
EFFECT OF CIPROFLOXACIN ON SEMEN ANALYSIS IN HUMAN HEALTHY VOLINTEERS

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Summary

The effect of ciprofloxacin treatment on semen analysis was studied. Six apparently healthy volunteers with age ranging from 30-51 years were included in this study. Ciprofloxacin tablet (500 mg) was given to each volunteer twice daily for 14 days. Semen analysis was performed for them before ciprofloxacin treatment and 2,4 and 6 weeks after treatment. Four weeks after treatment, there was a statistically significant reduction in total sperm count by 53.4% (from 157.16 ± 23.7 to 73.17 ± 19 millions, $p < 0.001$), in percentage of actively motile sperms by 40.5% (from 35 ± 7.06 to 20.83 ± 5.23 , $p < 0.001$) and in percentage of viable sperms by 15.2% (from 67.6 ± 6.01 to 57.33 ± 9.48 , $p < 0.025$). It is concluded that administration of ciprofloxacin (500 mg x 2 for 2 weeks) had, therefore, resulted in a significant reduction of various parameters of semen analysis. A finding, if proved to be true, should be taken in consideration during ciprofloxacin treatment for any type of infection in males.

Introduction

In the last few years, a marked decrease in male fertility has been reported¹. Environmental factors are recently suspected for this effect. Among these factors is the misuse of drugs; particularly antibiotics¹.

Antibiotic administration modifies some of the spermatic parameters (specially motility and morphology) in

patients whose semen analysis suggested infection². Among these antibiotics are quinolones which are a group of antibacterial agents with broad spectrum activity¹. Quinolones concentrations in prostatic fluid, prostatic tissue and in seminal fluid are found to be relatively high in comparison to the corresponding plasma concentration³. Ciprofloxacin is concentrated several folds in ejaculate and seminal fluid⁴.

Testicular impairment induced by some quinolone members is still controversial. Some studies showed bacteriological

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cure of prostatitis with improved sperm count, viability and total motile sperm per ejaculate⁵. Also ciprofloxacin had resulted in a significant reduction of semen leukocytic count with a significant improvement in sperm motility and activity in infertile patients⁶. While other studies revealed that the average of morphologically normal sperms significantly decreased after ciprofloxacin treatment in patients with asthenozoospermia and semen analysis suggestive of infection².

Animal studies have shown a marked reduction in testicular LDH-X activity, sperm count, motility and daily sperm production in rats after ciprofloxacin treatment¹.

This stimulated us to investigate the adverse testicular effects of the most familiar quinolone member (ciprofloxacin) in normal subjects.

Materials and Methods

Six apparently healthy volunteers with their age ranged from 30-51 years were included in the study. Semen analysis was made for each volunteer after 3 days of abstinence. Ciprofloxacin [Cifran tablet 500 mg, RANBAXY laboratories limited, INDIA] was given for each subject twice daily for fourteen days.

Semen analysis was repeated for them 2,4 and 6 weeks after ingestion of ciprofloxacin tablets⁷.

Results were expressed as mean \pm SEM. Comparisons between two means were performed using paired t-test. Significant

difference, with respect to pre-ingestion level, was assumed if $p < 0.05$.

Results

1. Effect of ciprofloxacin on total sperm count

The total sperm count before ingestion of ciprofloxacin (mean \pm SEM for $n=6$, 157.16 ± 23.7 millions) decreased by 12%, 53.4% and 40.6% at 2,4 and 6 weeks after ciprofloxacin ingestion respectively. These reductions are statistically significant (Table I).

2. Effect of ciprofloxacin on sperm motility

Ciprofloxacin (500 mg x 2 for 14 days) resulted in reduction of the proportion of actively motile sperms by 16.17%, 40.5% and 2.4%, 2,4, and 6 weeks after ingestion respectively. These reductions were statistically significant only at 4 weeks after ingestion ($p < 0.001$, Table II).

3. Effect of ciprofloxacin on % viability of sperms

Again results have shown a decrease in % viability of sperms 4 weeks after ingestion of ciprofloxacin by 15.2% (from 67.6 ± 6.01 to 57.33 ± 9.48) which is statistically significant (Table III).

Results also demonstrated that the above parameters started to increase 6 weeks after ciprofloxacin ingestion.

No evident effect of ciprofloxacin on morphology of sperm cells was found (Table IV).

Table 1: Effect of ciprofloxacin on total sperm count

	Before ingestion	2 weeks after ingestion	4 weeks after ingestion	6 weeks after ingestion
Mean \pm SEM	157.16 \pm 23.7	138.16 \pm 28.18	73.17 \pm 19	93.33 \pm 17.7
% reduction		- 12%	- 53.4%	- 40.6%
		P< 0.025	P< 0.001	P< 0.005

Table 2: Effect of ciprofloxacin on % actively motile sperms

	Before ingestion	2 weeks after ingestion	4 weeks after ingestion	6 weeks after ingestion
Mean \pm SEM	35 \pm 7.06	29.16 \pm 6.25	20.83 \pm 5.23	34.16 \pm 8.11
% reduction		- 16.7%	- 40.5%	- 2.4%
		Not significant	P< 0.001	Not significant

Table 3: Effect of ciprofloxacin on % viability of sperms

	Before ingestion	2 weeks after ingestion	4 weeks after ingestion	6 weeks after ingestion
Mean \pm SEM	67.6 \pm 6.01	60.16 \pm 8.28	57.33 \pm 9.48	61 \pm 10.12
% reduction		- 11%	- 15.2%	- 9.8%
		Not significant	P< 0.025	Not significant

Table 4: Effect of ciprofloxacin on morphology of sperms

		Before ingestion	2 weeks after ingestion	4 weeks after ingestion	6 weeks after ingestion
Mean	Normal	74.16 \pm 2.05	74.16 \pm 2.05	75.83 \pm 1.57	75 \pm 1.82
\pm SEM	Abnormal	25.83 \pm 2.01	25.83 \pm 2.01	24.16 \pm 1.55	25 \pm 1.82

Discussion

The effect of ciprofloxacin treatment on semen quality is controversial. Cardoso et al⁵ have demonstrated improved seminal parameters after treatment with ciprofloxacin. Improvement of sperm motility and activity in infertile patients was reported by Al-Sultani et al⁶.

On the contrary, studies in asthenozoospermic men revealed a significant decrease in the morphologically normal sperms after ciprofloxacin treatment². Studies in rats reported significant impairment of both testicular function and structure by ciprofloxacin¹.

The latter findings are similar to the findings of the present study in which

we found a statistically significant decrease in total sperm count, sperm motility and percentage of viability 4 weeks after ciprofloxacin ingestion twice daily for 14 days.

These effects are found to be reversible, as the total sperm count, % actively motile sperms and % viability started to increase 6 weeks after ciprofloxacin ingestion which required longer follow-up.

The mechanism by which ciprofloxacin induces such effects is not clear. Changes in reactive oxygen species (ROS) produced by sperm cells could be one mechanism. ROS are found to play an important role in sperm physiological functions, but elevated levels of ROS or oxidative stress are found to be

associated with male infertility⁸. Also ROS mediated damage to human spermatozoa has been implicated in the pathogenesis of male infertility⁹.

So ciprofloxacin, being an oxidant drug, may have an effect on ROS production by sperm cells. Several studies have shown that ROS generated by quinolones may be responsible for quinolone mediated phototoxicity^{10,11}.

It is, therefore, concluded that cipro-

floxacin treatment causes a significant decrease in male semen analysis parameters and the mechanism behind it may be due to its effect on ROS generation by sperm cells, which requires further verification. It is recommended that semen analysis must be taken into consideration while prescribing ciprofloxacin for any type of infection in male, and history of ciprofloxacin intake should be considered in infertile males.

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