

## ARTICLE

## EFFECT OF IRANIAN CRACK ON TESTOSTERONE AND GONADOTROPIN LEVELS IN ADDICTED MEN

Abdolkhahim Ghanbarzahi<sup>1</sup>, Hamed Fanaei<sup>2,3\*</sup>, Mehdi Khoshima Shahraki<sup>4</sup>, Mohsen Bameri Niafar<sup>1</sup><sup>1</sup>Department of Physiology, Iranshahr University of Medical Sciences, Iranshahr, IRAN<sup>2</sup>Pregnancy Health Research Center, Zahedan University of Medical Sciences, Zahedan, IRAN<sup>3</sup>Department of Physiology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, IRAN<sup>4</sup>Department of Medical Parasitology, Zabol University of Medical Sciences, Zabol, IRAN

## ABSTRACT

**Background:** Substance abuse is associated with a wide range of side effects such as hormonal and reproductive disorders. Iranian Crack is a new form of narcotic substance that widely used in Iran during last decade. The aim of this study was determination of the effects of Iranian Crack on serum testosterone and gonadotropin levels in addicted men. **Methods:** In this case-control study, participants were screened for eligibility, and then, serum levels of testosterone and gonadotropin (LH and FSH) hormones in 54 Iranian Crack addicts men were compared with 45 healthy subjects. Hormone levels in serum were measured by ELISA technique. **Results:** Results indicated that serum FSH levels in addict men was significantly lower than healthy subjects ( $p = 0.03$ ). Serum LH and Testosterone levels in case group had not significant difference with control group. **Conclusions:** According to our results, chronic use of Iranian Crack lead to a reduction in FSH levels, and this reduction may impair the reproductive function in addicted men.

## INTRODUCTION

Substance abuse is a major problem among the various societies throughout the world [1]. Opioids have been used for a long time for the treatment of acute and chronic pain [2]. Opioids induced a lot of side effects such as addiction, hypogonadism, immune suppression, osteoporosis and hyperalgesia [3]. Also, opioids act on endocrine system that may lead to further serious adverse effects [4].

The gonadotropins (FSH, LH) are secreted from pituitary gland and acts via hypothalamus-pituitary-gonadal axis, which stimulates gonadal endocrine function and gametogenesis in males [5]. Inhibition of this axis will lead to reduction of semen quality, sperm count, impairment of erection and finally infertility [6]. Several studies have evaluated the relation between drug use and Hypothalamic-Pituitary-Gonadal axis hormones, it has been demonstrated that opioid abuse may result in hypogonadism and infertility by decreasing release of gonadotropin releasing hormone (GnRH) [7], LH, FSH and testosterone hormones [8-10]. In addition has effect on sperm motility [11] and morphology [12].

There is a long history of opioid abuse in Iran [13]. In recent years, Iranian Crack consumption in addicts has increased. Iranian Crack is a new form of narcotic substance that has widely used in Iran in the past years [14]. Farhoudian A et al. showed that Iranian Crack contains heroin, acetaminophen, caffeine, morphine, codeine, thebaine and acetylcodeine, so they concluded that the Iranian Crack is heroin-based and hence is quite different from common Crack Cocaine found in the Western countries [15].

Despite many studies on the effects of opioids on different body systems, the effects of long term Iranian Crack consumption on endocrine system especially on sex hormones is not determined. Therefore, the aim of this study was determination of effects of Iranian Crack use on serum testosterone and gonadotropins in addicted men.

## MATERIALS AND METHODS

## Study subjects

In this case-control study, 84 addicted men were screened for eligibility (cases, group 1). They had Iranian Crack dependency and referred to Bahari Digar and Ofogh Bidari Addiction Treatment Centers at Zahedan city of Iran (2016). At the same time, 60 healthy men (control, group 2) among volunteer blood donors were screened. Healthy subjects were enrolled using local advertisements for a study of reproductive hormones. The study was explained to the participants, and written informed consent was collected from all the subjects. In addition, the ethics committee of Iranshahr University of Medical Sciences has approved this study (No. IR.IRSHUMS.REC.1394.4).

**KEY WORDS**  
Iranian Crack,  
Addiction, Testosterone,  
FSH, LH

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\*Corresponding Author  
Email: fanaeih@yahoo.com  
Tel.: +98-09151402123  
Fax: +98-05437212968

## Inclusion/exclusion criteria

Participants were entered in the study if they were between 20 and 50 years old. Participants had no history of known medical or surgical condition that could influence their fertility. Healthy subjects had no self-reported drug use history, and among them, who that had similar conditions (such as education, cigarette smoking, social and cultural features) with addicted men were selected as the control group.

The exclusion criteria which determined by interview and examination, consisted of having a history of any genitourinary surgery, epididymo-orchitis, cryptorchidism, varicocele, sexually transmitted disease, daily alcohol consumption, cancer, diabetes, serious medical illnesses that required pharmacological treatment, and any neurological or psychiatric disease. Also, polyconsumers were excluded from the study. Finally, 54 addicted men and 45 healthy subjects that met study criteria were recruited into the study.

## Measures

All participants were examined by a physician before inclusion in the study. Personal interviews were done with all participants to obtain relevant clinical data: age, weight, height, educational years, marital status, history of alcohol consumption, infertility status, history of any medical problem and treatment, history of smoking and history of drug use. Then, additional information from Iranian Crack-dependent subjects (duration of drug use, average daily dose, and route of drug administration) were also noted in the questionnaire.

In this study, laboratory tests included serum levels of testosterone, LH and FSH.

## Determination of testosterone and gonadotropin concentrations in serum

Serum testosterone, LH and FSH levels were examined for all subjects. Examination for Iranian Crack group was performed at baseline (before starting to treatment programs in the addiction treatment centers). Five milliliters of venous blood was collected (between 8 and 10 AM) then allowed to clot at room temperature, and the blood was centrifuged at 3500 rpm for 10 min instantly. Serum was obtained, and then stored at  $-80^{\circ}\text{C}$  until use. Serum levels of testosterone, LH and FSH were measured by ELISA technique.

## Statistical analysis

Statistical analysis was done using software SPSS-18. Descriptive statistics (mean, standard deviation) were calculated for age, weight, height, educational years, marital status, smoking status, duration of drug use, average daily dose and serum levels of hormones. Data analysis performed by Chi-Square and Independent sample t-test.  $P \leq 0.05$  was considered significant.

## RESULTS

### Demographic characteristics of participants

Demographic characteristics of Iranian Crack addicts (group1) and healthy subjects (group 2) are summarized in [Table 1]. Fifty-four Iranian Crack addicts and forty-five healthy subjects were recruited. Weight in addicted group was significantly lower than healthy subjects ( $p = 0.001$ ). There was no significant difference in any other variables between cases and healthy subjects. Duration of Iranian Crack use ranged from 1 year to 20 years, with an average duration of  $4.64 \pm 3.48$  years. dose of Iranian Crack use per day ranged from 0.5 to 6.0 g/day, with the average dose of  $1.05 \pm 0.56$  g/day. In all addict men, route of drug administration was smoking.

### Testosterone and gonadotropin (LH and FSH) levels of Iranian Crack addicts and healthy subjects

[Table 2] shows serum testosterone, LH and FSH levels of participants. Mean serum FSH levels of Iranian Crack addicts were significantly lower than healthy subjects ( $p = 0.03$ ). Testosterone levels were also lower in Iranian Crack addicts, although the difference was not statistically significant. Serum levels for LH were similar in the two groups.

**Table 1:** Demographic characteristics of the participants

Characteristics	Cases (n=54)	Controls (n=45)	P value*
Age (years)	31.24±0.96	32.44±1.27	0.44
Weight (kg)	67.03±1.45	74.46±1.7	<b>0.001</b>
Height (cm)	171.04±0.96	172.73±1.79	0.38
Education (years)	7.16 ± 0.56	7.13 ± 0.69	0.97
Marital status, no (%)			0.75
Married	32(59.25)	26(57.77)	
Never married	21(38.9)	17(37.77)	
Divorced, separated or		2(4.46)	

widowed	1(1.58)		
Smoking status, no (%)			
Consumption	35(64.81)	24(53.3)	0.24
Non consumption	19(35.19)	21(46.7)	
Duration of dependency (year)	4.64 ± 3.48	-	NA

Note: Bold value indicates  $p < 0.05$ . Key: NA, not applicable.

\*Derived from the Chi-Square test or Independent sample *t*-test.

**Table 2:** Testosterone, LH and FSH levels of participants

Hormones	Cases (n=54)	Controls (n=45)	P value*
T (ng/ml)	6.2±0.43	6.6±0.39	0.5
FSH (mIU/ml)	3.25±0.26	4.32±0.42	<b>0.03</b>
LH (mIU/ml)	3.18± 0.3	2.74±0.3	0.32

Note: Bold value indicates  $p < 0.05$ . Key: T, testosterone; FSH, follicle stimulating hormone; LH, luteinizing hormone. \*Derived from Independent sample *t*-test.

## DISCUSSION

To our knowledge, for the first time, this study was performed to determine the effect of Iranian Crack consumption on testosterone and gonadotropin levels in addicted men. Iranian Crack is a new form of narcotic substance that widely used in Iran during past years [14]. Iranian Crack is heroin-based substance, but it has complex composition that contains heroin, acetaminophen, caffeine, morphine, codeine, thebaine and acetylcodeine [15]. There is no study about Iranian Crack effects on body systems and hence, it seems that conducting of studies in this field could be essential.

In our study, men in group 1 showed significant decrease in FSH level when compared to the control group. But, serum testosterone and LH levels in case group had not significant difference with control group. The results of this study are not in agreement with the opioid studies, because previous studies have shown that chronic opioid administration decreases testosterone, LH, whereas FSH is not affected [8, 16-19]. These contradictory results can due to different composition of Iranian Crack. Although it is opioid-based, but it has complex and different composition.

Vuong and his colleagues (2010) concluded that in both animals and humans, opioids can not significantly alter FSH levels [16]. However, our results indicate that Iranian Crack can change serum FSH levels in human. This reduction may be due to a subsequent of the direct effect of Iranian Crack on the pituitary or may be due to effect on hypothalamus.

Some studies have suspected that opioids inhibit testosterone and LH secretion through effect on the hypothalamic-pituitary axis [18, 20-21]. Besides, opioids can directly decrease testosterone secretion by their effect on the testes [22]. But in our study, testosterone and LH did not change significantly in the case group when compared to the controls. These results can due to little effect of Iranian Crack on testosterone and LH secretion.

## CONCLUSION

The findings of this study showed that Iranian Crack addiction decrease FSH levels in addicted men. Hence, it can have a negative effect on reproductive system.

### CONFLICT OF INTEREST

Authors declare no conflict of interest.

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### FINANCIAL DISCLOSURE

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