Effect of mobile phone usage on semen analysis in infertile men

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Abstract

There has been scientific interest in the possible effects of continuous or pulsed exposure to microwave radiation as emitted by mobile phones. The use of mobile phones adversely affects the quality of semen. To determine the effect of mobile phone use on parameters of semen analysis in infertile men. Cross-Sectional study. Fertility, Infertility and IVF centre in Al – Batool Mosul Teaching Hospital for the period from 2009-2010. This study was conducted on 300 patients complaining of infertility after 2003, their mean age (29.87 ± 6.4) years. They were classified according to their active mobile phone use into group 1: 4 h / day; group 2: 3 h / day; group 3: 2 h / day; group 4: no use. Also they were classified according to the duration of use in years into group A: from 1 – 3 years; group B: from 4 – 6 years. Classification according to position of mobile phone in relation to the body into Group C: Trouser pocket; group D: waist pouch; group E: shirt pocket was done. Semen analysis was carried out for all subjects in addition; serum testosterone measurement was done for 100 subjects. The laboratory values of semen parameters significantly differ in all user groups as compared to non user groups. The longer the duration of daily exposure to cell phones, the greater decrease in semen parameters (sperm count, motility and normal morphology). The lower sperm count, motility and normal morphology were in the group B of mobile phone users who used cell phones for 4-6 years duration as compared to group A who used it for 1-3 years. There was no significant difference in mean serum testosterone e level in different mobile user groups. Keeping cell phones in the trouser pocket has been found to decrease sperm count, motility, and normal morphology as compared to men keeping phones in the waist pouch and shirt pocket. The present study conclude that the use of mobile phone decreases the semen quality in study subjects by decreasing count, motility and normal morphology.

Introduction

There has been a considerable public, scientific and media interest in the possible adverse effects associated with the continuous or pulsed exposure to microwave radiation as emitted by mobile phones (1).There has been a tremendous increase in the use of mobile phones in the past decade and concerns are growing about the possible hazardous effects of radiofrequency of electromagnetic waves (EMW) emitted by these devices on human health.(2). Cell phones have become indispensable devices in daily life. Preliminary studies, though with limitations in study design, suggest a possible link between cell phone use and infertility (2). A recent study found that use of cell phones adversely affects the quality of semen by decreasing the sperm count, motility and morphology (3). Other studies suggested that EMW emitted from cell phones can reduce the fertilizing potential of men (4-7), with regard to the potential damaging effects on the male reproductive system. A wide spectrum of possible effects that range from an insignificant effect to variable degrees of testicular damage and reduction of different sperm parameters were documented.(8). However, other study has analyzed the mobile phone usage of men and the effect on the subsequent provided semen. Authors concluded that just carrying a mobile phone affects human sperm (9). In a 2005 a study carried out in Hungary analyzed the impact of mobile phone use on the semen of 371 men. This study concluded that the longer a mobile phone is used on a daily basis , the bigger the effect on sperm quality .Longer exposure resulted in larger percentage of slower sperm which may be caused by electromagnetic radiation emitted from cell phones (5).. Moreover, a Polish study was conducted from 2004 – 2006 aimed to analyze of the effect of mobile phone on the semen, it was noted that an increase in the percentage of sperm cells of abnormal morphology is associated with the duration of exposure to the waves emitted by the mobile phone. It was noted that a decrease in the percentage of sperm cells of progressive motility in the semen is correlated with the frequency of using mobile phones (10). The present study was conducted to determine the effects of mobile phone usage on semen analysis parameters among men attending infertility clinic at Al-Batool Hospital in Mosul City.

Subjects and methods

Oral consent about the participation in the present study was taken from the study subjects before starting data collection. The design of this study is cross-sectional which was conducted to record information from mobile phone users on a predesigned questionnaire. Beside general information , patient records were maintained for daily frequency of calls (incoming and outgoing), duration of calls, usage duration in /day and in years, position of mobile phone in relation to body as in shirt pocket, trouser pocket and waist pouch. The study subjects included 300 men mean age (29.87±6.4) attending male infertility clinic at Al – Batool Hospital, for the period from 2009 - 2010 , they were classified according to the usage duration/day into four groups : group 1 : 4 h / day ; group 2 : 3 h / day ; group 3 : 2 h / day; group 4 : no use (control). Also they were classified according to the use period in years into group A: from 1 -3 years; group B: from 4 -6 years.3Classification according to the position of mobile phone in relation to the body, study subjects were divided into group C: Trouser pocket; group D:

waist pouch; group E: shirt pocket. Subjects who had undergo surgery for hernia repair, medical diseases as D.M, U.T.I, thyroid disease, patients who were on antipsychotic or antihypertensive drugs, or taking alcohol, azoospermics & those with small sized testes were excluded from the study.

Semen samples were obtained by masturbation after an abstinence period of 3 days; samples were processed by conventional analysis to determine volume, sperm count, motility and morphology according to WHO criteria. 10 ml of blood samples were taken from each subject in the morning. After centrifugation serum was kept frozen at – 20 c until analyzed for testosterone using MINIVIDUS ELISA technique. Data analysis was done using SPSS program version 11.5. Pearson correlation, and unpaired T-Test was used in the statistical analysis.P-value≤0.05 was considered significant throughout the study.

Results

The laboratory values of semen parameters were significantly differ in all user groups as compared to non users as shown in Table (1). Table 2 depicts that the longer the duration of daily exposure to cell phones, the greater decrease in semen parameters (sperm count, motility and normal morphology). A significantly lower sperm count , motility and normal morphology (P≤0.001each) were in the group B of mobile phone users who used cell phones for 4 -6 years duration as compared to group A who used it for 1 -3 years , while serum testosterone level showed no significant difference between the two groups (Table 3). Keeping cell phones in the trouser pocket has been found to decrease sperm concentration, motility and normal morphology as compared to men keeping mobile phones in the waist pouch and shirt pocket (Table 4). Table 5 shows a high significant negative correlation between semen parameters i.e. Count, motility and normal morphology and the use period of mobile phones in years and usage duration/day (P=0.001) each, while there was no significant correlation with semen volume and serum testosterone level was detected. It seems that semen volume as well as serum testosterone is not affected in all groups of mobile phone users. Table 6 shows that no significant difference in mean serum testosterone level in different mobile phone user groups.

Table (1):- The mean ± S.D of semen profile parameters among study subjects.

Parameter	Mobile users(n=270)	Non-users(n=30)
Volume (ml)	2.66 ±0.54	2.70±0.39
Count(million/ml)	22.41±6.65	36.166±5.56
Motility (%)	36.59±9.04	53.133±10.15
Morphology (%)	52.459±7.187	62.20±7.20

Table (2):- Mean ± SD of semen profile parameters among groups of usage duration/day.

Semen parameters	Group1(n=50)	Group2(64)	Group3(n=156)	Group4 non-users(n=30)
Volume(ml)	2.82±0.64(N.S)	2.59±0.59(N.S)	2.64±0.46(N.S)	2.70±0.39(N.S)
Count (million/ml)	16.04±3.45**	18.96±5.62**	25.87±5.49**	36.166±5.56
Motility (%)	31.12±7.42**	37.66±8.63**	45.56±3.69**	53.133±1.85
Morphology (%)	44.12±4.57**	50.14±6.40**	56.08±5.33**	62.20±7.20

Unpaired T-Test was used to determine the presence of significant differences between groups of mobile phone users and non-users. **P≤o.oo1

Table (3):- Comparison of semen parameters by using unpaired t – test in mobile users according to use period in years.

Semen Parameters	Group(n=157)	Group(n=113)
Volume(ml)	2.64±0.46	2.69±0.62(N.S)
Count(million/ml)	25.92±5.50	17.54±4.80**
Motility (%)	48.27±5.49	34.76±8.72**
Morphology (%)	56.14±5.36	47.34±6.21**

Unpaired T-Test was used.

Table (4):-The mean ± SD of semen profile parameters according to position of mobile phone in relation to the body.

Parameter	Trouser pocket(n=112)	Waist pouch(n=127)	Shirt pocket(n=30)
Volume(ml)	2.70±0.62	2.62±0.47	2.70±0.43
Count(million/ml)	17.49±4.78	25.81±5.49	26.40±5.60
Motility (%)	34.74±8.75	45.56±3.6	50.133±4.62
Morphology (%)	47.32±6.23	55.32±5.20	59.60±4.64

Table (5):- Correlation between semen profile parameters and testosterone level and duration of mobile phone usage /day of years.

	volume	Count	Motility	morphology	Testosterone
Use period in years	0.034(N.S)	-0.575**	-0.358**	-0.704**	0.980(N.S)
Use period in 24 hours	0.101(N.S)	-0.621**	-0.555**	-0.658**	0.069(N.S)

Table (6):- The mean ± S.D of serum testosterone level in mobile phone users.

Group	Mean ±S .D
1 – 3 years	5.11±1.89
4 -6 years	4.97±2.31
4 h / day	4.69±1.65
3 h / day	5.52±3.31
2 h / day	5.11±1.89.
Trouser pocket	4.97±2.31
Waist pouch	5.35±1.94

Discussion

Although previous studies suggested a role for cell phone use in male fertility , the mode of action of EMW emitted from cell phones on the male reproductive system is still unclear [(2)]. With regard to the potential damaging effects on the male reproductive system,Derias et al.,[(7)] carried out a study on animals. This study revealed a wide spectrum of possible effects that range from an insignificant effect to variable degrees of testicular damage and reduction of different sperm parameters. [(7)] Our results showed a strong association of cell phone use with decreased semen quality and this in agreement with other researchers [(4, 5)]. Also the present study suggested that the decrease in sperm count , motility and normal morphology is related to the duration of exposure to cell phones and this in agreement with Agrawal et al., 2008 [(3)]. Jung and Schill[(9)] stated that high intensities radiofrequency (RF) radiation has heating properties leading to thermal effects, and an increase in tissue or body temperature on exposure to EMW may cause reversible disruption of spermatogenesis. Wang et al., 2003 [(10)] in their study on mice, suggested that Leydig cells are among the most susceptible cells to EMW and injury to these cells may affect spermatogenesis. Exposure to RF electromagnetic radiation and mild scrotal heating can induce DNA damage in mammalian spermatozoa although the underlying mechanism is unclear [(2, 11).] The present study speculate that keeping cell phone in trouser pocket negatively affect spermatozoa and carrying cell phones near reproductive organs could negatively affect male fertility , this agrees with a study done by Kilgallon et al., 2005 [(5)]. Two studies infer that EMW emitted from cell phones may lead to oxidative stress in human semen [(12, 13)]. The current study concluded that a decrease in the sperm count, motility and normal morphology is correlated with the duration of mobile phone use. Storage of mobile phones close to the testes had a significant impact on sperm concentration, motility and normal morphology. These trends suggest that recent concerns over long term exposure to the electromagnetic irradiation emitted by mobile phones should be taken seriously.

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