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# Effect of Inhibin-B hormone and its relationship with a number of sex hormones in men with Azoospermia

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## ABSTRACT

Inhibin-B is produced by sertoli cells and acts as a negative feedback mechanism of follicular stimulation hormone (FSH). In order to evaluate the effect of Inhibin-B in men with Azoospermia, the study measured the concentrations of the following hormones: Inhibin-B, FSH, Luteinizing Hormone Prolactin (PRL), (LH) and Testosterone (Testo). Serum for 30 normal men semen and 50 men with Azoespermia (zero sperm count in sperm). The mean concentration of the hormone Inhibin-B in patients with Azoospermia was (135.7 ±87.6) pg/ml, while in normal men (175.6 ±47.9) Pg / ml with a significant value of the group of healthy patients at a significant level ($p \leq 0.01$). The mean serum FSH concentration in patients was (13.7 ± 12.27) lU / L whereas in normal men (4.1 ± 2.84) lU / L, the relationship was significant between patients and healthy at a significant level ($P \leq 0.01$) the correlation with the Inhibin-B hormone is reversible relationship. The mean concentration of LH in patients was (12.8±11.87) IU/L and in the healthy (7.9±5.57) IU/L and the relationship between them was significant ($P \leq 0.05$) and the correlation with the Inhibin-B hormone is positive relationship. The mean concentration of the Testosterone In the patients was (2.37 ± 1.22) IU / L and in the healthy (5.1 ± 1.96) IU/ L, the relationship was of significant value at $P \leq 0.01$ and the correlation with the Inhibin-B hormone is positive relationship, and there is a difference in the mean concentration of PRL between the patients and the healthy where it reaches (8.88 ±5.16) IU / L in patients and (8.03 ± 4.2) IU / L in the healthy. where the relationship was non-significant value between both patients and healthy and the correlation with the Inhibin-B hormone is positive relationship .

## Introduction

Azoospermia is the medical state whose a man seminal fluide does not contain sperm [1]. The loss of sperm affects about 1% of the male population [2] and can be seen in up to 20% of male infertility cases. Reproductive hormones play an essential role in the initiation and maintenance of reproductive function in males as FSH, LH, Testo, and inhibin-B are associated with sperm formation and male fertilization. PRL is also important for the formation of sperm [3-6]. Male genital operations require a complex organization between endocrine secretions of gonadal maturity and germ cell production [7]. The inhibin-B hormone is glycoprotein and dimethyl sulfide for two different subunits, common subunit α and subunit β, and the inhibin-B hormon are the subunit α-βB. Are often produced in testicular cells in the testis and inhibit pituitary secretion of FSH, inhibin- B acts as a negative feeding signal from the testis to inhibit the secretion of FSH [8,9].It reflects the level of testis function as a marker of the functional status of the spermatozoa, especially the sertoli cells [10,11] and in a group of men with unknown causes, the FSH alone had the predictive value and became higher as an indicator compared with inhibin- B in determining the cause of infertility in men [3].

## Materials and methods

A sample of 80 men, consisting of 30 healthy men as control group and 50 men with azoospermia, aged 25-

55 years, was studied In the Salahad Din Province from the general governorate of Salah al-Din for the period from July 2017 to August 2018. Blood samples were taken to check the levels of the following hormones: Inhibin-B, FSH, LH, PRL and levels of Testo. For each patient and control group. The semen was also taken and analyzed for all cases.

-Semen analysis

According to the recommendations of the World Health Organization, the absence of sperm in wet preparation (by microscopic examination) should be confirmed by centrifuge sperm samples at 3000 rpm for 15 minutes were examined again and repeated this test two times or three times between the examination and the other At least two weeks [12].

-Hormones assay

Enzyme linked Immune Sorbent Assay (ELISA) levels were assessed. ELISA is a test that depends on the interaction between antibodies/ antigens and color change to determine the concentration of the substance. The normal values of Inhibin-B (148- 365) pg / ml. (Work kit produced by Chinese company Elabscience). The normal values of FSH (1.0–14) lU / L and normal range from LH, (0.7-7.4) lU / L. The normal reading of the hormone was Testo. (2.5-10) ng / ml and normal values of PRL hormone. (1.8-17) ng / ml [13].

**Statistical Analysis**.

The statistical analysis program SPSS (version 22) was used to analyze all results and to mean and standard deviation. T-test was used. Microsoft office excel 2010 was used for graphs.

## Results and discussion

The results of the inhibin-B test indicated that the mean concentration of the patients in the Azoospermic group was (135.7±87.6) Pg/ ml and the control group had a mean concentration (175.6 ± 47.9 )Pg/ml. The relationship had a significant in level (P ≤0.01) Individuals with Azoospermia and control group as shown in Table(1) Figure (1). The inhibin-B in males acts as an inhibitor of follicle stimulating hormone (FSH) in the anterior pituitary gland by negative feedback mechanism with active sperm production, and with low or no sperm formation, The inhibin-B concentration returns again with the rise of FSH [14][15][16]**.** Sertoli cells support sperm activity through multiple mechanisms, including Inhibin-B secretion. There is evidence that Inhibin-B is undetectable in men who have SCOS, although the levels of Testo. Natural, indicating cytothelial cell damage. Inhibin-B is therefore a direct indicator of the condition of sertoli cells and an indirect marker of sperm[17].The results of Phillip and his colleagues in 2006 also showed that the levels of inhibin- B low in men with infertility problems, regardless of etiology, and therefore indicate that the levels of Inhibin-B is more than it is a sign of sensitivity to the factor of infertility in males, Regardless of etiology. These results may be explained by the fact that Inhibin-B is more directly related to changes in testicular function than FSH, an indirect sign of sperm formation **[**18].

**Table (1) Find the value (P) between hormones for patients with Azoospermia and healthy**

| Prolactine IU/L SD ±M | Testo. ng/ml SD ±M | LH IU/L SD ±M | FSH IU/L SD ±M | Inhibin-B pg/ml SD ±M | Hormones concentration / (N) groups |
|---|---|---|---|---|---|
| 5.16±8.88 | 1.22± 2.37 | 11.87±12.8 | 12.27±13.7 | 87.6±135.7 | Azoospermia (50) |
| 4.2±8.03 | 1.96± 5.1 | 5.57±7.9 | 2.84±4.1 | 47.91±75.6 | Control (30) |
| 0.234 | 0.00001** | 0.017* | 0.0096** | 0.011** | (P)Value |

*significant value at a significant level (P≤0.05)

**significant value at a significant level (P≤0.01)

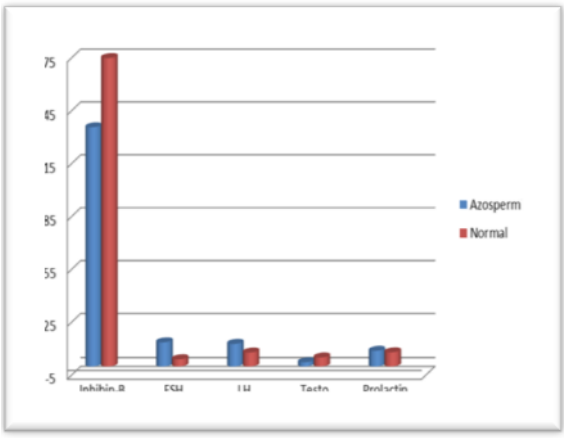


**Figure (1) Hormones Level in Azospermia and Normal Groupe**

The mean serum FSH concentration in patients was (13.7 ±12.27) lU /L whereas in normal men, (4.1 ± 2.84)lU / L the correlation was significant between patients and healthy at a significant level (P≤0.01) As shown in Table (1), the high concentration of FSH in patients with Azoospermia coincides with pituitary dysfunction, which was observed in the results of the current study. The results showed that many patients had an increase in FSH with significant differences in patients with healthy This rise is due to the lack of B-Inhibin secreted from the Sertoli cells, which is the primary regulator of the secretion of FSH hormone and its production through the mechanism Feedback [19][20] reduced the concentration of FSH receptors in the blood of men with sperm failure in conjunction with elevated LH.

The average of concentration of LH in patients was

(12.8 ± 11.87)IU / L and in the healthy (7.9 ± 5.57) IU/L and the relationship had a significant value between them at a significant level (P≤0.05) as shown in Table (1). In the concentration of LH may be attributed to the catalytic effect of some prostaglandin on the hypothalamic-pituitary-testicular axis, where it is known that LH is stimulated by lower estradiol levels through a positive feedback mechanism [21] suggest that prostaglandins stimulate the pituitary response to the pyramid (Gn-RH). It is known that the hypothalamus secreted hormones stimulate specific cells in the adenohypophysis called Gonadotrophic cells to produce the FSH and LH hormones. This stimulation is done by binding to certain receptors, The potential for the presence of Gn-RH receptors in the pituitary gland leads to increased secretion of LH and FSH. This is what many researchers have pointed out in their studies about the hormonal status of men with infertility, infertility or infancy, including [22].

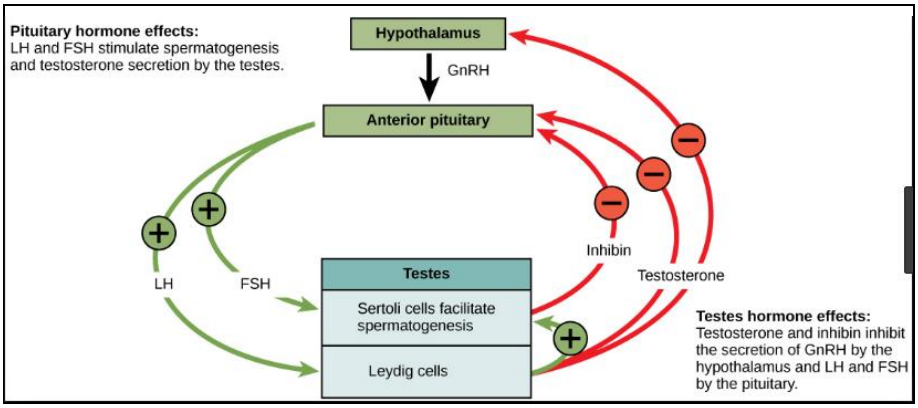


**Figure (2) Show (H.P.T) axis hormonal control [23]**

The mean concentration of the Testo. hormone was In patients (2.37 ± 1.22) IU / L and (1.96± 1.91)IU / L for the Azoospermia The relationship was significant at P≤0.01 (P =0.00001) as shown in Table (1). indicated Barcikowski a decrease in concentration of the hormone Testo. In seminal plasma, seminal plasma is injected when male rats are injected with methane. This decrease may be due to inhibiting the concentration of the LH hormone, minimizing the blood supply of the fetus and thus interfering with the Lyding cells in the formation of the sexual steroids (androgens). It is believed that the mutants are working to destroy the receptors of the LH-receptor in testicular cells**[**24]. The researcher Juengel noted that the mating interfere with mRNA, which encodes several important proteins in the regulation and manufacture of sexual steroids, including LH receptors**[**25].

The concentration of the hormone PRL. Patients had( 8.88 ± 5.16) IU / L and in healthy patients was (8.03 ± 4.2) IU / L where the relationship was not significant for both patients and healthy patients as shown in Table (1). Hyperprolactenemia directly affects sperm formation and steroid formation by working on the prolactin receptors in the sertoli cells and the lipid cells in the testicles, producing primary hypoproteinemia and infertility. It is noted that oligospermic or azoospermic patients who have serum levels of gonadotrophins appear The serum levels are relatively higher than prolactin, demonstrating the role of prolactin in the formation of gametes, which is independent of gonadotrophins [26,27]. The high level of PRL in patients with Azoospermia compared with the control group, which did not have any significant value in the current study, was consistent with JJO indicated[28].

The correlation between inhibin-B and FSH was negative (reversible). And that the correlation between the hormone inhibin-B and hormones LH, PRL., Testo. The relationship was positive as shown in Table (2)

**Table (2) Review (R) factor of the correlation between inhibin-B and FSH, LH, Testo, PRL.**

| PRL. | Testosterone | LH | FSH | Hormones / (R) factor |
|---|---|---|---|---|
| $^{+}$0.0886 | $^{+}$0.036 | $^{+}$0.0025 | $^{-}$0.112 | Inhibin-B |

The FSH and Inhibin-B together is a more sensitive marker and indicator than inhibin-B or FSH alone [29,3]. The study which presented by Illingworth and colleagues showed an inverse relationship between Inhibin-B and FSH in men with levels of normal and abnormal sperm count [30] Similarly, there was a significant negative relationship between FSH serum levels and Inhibin-B levels. Inhibin-B in patients with elevated FSH levels and normal FSH levels, Inhibin-B levels in the FSH group are significantly associated with sperm indicators, and high FSH levels are usually associated with primary testicular disorders and this This leads to the fact that the levels of Inhibin-B were significantly associated with sperm indicators in the high FSH group, indicating that this condition is more common and represents primary testicular disorders, and that it can serve as a direct sign of testicular function, FSH was a very useful sign for assessing the state of male fertility and the differentiation between peripheral and central disorders. Inhibin-B is a more useful and direct sign of testicular function, and may also be a better marker of sperm production and may be useful for

formulating new treatment methods and in evaluating and treating patients appropriately. Therefore, Inhibin-B levels may be a better indicator of the fertility factor for males than FSH and LH, [34]**,** and also noted that low B-inhibin levels were associated with a significant increase in FSH levels. That men with testicular problems may have low levels of Inhibin-B and have fertility problems, and high levels of follicle stimulating hormone (FSH) are generally seen in men with testicular disease, and notes lower levels in those with central disorders [31]**.** The hormone Inhibin-B is excreted from the sertoli cells and is controlled by the FSH hormone. The LH hormone secretes by pituitary gland and stimulates the secretion of the hormone Testo. (Both inhibin-B and testosterone) has a
positive association with testicular function and many authors have suggested that some of the known and unproduced factors of Leydig cells may modify the production and secretion of B- inhibin in the tubular chamber of the human testicle [32][33][34] .However, a study of Kolb et al., Noting that there is no significant relationship between levels of Inhibin-B and Testo. levels [35] .Phillip and colleagues note that Inhibin-B and Testo. excreted from different types of cells in the testis, but the Phillip study also found that Inhibin-B levels were positively associated with Testo. levels, Leydig cells may affect the secretion of Inhibin-B. According to Anderson [3]. whether the concentration of Testo. and Inhibin-B in serum. It can be a useful sign to diagnose testicular problems precisely because both of them are excreted directly from the testicle, the links between the Inhibin-B and Testo. index and sperm may be indicaters which are inconsistent and this difference may be due to the various causes in the space of the study and may be due to the lack of relationship between sperm indicators and hormone Testo**.** [36]. For PRL hormone. The results of this study were consistent with the results of Hassan [37]**.**

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# تأثير هرمون Inhibin-B وعلاقته بعدد من الهرمونات الجنسية عند الرجال المصابين بانعدام النطفية في السائل المنوي

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**الملخص**

ينتج هرمون الانهبين–ب من قبل خلايا سيرتولي sertoli cells، ويعمل كسيطرة سلبية راجعة على إفراز الهرمون المحفز للجريبات (FSH). ومن أجل تقييم تأثير هرمون الانهبين–ب في الذكور عديمي النطاف في السائل المنوي Azoospermia، قمنا بقياس تراكيز الهرمونات التالية: الانهبين– ب، FSH، الهرمون اللوتيني(LH ), هرمون الحليب (PRL) وهرمون الشحمون الخصوي (.Testo) في المصل ل 30 رجلاً طبيعي السائل المنوي و 50 رجلاً مصاباً بانعدام النطف في السائل المنوي Azoospermia (عدد الحيوانات المنوية صفر في السائل المنوي). فكان متوسط تركيز هرمون الانهبين–ب عند المرضى باللانطفية (87.6±135.7)بيكوغرام\مل بينما في الرجال الطبيعيين (47.9±175.6) بيكوغرام\مل مع قيمة معنوية لعلاقة هرمون المرضى بالاصحاء عند مستوى معنوي ($p \leq 0.01$). كان متوسط تركيز هرمون FSH في المصل لدى المرضى هو (12.27±13.7) وحدة دولية\لتر بينما في الرجال الطبيعيين (4.1±2.84) وحدة دولية\لتر والعلاقة معنوية بين المرضى والاصحاء عند مستوى معنوي ($P \leq 0.01$) وعلاقة الارتباط مع الانهبين–ب عكسية. كان متوسط تركيز هرمون ال LH لدى المرضى هو (12.8 ± 11.87) وحدة دولية\لتر ولدى الاصحاء (5.57±7.9) وحدة دولية / لتر وكانت العلاقة بينهما معنوية عند مستوى معنوي ($P \leq 0.05$) وعلاقته مع الانهبين –ب علاقة طردية. وكان متوسط تركيز هرمون ال.Testo لدى المرضى (1.22±2.37) وحدة دولية\لتر ولدى الاصحاء (1.96±5.1) وحدة دولية\لتر فكانت العلاقة ذات قيمة معنوية عند مستوى معنوي ($P \leq 0.01$) وعلاقة الارتباط مع الانهبين –ب علاقة طردية. بينما كان تركيز هرمون ال PRL. لدى المرضى كان (8.88± 5.16) وحدة دولية / لتر ولدى الاصحاء كان (8.03 ± 4.2) وحدة دولية/ لتر حيث لم تكن العلاقة ذات قيمة معنوية بين كل من المرضى والاصحاء وكانت علاقته مع الانهبين–ب علاقة طردية.