

## Semen volume and its correlation with reproductive hormones in azoospermic patients

### حجم المنى وعلاقته بالهرمونات التكاثرية في مرضى اللانطفية

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#### الخلاصة

هدفت الدراسة الى ايجاد نوع العلاقة بين حجم المنى والهرمونات التكاثرية المتمثلة بالهرمون المحفز للجريب والهرمون اللوتيني وهرمون البرولاكتين وهرمون الشحمون الخصوى لمرضى اللانطفية : شملت الدراسة مرضى اللانطفية (العدد =25 ومرضى سواء النطف) (العدد =25) كمجموعة سيطرة وتراوح عمر المرضى من 30 الى 34 سنة لكلا المجموعتين .تم قياس حجم المنى والهرمونات التكاثرية المتمثلة بالهرمون المحفز للجريب والهرمون اللوتيني وهرمون البرولاكتين وهرمون الشحمون الخصوى لكلا المجموعتين .بينت نتائج الدراسة وجود علاقة موجبة بين حجم المنى وهرمون الشحمون الخصوى ( $R=0.90$ ) (بينما اظهرت النتائج علاقة سالبة بين حجم المنى والهرمونات الاخرى المتمثلة بهرمون المحفز للجريب ( $R= - 0.93$ ) والهرمون اللوتيني ( $R= - 0.95$ ) وهرمون البرولاكتين ( $R= - 0.95$ )) في مرضى اللانطفية نستنتج من نتائج الدراسة ان الاضطراب في مستويات الهرمونات التكاثرية في مرضى اللانطفية يؤثر في حجم المنى ربما بسبب تأثير تلك الهرمونات في نمو غدة البروستات والحوصلات المنوية يمكن اجراء دراسة مستقبلية حول العلاقة بين حجم المنى ومستويات الهرمونات التكاثرية في شطري المنى ( first split and second split) لتوضيح العلاقة بين الهرمونات وافرازات غدة البروستات والحوصلات المنوية .

#### Abstract

The study was aimed to find the relationship between semen volume and follicle stimulating hormone(FSH),lutinizing hormone(LH),prolactin(PRL),and testosterone(T) in blood serum for Azoospermic patients. This study was included azoospermia(n=25) and normozoospermia (n=25) .semen volume and reproductive hormones(FSH,LH,Prolactin and testosterone) were assessed in both two groups .The results were showed a significant positive correlation between semen volume and testosterone hormone( $r= 0.90$  ) while it was revealed a significant negative correlation between semen volume and follicle stimulating hormone( $r= - 0.93$  ),lutinizing hormone( $r= - 0.95$  ),and prolactin hormone( $r= - 0.95$  ) in azoospermic group . in Conclusion , The disturbance of reproductive hormones in azoospermic group



affect semen volume may be because the effect these hormones on prostate growth. It is possible in future a study of the levels of reproductive hormones in first and second split of semen for azoospermia and normozoospermia .

## Introduction

Azoospermia , is complete absence of sperm in the ejaculation ,and it is present in a about 1% of all ,men (1,2) and in approximately 15% of infertile men (2) . Azoospermia is differ from aspermia , because aspermia means the complete absence of seminal fluid after ejaculation (3) .

Azoospermia can be categorized to : pre – testicular azoospermia(1 %), testicular failure or non – obstructive , azoospermia (49% to 93%) and post – testicular obstruction or retrograde ejaculation (7% to 51%) (1,2) . The causes of azoospermia may be defect of spermatogenesis or obstruction of ductal system particularly the vas deferens (4,5).Normal semen volume : 1.5 to 5 ml . The semen volume is consider abnormal when it is less than 1.5 ml (1). when vassal agensis and testicular atrophy are not present , semen volume and serum FSH are key factors in determining the etiology of the azoospermia (6) . Azoospermic patients with low semen volume and normal testes size may have ejaculatory dysfunction or ejaculatory obstruction (7) . There are number of hormones have role affect spermatogenesis process . Testosterone secreted by leydig cells in testis .It is essential for growth and the division of germinal cells during forming spermatozoa (8) . Luteinizing hormone (LH) secreted by anterior pituitary gland and it is stimulates the leydig cells to secretion of testosterone . Follicle stimulating hormone (FSH) secreted by anterior pituitary gland ,and it is help in a process of conversion spermatide to spermatozoa (9) ..Male germ cell development is dependent on the balanced endocrine interplay of hypothalamus pituitary and the testis . Gonadotropin releasing hormone (GnRH) secreted by the hypothalamus and it is elicit the release of gonadotrophins i.e , follicle stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary gland (10) . FSH binds with receptors in the sertoli cells and stimulates spermatogenesis while LH stimulates the production of testosterone in Leydig cells , which in turn may act on the sertoli and peritubular cells of the seminiferous tubules and stimulates spermatogenesis (11) . The failure of pituitary to secretion of FSH and LH will result in disruption of testicular function Leading to infertility . Testosterone ,estradiol and inhibin hormones are control on the secretion of gonadotrophins by feedback mechanism (12) . absences or decrease in sperm density associated with increase of the levels of



FSH,LH,PRL and decrease of the level of testosterone hormone, (13) . Prolactin also plays adirect role in spermatogenesis and steroidogenesis as prolactin receptors have been detecte sertoli cells and leydig cells in testes (14,15) . Higher serum levels of prolactin proving a role in gametogenesis that is independent of gonadotropins (16) .The present study was aimed to know effect of disturbance of reproductive hormones on secretion of accessory glands through study the correlation between reproductive hormones and semen volume in azoospermic patients .

## Materials and methods

This study was carried out in the center of fertility in Najaf city . A total number of 50 males(age group 30-34 years) were included in this study 25 healthy males and 25 azoospermic infertile males ..

### Semen examination

All semen samples were obtained by masturbation after 3 days of sexual abstinence. pellet test( centrifugation 3000 rpm for 10 min.) was achieved for azoospermic samples ,so semen samples for normozoospermia was determined according to WHO repor(1999). each sample was counsider normozoospermia if the sperm concentration was equal or more than 20 milliom/ml ,progresseve motile sperm was equal or more than 50 percent and normal sperm morphology was equal or more than 30 percent. Semen volume was measured by graduated tube for both azoospermia and normozoospermia(8) .

### Assessment of reproductive hormones

Blood samples were withdrawn from the vein of patients and leave for half an hour then the blood samples were transfered in to the centrifuge 3000 rpm for 10 minutes for the purpose of obtaining of serum that will be used to measure hormones.The levels of FSH ,LH,PRL, and T hormone were measured by Radio Immune assay (RIA) using the kits supplied by diagnostic products corporation,USA

**Statistical analysis:** Mean and standard error (SE) of each variable in the control and test group was calculated . Student's ((t)) test was applied to compare the results of the control and test group . Correlation coefficients were used to determine the correlation between semen volume and serum FSH , LH , prolactin and serum testosterone levels .



**Results:**The results of the current study were revealed a significant decrease( $p<0.5$ ) in semen volume and testosterone hormone for azoospermic group in comparison to that in normozoospermic group on the other hand was observed a significant increase ( $p<0.5$ ) in lutiniezing hormone (LH),follical stimulating hormone FSH),and prolactin hormone for azoospermic group in comparison to that in normozoospermic group ( table 1). No correlation between semen volume and

reproductive hormones(FSH,LH,PRL, and T) was observed for normozoospermic group. There was a negative strong correlation ( $r = - 0.93$  ,  $-0.95$  and  $- 0.93$ ) ( $P < 0.05$ ) respectively between semen volume and FSH , LH and prolactin hormone . While was there a positive strong correlation ( $r = 0.90$  ,  $p < 0.05$ ) between semen volume and testosterone hormone (Table 2) .

Table 1 : semen volume and the levels of reproductive hormones in the blood serum of the control and azoospermia .

| <i>Variables</i>            | <i>Normozoospermia group<br/>n = 25</i> | <i>Azoospermia group n = 25</i> | <i>P value</i>    |
|-----------------------------|---|---------------------------------|-------------------|
| <b>Semen volume (ml)</b>    | 4.24 ± 0.81                             | 1.526 ± 0.11                    | <b>&lt; 0.05*</b> |
| <b>FSH (MIU/ml)</b>         | 6.88 ± 0.91                             | 21.53 ± 3.11                    | <b>&lt; 0.05*</b> |
| <b>LH (MIU/ml)</b>          | 5.7 ± 0.89                              | 22.22 ± 4.21                    | <b>&lt; 0.05*</b> |
| <b>Prolactin (MIU/ml)</b>   | 7.16 ± 0.96                             | 21.66 ± 3.33                    | <b>&lt; 0.05*</b> |
| <b>Testosterone (ng/ml)</b> | <b>4.2 ± 0.61</b>                       | <b>1.98 ± 0.13</b>              | <b>&lt; 0.05*</b> |

The values are mean + SE

Table 2 : Correlation of semen volume with serum FSH , LH , porolactin and serum testosterone levels



| <i>Semen volume vs.reproductive hormones</i> | <i>Control group n = 25</i> |         | <i>Azoospermia group n = 25</i> |                   |
|--|-----------------------------|---------|---------------------------------|-------------------|
|  | R value                     | P value | R value                         | P value           |
| <b>FSH</b>                                   | 0.11                        | NS      | 0.93                            | <b>&lt; 0.05*</b> |
| <b>LH</b>                                    | 0.15                        | NS      | 0.95                            | <b>&lt; 0.05*</b> |
| <b>prolactin</b>                             | 0.21                        | NS      | 0.93                            | <b>&lt; 0.05*</b> |
| <b>testosterone</b>                          | <b>0.09</b>                 | NS      | <b>0.90</b>                     | <b>&lt; 0.05*</b> |

\* significant < 0.05 , NS: non significant > 0.05

### Discussion :

An adequate semen volume of ejaculate fluid is required to transport sperm into the female reproductive tract and allow for fertilization of the oocyte. Thus, seminal fluid volume is an important part of the semen analysis done to investigate male infertility.(17)The results of this study were showed a significant decrease of semen volume for azoospermia in comparison to that in normozoospermia because azoospermic patients are not divided in this study to obstructive and non obstructive azoospermia and therefore may be some patients had obstructive azoospermia that was cause of decline in semen volume. Obstructive azoospermia means absence of spermatozoa and spermatogenic cells in semen and after post ejaculate urine .Common causes of obstructive azoospermia are divided to epididymal,vas deferens and ejaculatory obstruction(18),also the ejaculatory obstruction have low semen volume ,decrease or absence of fructose in semen and acidic PH(19,20) a significant increase in the levels of FSH,LH,PRL and a significant decrease in the level of testosterone for azoospermic patients is may be due to the damage of seminiferous tubules and lydig cells which affect the negative feed back mechanism or decause pre testicular desease for these patients. These results are in agreement with Babu *et al* .,( 21 ) who showed significantly elevated mean FSH and LH levels with azoospermia. One study found a significant increase in the levels of serum FSH and LH hormones for patients with azoospermia Compared to men with normozoospermia(22) .The increase in the levels of FSH in serum indicative of the damage happening in the germinal epithelial (23 )The measurement of the FSH hormone guide to distinguish between obstructive and non obstructive azoospermia(24).characterized patients with primary testicular disease clinically in patients with oligozoospermia and azoospermia with reducing the size of the testis and increase FSH levels and low levels of serum testosterone hormone (25) The increase in the concentration of reproductive hormone(FSH,LH and PRL) and low levels of testosterone hormone in the blood serum indicative of the patients have infected azoospermia(26).Observed in the current



results a positive relationship between the level of testosterone hormone and semen volume and an inverse relationship between semen volume and reproductive hormones(FSH,LH,and PRL).And this due to the existence of a relationship between the secretion of prostate gland and both testosterone and prolactin hormones. Luteinizing hormone–releasing hormone (LHRH), also known as gonadotropin-releasing hormone (GnRH), stimulates the pituitary to release the gonadotropins luteinizing hormone (LH) and follicle-stimulating hormone (FSH), which stimulate the Leydig cells of the testes to synthesize testosterone. Testosterone is the major serum androgen stimulating prostate growth. Peripheral conversion of testosterone by aromatization forms the estrogens in the male. The adrenal gland is under stimulation by adrenocorticotropic hormone (ACTH) and releases the minor androgens, such as androstenedione, which is also converted peripherally to estrogens. Prolactin has a minor effect in stimulating androgen-induced prostate growth.(27 ).

**Conclusion:** no correlation between semen volume and reproductive hormones in normozoospermic group while the disturbance of reproductive hormones in azoospermic group affect semen volume may be because the effect of these hormones on prostate growth and seminal vesicles .

**Recommendation:** a study of reproductive hormones and its correlation with semen volume in both two semen parts( first and second split) for azoospermia and normozoospermia patients .

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