

## OPIUM EFFECT ON SPERMATOGENESIS OF ADDICTED MEN

\*<sup>1</sup>Abdolvahab Moradi

Ph.D, Associate Professor, Faculty  
of Medicine, Gorgan University of  
Medical Sciences, Gorgan, IRAN .  
E.mail: abmoradi@yahoo.com

<sup>2</sup>Iraj Sharamian

MD, Pediatric Specialist, Zabol  
University of Medical Sciences.  
Zabol, IRAN.  
E.mail: ir\_buper@yahoo.com

<sup>3</sup>Elham Sharafi

MD., Zabol Health center. Zahedan  
University of Medical Sciences.  
Zabol, IRAN.  
E.mail: i\_shahramian@yahoo.com

**Abstract—Introduction:** Drug abuse may alter function of sex organs. One of the well known drugs is opium, which its effects on spermatogenesis of addicted men studied in a main drug abuse center.

**Material & Methods:** In this study; sperm analysis of 224 men (112 of them were addicted to use opium, and 112 healthy men) tested to evaluate possible effects on spermatogenesis. The results analyzed using the T-test and Chi-square statistical methods. Mean differences considered for values of  $p \leq 0.05$ .

**Findings:** There was a meaningful difference on sperm count, its flowing time and viscosity, spermatozoa morphology and motility.

**Conclusion:** the results showed that addiction to opium has a lot of pathological effects on spermatogenesis that can cause infertility and low fertility in men, probably because of decrease in testosterone level related to possible suppressive effects of opium.

**Key words:** Spermatogenesis, opium, addiction.

### I. INTRODUCTION:

Opium comes from poppy, which include at least 20 alkaloids. One of its main alkaloids is morphine, which includes up to 10% of opium [1]. Opium is an ancient drug and like other kinds of drugs acts through drug receptors, [2]. These receptors are dispersed in limbic system (Hippocampus and Amygdale), thalamus and hypothalamus, and also exist in testis [1,2]. As the HPG axis control center, Hypothalamus receives nerve messages from so many brain centers like Amygdale and thalamus, Pons and cerebral cortex, which are, alternately responsible for Hypophysis and gonadic secretions. GNRH coagulated from hypothalamus leads to instigation to coagulate LH and FSH from anterior hypophysis. LH affects on lydig cells and causes to produce testis steroids. On the other hand, FSH is the main instigator for growth of testis somniferous tubules. These tubules are responsible for function of exocrine and producing spermatozoon. 300 spermatozoa are made as per of each gram of testis per second [3].

Exact analysis of sperm is the first source of information on sperm generation, hormonal sufficiency and reproductive organ. Fresh sperm is a coagulated liquid which comes to liquid 5 to 30 minuets after seminal effusion. Seminal secretions of vesicles include coagulating materials, and prostate contain solvent materials for protein.

Drugs influence hypophysis system of sex organs and also sexual abilities. For example: Daily methadone injection for 5 to 10 days, considerably leads to weight loss in sex organs of lab mice [2]. In another research by Danielle and his colleagues, the controlled effects of opioids on secretion of GNRH was seen [4]. And in another study, done in England by Rangi, analysis of semen of men addicted to Heroin was completely abnormal, which could be a sign of Heroin toxicity in their productive systems [5]. Moreover, the controlled effects of opiopeptins on secretion of GNRH were also reported [6]. Considering that all drugs affects from the brain cortex to testis, which were seen in many cases and since the spermogram shows good aspects of productive system and spermatogenesis, this study was done in order to study the effects of opium on spermatogenesis of addicted men, in comparison with normal subjects.

### II. MATERIALS AND METHODS:

In order to measure the sample volume in this case-observation study, a piolot study was done on 40 men (20 addicted to opium, 20 normal). According to the percent of the subjects' variables, sample volume of 112 men was considered for each group. In this study, 112 married men, in ages from 20 to 40, were randomly selected among whom came to Drug Abandonment Center in Zabol, and variables studied were their secondary characteristics, gynecomastia, and body hairs. Contents of scrotum were touched in stand mode, and the measures and thickness were studied. With patients consent, their semen gathered in a wide opening glass through interrupted sex method, after 3 days having no sex. Semen analysis was done within 1 to 3 hours after samplings. One hundred twelve cases (112) were also randomly selected among normal men (as controls); who have the same age rang and came to do sperm analysis before vasectomy. Their semen samples gathered, too. At the same time a questionnaire, of demographic information, was fulfilled by them. Lab Findings of each person's semen registered separately. Then the data entered into the computer through SPSS software, analyzed according to the statistical testing by means of Chi-square technique and T-test. The meaningful difference considered as  $P < 0.05$ .

### III. RESULTS:

All samples were studied using spermogram method. Each group had the age rang from 20 to 40, almost 30, in

average. Number of spermatozoa count in drug addicts was 3 to 95 millions (mean=57,800,000), versus 71 to 162 millions (122,600,000 in average), in each milliliter, in normal men.

The results showed that in 44.6% cases of drug addicts, sperm number had been lower than 60 millions in each milliliter and under fertility level. In normal men, this number was 2.7%, (P<0001). In table.1, the comparison between men's sperm count was shown in two groups: lower than 60,000 per milliliter, and more than 60,000 per milliliter. (Table 1).

Table 1: Comparison of sperm count between addicted and control Groups

| Groups   | ≤60000     | ≥60000      | Total Num. |
|----------|------------|-------------|------------|
|          | Num..(%)   | Num..(%)    |            |
| Addicted | 50 (44.6%) | 62 (55.4%)  | 112 (100%) |
| Controls | 3 (2.7%)   | 109 (97.3%) | 112 (100%) |

The results showed that in 95.5% of cases, quality of spermatozoa motility had been lower than normal level in drug addicts; while, in normal men, it was just 9%, (P<0001). (Table 2).

Table 2: comparison of sperm movement qualities between groups

| Groups   | ≤10%        | ≥10%      | Total Num. |
|----------|-------------|-----------|------------|
|          | Num..(%)    | Num..(%)  |            |
| Addicted | 107 (95.5%) | 5 (4.5%)  | 112 (100%) |
| Controls | 10 (9%)     | 102 (91%) | 112 (100%) |

Microscopic study on spermatozoa morphology, in drug addicts and normal men, showed that there were more than 10% abnormal forms in 64.3% of drug addicts; while it was lower than 1% in normal men. Spermatozoa with big heads were more than 10% in 59.8% of drug addicts, but it was 0% in normal men. And for drug addicts and normal men, having sperm with big head in 5% to 10% of each 100 sperm was 34.8% and 17.9% respectively. Two headed ones per 100 spermatozoa, was 58.9% in drug addicts, and zero in normal men, in more than 10% of subjects. IN all above mentioned cases, there was a meaningful differences, p<0.001 (Table. 3).

Table 3: Comparison of sperm morphology between groups

| Morphology    | Groups   | ≤10%       | ≥10%      |
|---------------|----------|------------|-----------|
|               |          | Num.(%)    | Num.(%)   |
| Amorph        | addicts  | 36(32.1%)  | 76(67.9%) |
|               | controls | 111(99.1%) | 1(0.9%)   |
| With big head | addicts  | 45(40.2%)  | 67(59.8%) |
|               | controls | 112(100%)  | 0 (0%)    |
| With two head | addicts  | 46 (41.1%) | 66(58.9%) |
|               | controls | 112(100%)  | 0 (0%)    |

The results showed that the sample viscosity was abnormal in 25% of subjects, in drug addicts, and for normal men this was 3.6%. After 30 minuets, the spermatozoa motility was seen in 52.7% of drug addicts, and 98.2% of normal men. Abnormality in time of semen

flow was 43.8% in drug addicts and 3.6% in normal men p<0.001(Table. 4).

Table 4: Comparison of semen viscosity and time of flowing between groups

| Variables       | Groups   | Abnormal Num.(%) | Normal Num.(%) |
|-----------------|----------|------------------|----------------|
| Viscosity       | addicts  | 28 (25%)         | 84(84%)        |
|                 | controls | 4 (3.6%)         | 108 (96.4%)    |
| time of flowing | addicts  | 59(52.7%)        | 63 (56.3%)     |
|                 | controls | 2 (1.8%)         | 110 (98.2%)    |

#### IV. CONCLUSION:

Drug addiction is one of today's the most critical problems. Heroin, Morphine, Methadone, Opium, Marijuana, and ... are well-known samples of such drugs. According to the taste of people and place of residence, use of one or more is prevalent, in different parts of the world. This study was done in a place were the most abused drug was opium. We found that, use of drug can affect the sexual functions and related hormone levels [7]. So, it can also affect spermatozoa. On the other hand, drugs have receivers on some parts of testis, such as certulial cells and seminiferous tubes that prove spermatogenesis process miss effects. This study showed that the average numbers of spermatozoa per milliliter was 57,500,000 for drug addicts, and 122,100,000 for normal men. Since at least 60,000,000 cells per milliliter of semen are needed for its fertilizing capacity; so it could be assumed that most drug addicts lose their power of fertility. There is a same study with similar results in Arabia. which proves it, too [8]. A research from India reports that it is also the same in addicted men to tobacco [9]. Our study shows that, there is more than 10% morphological abnormalities in 64.3% of drug addicts. While, there is no such problem in normal men. And this number is lower than 1% in 98.2% of normal men. A research on drug addicts in Egypt showed that so many morphologic changes of spermatozoa cells had been seen in seminal microscopic study [4].

In our study, we found that 5% to 10% of 34.8% cases had big abnormal heads, but this number in normal men was 17.9% cases. 5% to 10% of every 100 analyzed sperm of 58.9% of drug addicts had two heads. But, this was not seen in normal men. The results of study in Egypt were the same [10]. A research in Germany shows that drug addiction can make diminished spermatogenesis, and can reduce the diameter of seminiferous tubes [5]. This study shows that the cell movement of lower than normal level in 95.5% of drug addicts and 4.5% of normal men, that is the same as the results of studies done in Arabia [ 8], Egypt [10], Germany [11], India [9], and Europe [5]. Sperms in Drug addicts and normal men, is significant in comparison with of the control group (P<0.001). Considering the viscosity, movement after 30 minutes and flowing time, this is the same as the Indian [9] and Arabian [2] study results. In Kerman [12], Drug addicts' testosterone and gonadotropins

were studied, but there were no registered results of research on morphology and physical characteristics of drug addicts' spermatozoa in Iran. Since sex hormones can widely affect different systems of the body, Kerman study shows that having addiction to opium will reduce the gonadotropins (LH & FSH), in drug addicts in, comparison with normal men. These hormones cause testis growth and spermatogenesis instigation, in men. This study also shows abnormalities in forms, numbers, and movements of the cells, viscosity and flowing time of the semen in drug addicts. So, we can say that addiction to opium can cause pathological effects on spermogram, which is probably because of direct effect on testis through drug receptors and indirect effect by affecting on sex hormones. And it is possible to cause infertility or low fertility in drug addicts. Another studies needed to capture more clarifications.

#### ACKNOWLEDGEMENT:

We appreciate the Research office of Assistant of Zabol Medical Science University that pays the expenses and addiction treatment clinic of Zabol, in which this research was done, and also Ms. Narooi, and Ms. Firoozkoohi, who helped us with this study.

#### REFERENCES:

- [1] Shahramian I, Kohan F, Moradi A, Opioids in pediatric. Opioid history, first Ed, Golban press, 2004.1-3,80
- [2] Thomas JA, Domborsky JT, Effects of methadone on the male reproductive system. Arch Int Pharmacodyn Ther. 1975.Jun;215(2):215-21
- [3] Rangi G, DeLauretis L, Betetti O, Gonadal function in male heroin and methadone addicts. Int J Androl. 1988. Apr; 11(2):93-100
- [4] Daniell HW, Hypogonadism in men consuming sustained –action of opioids. J Pain. 2002. Oct ; 3(5):377-84.
- [5] Rangi G, DeLauretis L, Gambaro V, Semen evaluation in heroin and methadone addicts. Acta Eur Fertil. 1985. Jul-Aug; 16(4):245-9.
- [6] Mendelson JH, Mendelson JE, Patch VD, Plasma testosterone in heroin addiction and during methadone maintenance. J Pharmacol Exp Ther. 1985.Jan;192(1):211-17
- [7] Bolelli G, Lafisca S, Flamigni C, Lodi S, Franceschetti F, Filicori M, Mosca R. Heroin addiction: relationship between the plasma levels of testosterone, dihydrotestosterone, androstenedione, LH, FSH, and the plasma concentration of heroin. Toxicology. 1979 Dec; 15(1):19-29.
- [8] el-Shoura SM, Abdel Aziz M, Ali ME, el-Said MM, Ali KZ, Kemeir MA, Raoof AM, Allam M, Elmalik EM. Deleterious effects of khat addiction on semen parameters and sperm ultrastructure. Hum Reprod. 1995 Sep; 10(9):2295-300.
- [9] Banerjee A, Pakrashi A, Chatterjee S, Ghosh S, Dutta SK. Semen characteristics of tobacco users in India. Arch Androl. 1993 Jan-Feb; 30(1):35-40.
- [10] el-Gothamy Z, el-Samahy M. Ultrastructure sperm defects in addicts. Fertil Steril. 1992 Mar; 57(3):699-702.
- [11] Reuhl J, Bachl M, Schneider M, Lutz F, Bratzke H. Morphometric assessment of testicular changes in drug-related fatalities. Forensic Sci Int. 2001 Jan 15; 115(3):171-81.
- [12] Sepehri Gh., Gholamhosseinian A., Hejazian H., Dabiri Sh., Atapour F. The Effects of Opium Addiction on testosterone and Gonadotropins in Addicted Men journal of kerman university of medical sciences, 1995;2(2):56-60