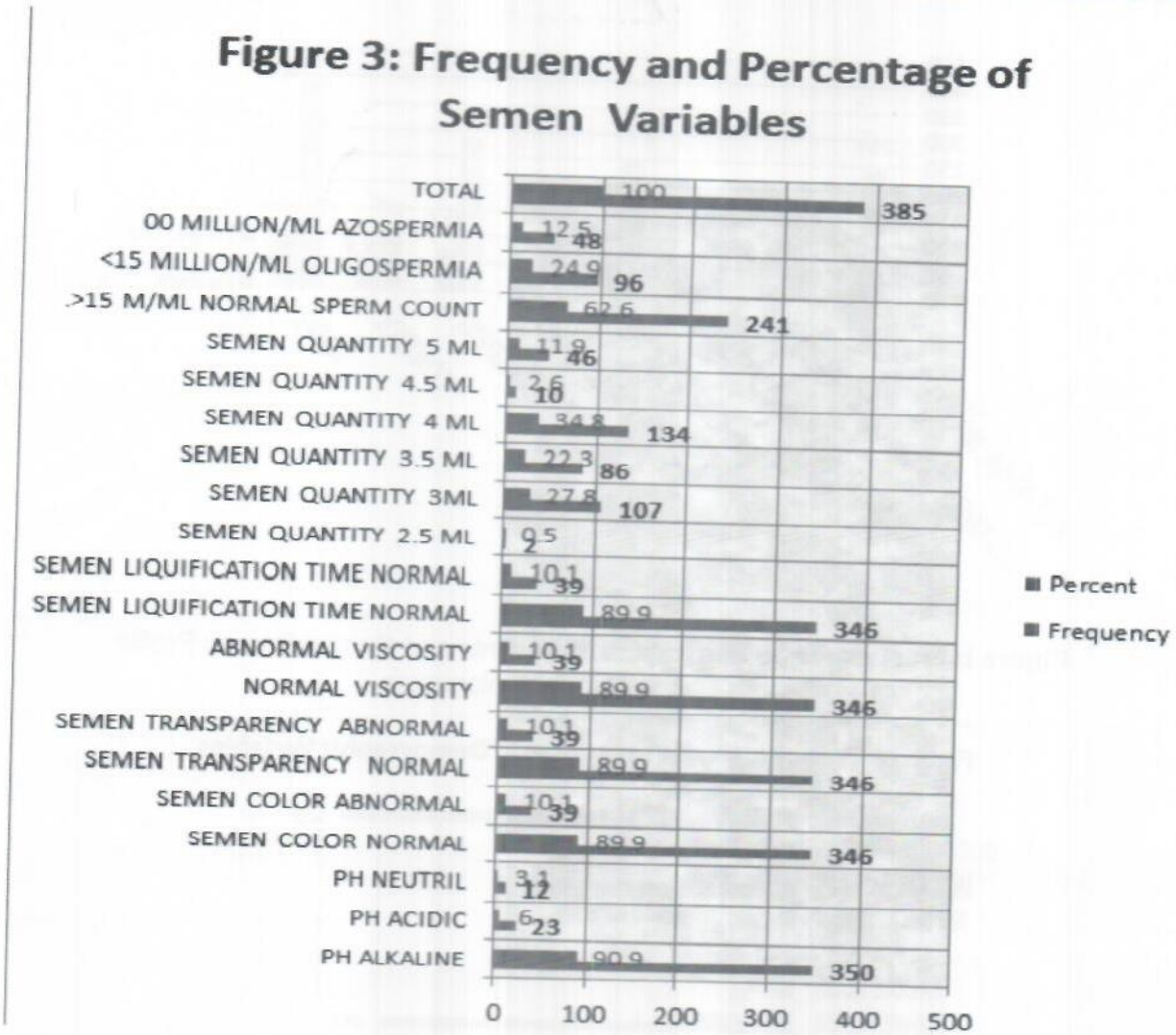

Figure III: Semen physical parameters; frequency and percentages including normal, low and no count of sperms in semen, color, quantity, viscosity, transparency and pH of semen.

sperm count was 63.1%, oligospermia 20.2% and in azoospermia 16.7%. From 195/287 patients using the mobile phones, normal sperm count (>15M/ml) was found in 114 (58.5%), oligospermia (sperm count <15M/ml) in 43(22.1%) and azoospermia (sperm count 00M/ml) was found in 38 (19.5%) patients. Percentage of within remarks regarding level remarks was 63.0% with normal sperm count (>15 M/ml) 74.1% in oligospermia and 79.2% in azoospermia.In mobile phone use total % age with normal sperm count was 39.7%, oligospermia 15% and in azoospermia 67.9%. From 92/287 patients not using the mobile phones, normal sperm count (>15M/ml) was found in 67 (72.8%), oligospermia (sperm count <15M/ml) in 15 (16.3%) and azoospermia (sperm count 00M/ml) was found in 10 (10.9%) patients. Percentage of within remarks regarding level remarks was 37.0% with normal sperm count (>15 M/ml) 25.9% in oligospermia and 20.8% in azoospermia. In non-mobile phone users % age with normal sperm count was 23.3%, oligospermia 5.2% and in azoospermia 3.5%. From total 98 controls (mobile phone users and non-users), the normal sperm count was found in 85 (86.7%), oligospermia 13(13.3%) and azoospermia in 00.0 (00%) controls. Percentage of within remarks regarding level remarks was 100.0% with normal sperm count, 100.0% in oligospermia and 100.0% in azoospermia. In total controls % age with normal sperm count was 86.7%,

oligospermia 13.3% and in azoospermia 00.00%. In 61/98 controls mobile phone users, normal sperm count was found in 52 (58.2%), oligospermia in 09 (14.8%) and azoospermia was found in 00.0 (00.0%) controls. Percentage of within remarks regarding level remarks was 61.2% with normal sperm count, 69.2% in oligospermia and 00.0% in azoospermia. In mobile phone use % age with normal sperm count was 53.1%, oligospermia 9.2% and in azoospermia 00.0%. In 37/98 non-mobile phone user controls, normal sperm count was found in 33 (89.2%), oligospermia in 04 (10.8%) and azoospermia was found in 00.0 (00.0%). Percentage of within remarks regarding level remarks was 38.8% with normal sperm count, 30.8% in oligospermia and 00.0% in azoospermia. In non-mobile phone users % age with normal sperm count was 33.7%, oligospermia 4.1% and in azoospermia 00.0% (Table 1. A).

Chi square test was used for patients who were using and not using mobile phones, Pearson chi square was 5.842, df 2, Asymp. sig.(2-sided) .054. Likelyhood ratio 6.065, df 2, Asymp. sig.(2-sided) .048. Linear by linear association was .5.642, df 1, Asymp. sig.(2-sided) .018. Interval by interval pearsons R value was -.140, Approx. Sig .017. Ordinal by ordinal Spearman correlation value was -0.143, Approx. Sig .016. Chi square test for controls patients who were using and not using mobile phones, Pearson chi square was . 311, df 1, Asymp. sig.(2-sided) .577. Continuity correction .063, df 1, Asymp. sig.(2-sided) .802. Likelyhood ratio .319, df 1, Asymp. sig.(2-sided) .572. fisher exact test, exact 2 sided .761, exact 1 sided .409. Linear by linear association was .308, df 1, Asymp. sig.(2-sided) .579. Interval by interval pearsons R value was -.140, Approx. Sig .017. Ordinal by ordinal Spearman correlation value was -0.143, Approx. Sig .016. For 287 valid cases that were patients, the Interval by interval pearsons R value was -.140, Approx. Sig .017. Ordinal by ordinal Spearman correlation value was -.143, Approx. Sig .016. For 98 valid cases that were controls, the Interval by interval pearsons R value was -.056, Approx. Sig .582. Ordinal by ordinal Spearman correlation value was -.056, Approx. Sig .582 (Table 1. B).

In relation to mobile phone usage and infertility with semen parameters paired sample test was performed with mean and SD, Std. Error Mean and Correlation, the p-value was statistically not significant in mobile phone usage and with pair of semen parameters. Mobile phone user and semen quantity (p=0.842) mobile phone user mobile sperm count-total count M/ML (p=0.658) phone user mobile phone user sperm count-sperm/ejaculate MILLIONS (p=0.674) mobile phone user motility-% motile sperm (p=0.180) mobile phone user motility-%rapid linear progression (p=0.670) mobile phone user motility-% slow nonlinear progression (p=0.023) mobile phone user motility-% non-progressive (p=0.121) (Table-II).

In relation to mobile phone usage and infertility with semen parameters paired sample test was performed with mean and SD, Std. Error Mean and upper and lower limits, with 95% confidence interval as shown in table 2, the p-value was statistically significant mobile phone usages and with pair of semen parameters. Mobile phone user and semen quantity mobile (p=<0.000) phone user mobile sperm count-total count M/ML (p=<0.000) phone user mobile phone user sperm count-sperm/ejaculate MILLIONS (p=<0.000) mobile phone user motility-% motile sperm (p=<0.000) mobile phone user motility-% rapid linear progression (p=<0.000) mobile phone user motility-%slow nonlinear progression (p=<0.000) mobile phone user motility-% non-progressive (p=<0.000) p-value was statistically significant with all pairs. While rest of statistical parameters which are mean SD Std. Error Mean, 95% Confidence Interval of the Difference, Lower Upper, t, df values are shown in Table-III.

Mobile phone use was significantly associated with motility-% slow nonlinear progression Pearson Correlation (.116) and Sig. (2-tailed) (.023), while not with other parameters of sperms. While Pearson Correlation and Sig. (2-tailed) of sperm count-total count, semen quantity, sperm count-total count M/ML sperm count-sperm/ejaculate MILLIONS, motility-% motile sperm, rapid linear progression, motility-%

Table-IA: Mobile Phone User * Remarks * Patients And Controls Cross tabulation

Patients And Controls				Remarks			Total
				.>15 M/Ml Normal Sperm Count	<15 Million/Ml Oligospermia	00 Million/Ml Azospermia	
Patient	Mobile Phone User	Yes	Count	114	43	38	195
			% Within Mobile Phone User	58.5%	22.1%	19.5%	100.0%
			% Within Remarks	63.0%	74.1%	79.2%	67.9%
			% Of Total	39.7%	15.0%	13.2%	67.9%
		No	Count	67	15	10	92
			% Within Mobile Phone User	72.8%	16.3%	10.9%	100.0%
			% Within Remarks	37.0%	25.9%	20.8%	32.1%
			% Of Total	23.3%	5.2%	3.5%	32.1%
	Total		Count	181	58	48	287
			% Within Mobile Phone User	63.1%	20.2%	16.7%	100.0%
			% Within Remarks	100.0%	100.0%	100.0%	100.0%
			% Of Total	63.1%	20.2%	16.7%	100.0%
Control	Mobile Phone User	Yes	Count	52	9	0	61
			% Within Mobile Phone User	85.2%	14.8%	0%	100.0%
			% Within Remarks	61.2%	69.2%	0%	62.2%
			% Of Total	53.1%	9.2%	0%	62.2%
		No	Count	33	4	0	37
			% Within Mobile Phone User	89.2%	10.8%	0%	100.0%
			% Within Remarks	38.8%	30.8%	0%	37.8%
			% Of Total	33.7%	4.1%	0%	37.8%
	Total		Count	85	13	0%	98
			% Within Mobile Phone User	86.7%	13.3%	0%	100.0%
			% Within Remarks	100.0%	100.0%	0%	100.0%
			% Of Total	86.7%	13.3%	0%	100.0%

Table 1B. Chi-Square TestsMobile Phone User * Remarks * Patients And Controls Crosstabulation						
patients and controls		Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Patient	Pearson Chi-Square	5.842[a]	2	.054		
	Likelihood Ratio	6.056	2	.048		
	Linear-by-Linear Association	5.642	1	.018		
	N of Valid Cases	287				
Control	Pearson Chi-Square	.311[b]	1	.577		
	Continuity Correction	.063	1	.802		
	Likelihood Ratio	.319	1	.572		
	Fisher's Exact Test				.761	.409
	Linear-by-Linear Association	.308	1	.579		
	N of Valid Cases	98				

Symmetric MeasuresMobile Phone User * Remarks * Patients And Controls Crosstabulation						
patients and controls			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Patient	Interval by Interval	Pearson's R	-.140	.055	-2.395	.017[c]
	Ordinal by Ordinal	Spearman Correlation	-.143	.055	-2.434	.016[c]
	N of Valid Cases		287			
Control	Interval by Interval	Pearson's R	-.056	.097	-.553	.582[c]
	Ordinal by Ordinal	Spearman Correlation	-.056	.097	-.553	.582[c]
	N of Valid Cases		98			

Table II. Mobile Phone Usage and Infertility with Semen Parameters
Paired Samples Statistics

	Mean	Std. Deviation	Std. Error Mean	Correlation	Sig.
Mobile Phone User Semen Quantity	1.3351	.47263	.02409	.010	.842
	3.735	.6343	.0323		
Mobile Phone User Sperm Count-Total Count M/Ml	1.3351	.47263	.02409	.023	.658
	18.1922	17.31357	.88238		
Mobile Phone User Sperm Count-Sperm/Ejaculate Millions	1.3351	.47263	.02409	.022	.674
	64.7519	58.76213	2.99480		
Mobile Phone User Motility-%Motile Sperm	1.3351	.47263	.02409	.068	.180
	40.0597	24.58243	1.25284		
Mobile Phone User Motility-%Rapid Linear Progression	1.3351	.47263	.02409	.022	.670
	11.0286	9.17263	.46748		
Mobile Phone User Motility-%Slow Non Linear Progression	1.3351	.47263	.02409	.116	.023
	75.9584	30.46212	1.55249		
Mobile Phone User Motility-% Non Progressive	1.3351	.47263	.02409	.079	.121
	47.8390	26.39987	1.34546		

slow nonlinear progression, motility-% non-progressive Correlation were significant statistically (Table-IV).

Mobile phone use was significantly associated with different morphologies of sperms. Use of mobile phone Correlation was significant statistically between morphology-% normal forms, morphology-head abnormalities-large oval, morphology-head abnormalities-small oval,morphology-head abnormalities-duplicate by using Pearson Correlation and Sig. (2-tailed). While morphology- % abnormal forms, morphology-head abnormalities-tapering, morphology-head abnormalities-amorphous and mid piece abnormalities Correlation were not significant statistically. While Pearson Correlation and Sig. (2-tailed) of was significant statistically between morphology-% normal forms, morphology-head abnormalities-large oval, morphology-head abnormalities-small oval, morphology-head abnormalities-duplicate, morphology- % abnormal forms, morphology-head abnormalities-tapering, morphology-head abnormalities-amorphous and mid piece abnormalities (Table-V).

DISCUSSION:

Human interaction with radio frequency (RF) radiation can ensue from many resources, comprising the high-frequency dielectric and induction heaters, broadcast antennas, high-power pulsed radars, medical appliances, cell phone base

Table III. Mobile Phone Usage and Infertility With Semen Parameters Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Mobile Phone User - Semen Quantity	-2.40000	.78710	.04011	-2.47887	-2.32113	-59.829	384	.000
Mobile Phone User - Sperm Count-Total Count M/ML	-16.85714	17.30931	.88216	-18.59162	-15.12267	-19.109	384	.000
Mobile Phone User - Sperm Count-Sperm/Ejaculate	-63.41688	58.75386	2.99437	-69.30430	-57.52946	-21.179	384	.000
Mobile Phone User - Motility-%Motile Sperm	-38.72468	24.55462	1.25142	-41.18517	-36.26418	-30.945	384	.000
Mobile Phone User - Motility-%Rapid Linear Progression	-9.69351	9.17450	.46758	-10.61284	-8.77418	-20.731	384	.000
Mobile Phone User - Motility-%Slow Non Linear Progression	-74.62338	30.41083	1.54988	-77.67069	-71.57606	-48.148	384	.000
Mobile Phone User - Motility-% Non Progressive	-46.50390	26.36672	1.34377	-49.14597	-43.86182	-34.607	384	.000

Table IV. Correlations Between Mobile Phone Use and Semen (sperm count and motility)

			Sperm Count-Total Count M/ML	Sperm Count-Sperm/ Ejaculate MILLIONS	Motility-% Motile Sperm	Motility-% Rapid Linear Progression	Motility-%Slow Non Linear Progression	Motility-% Non Progressive
Mobile Phone User	Pearson Correlation	1	.023	.022	.068	.022	.116*	.079
	Sig. (2-tailed)		.658	.674	.180	.670	.023	.121
Sperm Count-Total Count M/Ml	Pearson Correlation	.023	1	.964**	.370**	.246**	.371**	.155**
	Sig. (2-tailed)	.658		.000	.000	.000	.000	.002
Sperm Count-Sperm/ Ejaculate MILLIONS	Pearson Correlation	.022	.964**	1	.424**	.292**	.378**	.132**
	Sig. (2-tailed)	.674	.000		.000	.000	.000	.009
Motility-%Motile Sperm	Pearson Correlation	.068	.370**	.424**	1	.854**	.433**	-.137**
	Sig. (2-tailed)	.180	.000	.000		.000	.000	.007
Motility-%Rapid Linear Progression	Pearson Correlation	.022	.246**	.292**	.854**	1	.214**	-.206**
	Sig. (2-tailed)	.670	.000	.000	.000		.000	.000
Motility-%Slow Non Linear Progression	Pearson Correlation	.116*	.371**	.378**	.433**	.214**	1	.772**
	Sig. (2-tailed)	.023	.000	.000	.000	.000		.000
Motility-% Non Progressive	Pearson Correlation	.079	.155**	.132**	-.137**	-.206**	.772**	1
	Sig. (2-tailed)	.121	.002	.009	.007	.000	.000	
	N	385	385	385	385	385	385	385
*. Correlation is significant at the 0.05 level (2-tailed).								
**. Correlation is significant at the 0.01 level (2-tailed).								

Table V. Correlations Between Mobile Phone Use and Sperm Morphology

		Mobile Phone User	Morphology-% Normal Forms	Morphology-% Abnormal Forms	Morphology-Head Abnormalities-Large Oval	Morphology-Head Abnormalities-Small Oval	Morphology-Head Abnormalities-Tapering	Morphology-Head Abnormalities-Duplicate	Morphology-Head Abnormalities-Amorphous	Mid Peice Abnormalities
Mobile Phone User	Pearson Correlation	1	.106*	-.016	.106*	.131*	.000	.123*	.002	.023
	Sig. (2-tailed)	-	.038	.750	.038	.010	.990	.016	.968	.655
Morphology-% Normal Forms	Pearson Correlation	.106*	1	-.420**	.527**	.609**	.478**	.509**	.177**	.225**
	Sig. (2-tailed)	.038	-	.000	.000	.000	.000	.000	.001	.000
Morphology- % Abnormal Forms	Pearson Correlation	-.016	-.420**	1	.266**	.362**	.226**	.226**	.362**	.311**
	Sig. (2-tailed)	.750	.000	-	.000	.000	.000	.000	.000	.000
Morphology-Head Abnormalities-Large Oval	Pearson Correlation	.106*	.527**	.266**	1	.808**	.426**	.441**	.255**	.140**
	Sig. (2-tailed)	.038	.000	.000	-	.000	.000	.000	.000	.006
Morphology-Head Abnormalities-Small Oval	Pearson Correlation	.131*	.609**	.362**	.808**	1	.489**	.778**	.371**	.269**
	Sig. (2-tailed)	.010	.000	.000	.000	-	.000	.000	.000	.000
Morphology-Head Abnormalities-Tapering	Pearson Correlation	.000	.478**	.226**	.426**	.489**	1	.586**	-.061	.112*
	Sig. (2-tailed)	.990	.000	.000	.000	.000	-	.000	.232	.028
Morphology-Head Abnormalities-Duplicate	Pearson Correlation	.123*	.509**	.226**	.441**	.778**	.586**	1	-.073	-.100
	Sig. (2-tailed)	.016	.000	.000	.000	.000	.000	-	.152	.050
Morphology-Head Abnormalities-Amorphous	Pearson Correlation	.002	.177**	.362**	.255**	.371**	-.061	-.073	1	.814**
	Sig. (2-tailed)	.968	.001	.000	.000	.000	.232	.152	-	.000
Mid Peice Abnormalities	Pearson Correlation	.023	.225**	.311**	.140**	.269**	.112*	-.100	.814**	1
	Sig. (2-tailed)	.655	.000	.000	.006	.000	.028	.050	.000	-
	N	385	385	385	385	385	385	385	385	385

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

stations, broadcast antennae and usage of individual devices such as cell phones, cordless phones, Wi-Fi, Bluetooth, amateur radios, etc[7]. The most common device we see these days is people with cell phones next to their ears. Mobile phones are low power RF transmitters, having frequencies ranging between 450 MHz to 2700 MHz working through a network of base locations having power ranging between 0.1 W to 2.0 W[8].The electromagnetic waves that emitted from the mobile phones, travel from the phone to the nearest base station to deliver calls, messages, images, e-mails, web downloads[9]. These radiofrequency waves are different from ionizing radiation (X-rays or gamma rays), cannot break chemical bonds, and are not sufficiently strong to injure our DNA. However, the tissue closest to the site of contact to the device is likely to absorb and yield the minor limited thermal consequence[10]. Generally, a decline in the parameters of semen analysis that characterize quantity, movements, and morphology of sperms has been observed throughout the globe in current years. Investigators agree on the undesirable influence of some ecological elements on the quality of sperms. The utmost common are the injurious effects of Smoking, alcohol abuse, intake of spermicidal food products, etc. are the most common injurious agents. Similarly, the undesirable effect of local testicular warming on sperm formation has been demonstrated[11-13].

Reproductive toxic substances such as lead and cadmium must be considered as the causes of low quality semen parameters. In male subjects with idiopathic oligo-asthenozoospermic, there were increased levels of lead and cadmium in semen that are associated with impaired motility and vitality of sperms, and most importantly with high sperm DNA fragmentation and the levels of reactive oxygen species[14]. The potential undesirable influence of cell phone radiation on the quality of sperms has been recognized recently. Whereas no assured inferences could be obtained from existing data, a n increasing number of researches specify a decline in male fertility related with cell phone use[15].The use of mobile phones in male subjects is related with decrease in, count of sperms, progressive movement, viability and morphology, all these alterations in semen parameters are associated with the duration of cell phone exposure[16,17]. Important positive relationships among reductions in sperm parameters were noted, if one of the parameter values is reduced, the other parameter also changes[17]. Increased use of devices for wireless communication and by their respective base stations cause various adverse health effects including disturbances of sleep pattern, headache, increased blood pressure, endocrine abnormalities, tinnitus and virtually endless list of other alleged effects[13]. Also, alterations in the blood-brain barrier permeability and electroencephalographic activity, aches in ear, perception of warmth, problem in attentiveness and tiredness have been described by any researchers[14,15]. Numerous neurological problems affecting brain function such as neurobehavioral and neuropsychiatric problems are noted in subjects who are especially living near mobile phone towers and those who experience the prolonged contact to nonionizing microwave radiation may have infertility due to free radical/oxidative species facilitated path[16,17]. A relationship has been observed between the use of mobile phone (RF exposure), DNA and chromosomal damages in lymphocytes of mobile phone users. These harms can have long-term concerns in terms of high threat of tumors or other age-connected alterations[18].The testicle is one of the tissues that are very vulnerable to radiation damage, radiations leads to significant dysfunction of the testicle[19].The membranes of mammal sperms are occupied by unsaturated fatty acids and are more susceptible to oxidation. Unusual sperm are liable for the excessive production of reactive oxygen species (ROS) that lead to oxidative stress and are reflected one of the reasons of infertility in male subjects[15]. The plasma of semen encompasses adequate antioxidant mechanisms and may counteract the influence of reactive oxygen species on the sperm. Though, if any imbalance occurs for any reason, the sperm pass thru variations that undesirably affect sperm parameters, this change may be

related with age, ecological components like radiation contact and nutritional factors[20]. Prolonged exposure of cell phone radiofrequency to male rats resulted in decreased activity of protein kinase C, sperm count and augmented apoptosis due to more ROS production[21]. In 2011Kesari et al. found that chronic exposure of male Wistar rats to cell phone radio-frequencies was associated with decreased glutathione peroxidase and superoxide dismutase, increased in catalase and malondialdehyde, decreased histone kinase, decreased micronuclei, and changed sperm cell cycle[22], and also increase and disorganization in the diameter, sperm cycle of the seminiferous tubule[23]. Cell phone prolonged radiation exposure also resulted in three fold increase in testicular tissue conjugated diene, lipid hydroperoxide and catalase, whereas total serum, testicular tissue glutathione and glutathione peroxidase were decreased, these harmful influences may be prevented by the use of vitamin C and E[23]. Decreased level of testosterone, increased caspase-3 activity, abnormalities of sperm head and mid portion, and decreased gonadotrophic hormones are related to the increased production of ROS in chronically exposed rats[24,25]. Low sperm count, decrease of progressive movement, viability, and normal morphology these variations are associated with daily duration of cell phones usage[26,16]. Radio frequency electromagnetic waves released by cell phones revealed a reduction in sperm motility and viability, an increase in the level of ROS, and a decline in the semen TAC score (ROS-TAC score)[27]. Mobile phone use by male subjects has been related with increased anomalous sperm morphology, high levels of free testosterone in blood, and decreased levels of LH without any variations in FSH and prolactin[28]. Increase in sperm DNA fragmentation is associated with prolonged daily use of cell phones more than 04 hours per day[29]. Contact to electromagnetic RF emission from cell phones and wireless internet resulted in decrease in the total number of motile sperm, as well as decrease in sperm progressive movement gradually[30]. Male fertility in cell phone users is impaired due to negative effect of radiation on different parameters of semen such as decreased volume of semen, decrease in sperm concentration and quantity[31].

Conclusion

Cell phone radiation may adversely influence quality of male sperm by reducing semen volume, decreasing concentration, count, movements and vitality of sperm and affecting fertility in male subjects. It must be supported thru the public media to increase public awareness of the potential effects on wellbeing of humans from RF release from mobile devices and reduce their contact. Current research briefly reviews recent data on the influence of mobile phones on infertility in male subjects. Prolonged exposure of semen in the areas of cell phone leads to a substantial decline in the count of sperm, decrease in progressive motility of sperm and resulting increase in the number of sperm with non-progressive movement. Long term direct cell phone contact could express almost sperm DNA disintegration. For male subjects who arrange to become father, particularly when there is a recorded fertility issue, this should be best advice for them not to hold the mobile phone in their trouser pocket for longer durations.

REFERENCES:

1. El-Hamd MA, Aboeldahab S. Cell phone and male infertility: An update. J Integrat Nephrol Androl. 2018;5(1):1-5. doi: 10.4103/jina.jina_34_17
2. Schulte RT, Ohl DA, Sigman M, Smith GD. Sperm DNA damage in male infertility: etiologies, assays, and outcomes. J Assist Reprod Genet. 2010;27:312.
3. De Iuliis GN, Newey RJ, King BV, Aitken RG. Mobile Phone Radiation Induces Reactive Oxygen Species Production and DNA Damage in Human Spermatozoa In Vitro. In Zhang, Baohong. 2009;4:e6446. PLoS ONE (Callaghan, New South Wales, Australia)
4. Hardell L, Carlberg M, Hansson Mild K. Epidemiological evidence for an association between use of wireless phones and tumor diseases. J Pathophysiol. 2009;16:113-22.

5. Gorpinchenko I, Nikitin O, Banyra O, Shulyak A. The influence of direct mobile phone radiation on sperm quality. Cent European J Urol. 2014; 67(1): 6571. Published online 2014 Apr 17. doi: 10.5173/ceju.2014.01.art14.
6. World Health Organization (WHO). (2010) WHO Laboratory Manual for the Examination and Processing of Human Semen, 5th edn. World Health Organization, Geneva, Switzerland. Available from; https://www.who.int/reproductivehealth/publications/infertility/9789241547789/en/
7. International Agency for Research on Cancer. Non-Ionizing Radiation, Part 2: Radio frequency Electromagnetic Fields. WHO Press; Lyon, France: 2013. IARC monographs on the evaluation of carcinogenic risks to humans, Volume 102. Available online: http://monographs.iarc.fr/ENG/Monographs/vol102/mono102.pdf. [Last accessed on 2017 Apr 01].
8. World Health Organization. Fact Sheet No. 193. Electromagnetic Fields and Public Health: Mobile Phones. Geneva: 2014. p. 1. Available from: http://www.who.int/peh-emf/publications/factsheets/en. [Last accessed on 2016 August 4].
9. EMF Explained Series. Available from: http://www.emfexplained.info. [Last accessed on 2014 May 10].
10. Dhami AK. Study of electromagnetic radiation pollution in an Indian city. Environ Monit Assess. 2011;184:6507-12.
11. Burton A. Study Suggests LongTerm Decline in French Sperm Quality Environ Health Perspect. 2013;121:a46.
12. GeoffroySiraudin C, Loundou AD, Romain F, Achard V, Courbière B, Perrard MH, et al. Decline of semen quality among 10 932 males consulting for couple infertility over a 20year period in Marseille, France. Asian J Androl. 2012;14:584590.
13. Jørgensen N, Vierula M, Jacobsen R, Pukkala E, Perheentupa A, Virtanen HE. Recent adverse trends in semen quality and testis cancer incidence among Finnish men. Int J Androl. 2011;34:e37e48.
14. Taha EA, Sayed SK, Ghandour NM, Mahran AM, Saleh MA, Amin MM. Correlation between seminal lead and cadmium and seminal parameters in idiopathic oligoasthenozoospermic males. Centr European J Urol. 2013;66:8492.
15. Agarwal A, Singh A, Hamada A, Kesari K. Cell Phones and Male Infertility: A Review of Recent Innovations in Technology and Consequences. Inter Braz J Urol. 2011;37: 432454.
16. Agarwal A, Deepinder F, Sharma R, Ranga G, Li J. Effect of cell phone usage on semen analysis in men attending infertility clinic: an observational study. Fertil Steril. 2008;89: 124128.
17. Boulos V, Hassan H. Do cell phones affect semen quality? Eur Urol Suppl. 2013; 12:e843e844.
18. Gandhi G. Anita Genetic damage in mobile phone users. Some preliminary findings. Int J Hum Genet. 2007;11:99-104.
19. Howell SJ, Shalet SM. Spermatogenesis after cancer treatment: Damage and recovery. J Natl Cancer Inst Monogr. 2005;34:12-7.
20. Hammadeh ME, Filippos A, Hamed MF. Reactive oxygen species and antioxidant in seminal plasma and their impact on male fertility. Int J Fertil Steril. 2009;3:87-110.
21. Kesari KK, Kumar S, Behari J. Mobile phone usage and male infertility in wistar rats. Indian J Exp Biol. 2010;48:987-92.
22. Kesari KK, Kumar S, Behari J. Effects of radiofrequency electromagnetic wave exposure from cellular phones on the reproductive pattern in male wistar rats. Appl Biochem Biotechnol. 2011;164:546-59.
23. Al-Damegh MA. Rat testicular impairment induced by electromagnetic radiation from a conventional cellular telephone and the protective effects of the antioxidants vitamins C and E. Clinics (Sao Paulo). 2012;67:785-92.
24. Kesari KK, Behari J. Evidence for mobile phone radiation exposure effects on reproductive pattern of male rats: Role of ROS. ElectromagnBiol Med. 2012;31:213-22.

25. Oyewopo AO, Olaniyi SK, Oyewopo CI, Jimoh AT. Radiofrequency electromagnetic radiation from cell phone causes defective testicular function in male wistar rats. Andrologia 2017;49.
26. Wdowiak A, Wdowiak L, Wiktor H. Evaluation of the effect of using mobile phones on male fertility. Ann Agric Environ Med. 2007;14:169-72.
27. Agarwal A, Desai NR, Makker K, Varghese A, Mouradi R, Sabanegh E, et al. Effects of radiofrequency electromagnetic waves (RF-EMW) from cellular phones on human ejaculated semen: An in vitro pilot study. Fertil Steril. 2009;92:1318-25.
28. Gutschi T, Mohamad Al-Ali B, Shamloul R, Pummer K, Trummer H. Impact of cell phone use on men's semen parameters. Andrologia. 2011;43:312-6.
29. Rago R, Salacone P, Caponecchia L, Sebastianelli A, Marcucci I, Calogero AE, et al. The semen quality of the mobile phone users. J Endocrinol Invest. 2013;36:970-4.
30. Yildirim ME, Kaynar M, Badem H, Cavis M, Karatas OF, Cimentepe E, et al. What is harmful for male fertility: Cell phone or the wireless internet? Kaohsiung J Med Sci. 2015;31:480-4.
31. Zhang G, Yan H, Chen Q, Liu K, Ling X, Sun L, et al. Effects of cell phone use on semen parameters: Results from the MARHCS cohort study in chongqing, china. Environ Int. 2016;91:116-21.