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# Influence of Anabolic Steroids on Male Fertility Among Healthy Gyms-Goers in Mosul City

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**Abstract:** Misuse of anabolic-androgenic steroids (AAS) is on the rise globally, particularly among male gymgoers who use them to gain muscle and enhance their physical appearance. Because AAS abuse affects the hypothalamic-pituitary-gonadal axis and can temporarily or permanently reduce spermatogenesis, it is thought to be a preventive factor in male fertility. The study aimed to examine the impact of anabolic steroid abuse based on semen characteristics, serum FSH, LH, and free Testosterone horhormonevels suggesting a reduction in male bodybuilders' fertility. Eighty healthy male gym-goers from Mosul city were separated into the case and control groups for a prpective cohort research. For a period ranging from September 28, 2020, to March 15, 2021, a structured interviewing questionnaire was employed to gather data on AAS misuse, blood sampling, and semen specimen for examination of serum levels of FSH, LH, Free T, and sperm parameters, respectively. The AAS group experienced a significant drop in the mean serum levels of luteinizing hormone, follicle-stimulating hormone, and free testosterone (P = 0.000). According to a semen study, the overall mean of the total count of sperms per ejaculate was (18.83 ± 24.02 vs. 139.5 ± 24.80) As compared to the control group, the proportion of sperm motility was significantly lower. The risk of developing oligospermia is five times higher in the AAS group compared to the control group (RR: 5; 96 percent CI: 2.690-9.293; P => 0.001). Male fertility is significantly impacted by the use of AAS; users showed significantly reduced levels of gonadotropins, which may indicate hypogonadism, as well as low free testosterone and sperm counts, both of which may indicate poor spermatogenesis. The study advises against anabolic steroid addiction and warns against its negative side effects, which have a particularly negative impact on fertility.

**Keywords:** Male Fertility, Hypogonadism, Anabolic-Androgenic Steroids, Spermatogenesis

## 1. Introduction

Anabolic steroids, also known as anabolic-androgenic steroids (AAS), are the most widely used substances in the world to improve physical appearance, muscle growth, and athletic performance. They are regarded as the most well-known class of performance-enhancing drugs (PED) in the bodybuilding community. Synthetic hormones called anabolic-androgenic steroids have androgenic and anabolic effects that are similar to those of testosterone. Because they contain a steroid ring in their chemical makeup, they are classified as steroids. The anabolic properties of AAS drugs are the dominant influence, while the androgenic properties are limited [1].

The mechanism of action for anabolic steroids can be categorized into two categories. It varies but overlaps: anabolic, by enhancing the anabolism (or growth of cells), and androgenic (or virilizing) purport they impact the development and maintenance of masculine features. To optimize the anabolic effects and reduce androgenic effects, several structural changes have been introduced into testosterone. Nandrolone, oxymetholone, oxandrolone, stanozolol, and trenbolone acetate are several examples of anabolic steroids. [2].

The misuse of anabolic steroids is a rising public health problem. The prevalence rate is estimated at ~38% amongst gym athletes. AAS are used by men with an estimated lifetime prevalence rate of 6.4% [3]. There is a constant rise in the use of anabolic hormones by gym users in the Middle

East. In Jordan, approximately 26% of gyms-goers used anabolic steroids, where consumers in the United Arab Emirates were estimated at 22%, in Iran, about 13%, and in Iraq 20% [4].

Anabolic-androgenic steroids were popular in sports and bodybuilding in the 1960-the 1970s, but the number of AAS users among non-professional athletes and persons engaged in physical recreational activity remains large. The primary motivating reasons for using steroids are the increase in muscle mass, body strength, and the aesthetic improvement of the physique [5].

Currently, AAS are categorized according to anabolic-androgenic actions into three main groups [6]:

1. Drugs that have testosterone-like effects:

They have a significant androgenic effect and are used in muscle reinforcement. Since it is converted into estradiol, it has gynecomastia and edema-causing properties, like (Boldenone, Testosterone Cypionate, Chloro-dehydro-methyltestosterone, Methyl-testosterone, Methandrostenolone, Fluoxymesterone, Testosterone undecanoate).

2. Drugs that have effects like dihydrotestosterone:

They have a high significant androgenic effect. Since it is not converted into estradiol, it does not cause gynecomastia and edema-causing properties, like (Methenolone, Stanozolol, Oxymetholone, Oxandrolone, Mesterolone).

3. Drugs that have effects like Nandrolone:

Has significant anabolic and weak androgenic effects, like (Nandrolone decanoate, Trenbolone, Nandrolone phenylpropionate).

Anabolic steroids have multiple illegal uses in some sports. The use of AAS for non-medical reasons is not only an illegal and social problem but also a medical problem. Common side effects of steroid use include acne, prostate enlargement, alopecia, and gynecomastia. Stopping steroid use after prolonged use can cause erectile dysfunction and decreased libido. In connection with the increasing problem of infertility, the effect of AAS on reproductive function is of concern. With long-term use of AAS, the hypothalamus-pituitary-gonad axis is inhibited, which is the cause of hypogonadotropic hypogonadism, sexual dysfunction, and decreased fertility [7].

Erectile dysfunction is the most common problem that make young men who took anabolic steroids to see a doctor, because contrary to what the muscle-packed appearance achieved with these substances suggests, their use is coupled with negative feedback on sex hormone production. Via the axis from the hypothalamus, pituitary gland to the gonads, anabolic steroids suppress spermatogenesis, lead to testicular atrophy, and ultimately to infertility and to erectile problems and loss of libido in men. This side of anabolic steroids is unknown to most people since they have had a completely different reputation since they were first abused [8].

Users of AAS typically take them in various ways, which they think avoid the side effects and optimize their actions. The cyclic technique of taking doses for a time, stopping for a while, and then restarting is a common practice. Additionally, there is the stacking technique, which combines two or more distinct steroid forms, and the pyramiding technique, which gradually reduces the dose after reaching the peak dose [9].

Bodybuilding has long been the pursuit of many men, but studies have pointed out that men may sacrifice their fertility while exercising, but taking too much AAS drugs, will reduce the amount of testosterone produced by the body, and the endogenous testosterone concentration of the testis will also decrease, which will affect the spermatogenesis function [10].

Male infertility after misuse of AAS is commonly associated with sperm motility and morphology defects, such as oligozoospermia or azoospermia. Spermatogenesis is a complicated process, so the intact stimulation of the hypothalamus-pituitary gland hormones and the proper testes development is very important to complete it [11].

During abuse of anabolic steroids, substances can cause dramatic short and/or long-term changes in the parameters of semen. However, it may lead to clinically relevant impairments in spermatogenesis that result in semen parameter changes [12].

The effect of AAS on fertility varies from person to person; thus, it is likely difficult to decide what dosage for any given person will be harmful. According to current knowledge, however, permanent damage is not to be feared. This is known from many studies in which testosterone derivatives have been tested as a "pill for men" in more than 1,500 healthy men in the therapeutic area. After discontinuing the preparations, the stereogram is within the normal range after one year for 90% and after two years for 100% of the test persons [13].

Fertility restoration has been documented up to 5 years after AAS discontinuation, including in cases of long period of azoospermia; because of its endocrine origin, AAS-associated male infertility can be treatable [14].

### *1.1. Importance of the Study*

This study will be a significant endeavor in promoting the fertility and reproductive health of gyms-goers who abuse anabolic steroids by demonstrating the actual effect of steroids on fertility. The majority of AAS-users are unaware of the side effects of these illicit medications, posing serious risks to their long-term health and, more importantly, their potential fertility and sperm count [15].

The non-medical use of anabolic steroids is a major public health problem and has become one of the key causes of preventable infertility of malefactor, men who use steroids to gain muscle may damage their chances of having children, they are simply unaware of the harm that anabolic steroids may do to their long-term health and fertility, and they may have a chance to become infertile [16].

The global prevalence rate of AAS users among gym enthusiasts is ranging from (69%-79.6%) in the European Union countries and (9.8%-26%) in the Middle East countries [1].

The nursing profession is responsible for being acquainted

with the effects of using anabolic steroids. The adverse effects and motivational factors of using anabolic steroids should be known to nurses. They need this information to assess clients' needs and promote healthy lifestyles through education.

### *1.2. Study Objectives*

1) To Identify the demographical characteristics of the study sample.
2) To describe the disturbances of hormonal assay tests of AAS abuser by performing (Free Testosterone, FSH, LH).
3) To evaluate the quality and quantity of sperm for AAS abuser by performing (Semen analysis).

## 2. Methodology

### *2.1. Study Design*

To achieve the study's goals for the extended period of time from September 28, 2020, to March 15, 2021, this study is a prospective cohort study that is non-experimental and includes a nested case-control study.

### *2.2. Study Setting*

This research was conducted on thirty gymnasiums in Mosul, the capital of the Nineveh Governorate in northern Iraq, with twenty of them situated on the east side and ten on the west.

### *2.3. Data Collection Period*

Thirty gyms in Mosul City were the subject of a three-month data gathering session that ran from the 15th of the November 2020 to the 15th of the February 2021.

### *2.4. Sample of the Study*

The inclusion and exclusion criteria of gym patrons who visit the gym for the purpose of weightlifting and bodybuilding were used to purposefully choose a non-probability sample. During the study period, (90) gym-goers were interviewed; however, (10) of them were excluded because they did not adhere to the study's criteria. Gym patrons from 30 gyms were encouraged to freely participate in the study. The comprehensive example is shown below (Figure 1).

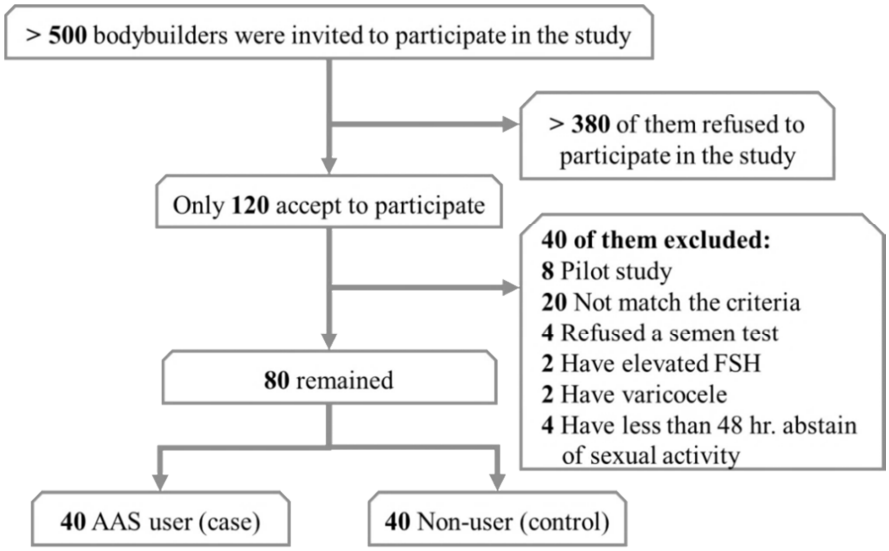


***Figure 1.*** *The diagram of selected sample.*

#### *2.4.1. Inclusion Criteria*

1) Male Healthy adults (with any marital state).
2) Age range (18-39) years.
3) Who using anabolic steroids with/or without steroid accessory.
4) Not complain of any previous reproductive problems.
5) Any sort of AAS use, whether ongoing or discontinued.
6) Participant approval.

#### *2.4.2. Exclusion Criteria*

1) Age <18 but >39 years.
2) Who, according to a diagnosis, is infertile primary or secondary.
3) Levels of FSH and LH are increased.
4) Give no sample of semen.
5) Unhealthy or suffering from a persistent illness.

### *2.5. Data Collection Tools*

The study instrument was a structured interviewing questionnaire and composed of (3) parts, which included the following:

#### *2.5.1. Part One*

This part included the following items:

1) Demographic data: (participant ID, age, education, marital state, and occupation).
2) 2. Measurements of height and weight: Body mass index (BMI) was determined after height and weight

were estimated to the nearest 0.1 kg and 0.5 cm using the Seca scale, respectively.

3) Social habitus: Smoking status and alcohol intake.
4) Medical data: Reproductive problems and chronic diseases such as (DM, HT, heart diseases, liver diseases, renal diseases).

#### *2.5.2. Part Two*

This part focuses on the following items:

1) Abuse of anabolic steroids: The type of AAS, dose, frequency of use per week, duration of use, methods of administration, the pattern of use, period of withdrawal, type of accessory steroids used.
2) The justifications for using AAS improperly and where to get it.
3) Side effects that the players experienced as a result of using AAS.

#### *2.5.3. Part Three*

This part includes the results of laboratory analysis of hormonal assay which include (free testosterone, follicle stimulating hormone, and luteinizing hormone) and semen analysis. All of these laboratory analyses were conducted in "Al-Mohandessin Laboratory," that located in the Al-Mohandessin district on the East side of the city. FSH and LH were assayed using Cobas e411 analyzer manufactured by Roche Diagnostics GmbH, Model: 04775201001, made in Germany, Free testosterone assayed using ChroMate® ELISA Reader (Order No. EQOLE1408), made in the USA. Finally, Semen analysis was done according to the WHO laboratory guidance for the human sperm analysis and processing.

### *2.6. Data Collection Method*

Each participant took about 15 to 20 minutes to complete the data collection and carry out the tests during the interview with the gym-goers in the lab. The interview also included doing the hormone assay and analyzing the participants' semen.

#### *2.6.1. Blood Sampling*

A blood sample from each participant in the study was obtained from the antecubital vein following sterilization using a 5ml disposable syringe in order to determine the concentrations of the follicle-stimulating hormone (FSH), luteinizing hormone (LH), and free testosterone. Following that, the blood was put in a typical laboratory tube, and the specimens were marked with the participant's identifying number and the date of collection (Free T).

#### *2.6.2. Semen Analysis*

After (2–7) days of abstention from sexual activity, all individuals submitted a sample of semen in a confidential area of the lab. According to the guidelines established by the World Health Organization at the time of the examination, the volume, sperm concentration per milters, total sperm count per ejaculate, percentage of spermatozoa motility, and morphological characteristics of the semen sample were all analyzed. After liquefaction at 37C, this was done.

### *2.7. Pilot Study*

The pilot study was conducted for the period from 5th November 2020 to 14th November 2020 on 8 volunteers (10% of the total sample) from 3 gyms on the East side of Mosul city, and the sample of the pilot study was also excluded in the current study.

The pilot study's key goals were to:

1. To determine the study's feasibility.
2. To make needed alterations in the data collecting method.
3. To reduce the unanticipated problems.

### *2.8. Validity and Reliability*

Validation of the tool of the study was performed to provide confidence in the results through a panel of seventeen experts was chosen from different specialties to examine content validity for clarity, relevance, and applicability of it. Their views, feedback, and recommendations have been addressed in the final draft of this study tool. The reliability test was done to measure the errors in the measurement technique; therefore, each instrument used in this study was assessed by statistical analysis. Spearman's correlation coefficients and coefficients of variation were computed to measure the reliability of the study tools throughout the application of the Test-retest reliability coefficients (or called coefficients of stability), which was shown in the table below. Moreover, this means that the tools are stable and reliable [17].

***Table 1.*** *Coefficient of variation and Spearman's correlation coefficients.*

| Variables | AAS Group | | Control Group | | Spearman's Correlation Coefficient |
|---|---|---|---|---|---|
| | Test | Retest | Test | Retest | |
| Total Sperm Count per Ejaculate | 0 | 0 | 130 | 130 | 0.868 |
| | 1 | 2 | 120 | 130 | |
| | 14 | 15 | 160 | 160 | |
| | 20 | 20 | 180 | 170 | |
| Coefficient of variance (CV%) | 1.125 | 1.056 | 0.186 | 0.139 | |
| FSH (mIU/ml) | 0.01 | 0.04 | 4.35 | 4.20 | 0.787 |
| | 0.10 | 0.14 | 1.83 | 1.90 | |
| | 1.00 | 0.90 | 2.07 | 2.00 | |
| | 0.10 | 0.15 | 6.65 | 6.99 | |

| Variables | AAS Group | | Control Group | | Spearman's Correlation Coefficient |
|---|---|---|---|---|---|
| | Test | Retest | Test | Retest | |
| Coefficient of variance (CV%) | 1.543 | 1.294 | 0.605 | 0.634 | |
| LH (mIU/ml) | 0.01 | 0.02 | 5.55 | 5.50 | 0.775 |
| | 0.50 | 0.48 | 3.01 | 3.00 | |
| | 0.90 | 0.92 | 2.45 | 2.41 | |
| Coefficient of variance (CV%) | 0.10 | 0.14 | 12.06 | 12.0 | |
| | 1.081 | 1.034 | 0.764 | 0.767 | |
| Free Testosterone (pg/ml) | 2.00 | 2.10 | 14.80 | 14.83 | 0.791 |
| | 2.30 | 2.28 | 19.50 | 19.52 | |
| | 5.20 | 5.23 | 17.10 | 17.14 | |
| Coefficient of variance (CV%) | 1.20 | 1.25 | 21.0 | 21.0 | |
| | 0.652 | 0.639 | 0.150 | 0.149 | |

Note: CV%: Coefficient of variation.

### *2.9. Statistical Analysis*

Data were statistically analyzed using (SPSS) software version 26. A descriptive strategy was used. We estimated the mean, standard deviation, median, and frequency (%). To evaluate the differences between gym-goers who use anabolic steroids and those who do not, Chi-square and Mann-Whitney tests for specific categorical variables were used, as well as, used NCSS data analysis software version 21.0.2 to determine the appropriate the AUC values for hormones and semen analysis, was adopted the excellent for AUC values between 0.9 - 1, good for AUC values between 0.8 - 0.9, fair for 0.7 - 0.8 AUC values, poor for 0.6-0.7 AUC values and failed for AUC values between 0.5 - 0.6 [18].

### *2.10. Ethical Considerations*

The Nursing College at the University of Mosul, as well as the university's collegiate council for medical research ethics, gave their approval for the study's ethical conduct. Additionally, in order to carry out the study, official approval from the Nineveh chapter of the Iraqi Federation of Bodybuilding was secured. The goal of the research and its methods were discussed, and a focus was placed on the study participant's right to autonomy, anonymity and confidentiality. On the interviewing questions, numerical codes were used in place of the participants' names to protect anonymity. Men who volunteered to take part in the study were notified prior to blood collection and semen analysis.

## 3. Results

***Table 2.*** *Mann–Whitney U test for the AAS group and control groups' age, height, weight, and BMI.*

| Variables | AAS Group (n=40) | | Control (n=40) | | *Z* | *P*-value |
|---|---|---|---|---|---|---|
| | $\bar{x}$ | SD | $\bar{x}$ | SD | | |
| Age (years) | 25.55 | 5.462 | 26.35 | 5.93 | 0.58 | 0.559 |
| Height (cm) | 172.40 | 8.09 | 172.27 | 7.98 | 0.05 | 0.988 |
| Weight (kg) | 80.57 | 11.80 | 80.50 | 11.42 | 0.02 | 0.981 |
| Body Mass Index | 27.02 | 3.02 | 27.07 | 3.03 | 0.09 | 0.927 |

Note: $\bar{x}$: Mean; SD: Standard Deviation, BMI: body mass index.

Table 2 shows the participants' average body mass index (BMI) was 27.04, their average height was 172.33, their average weight was 80.53, and their average age was 25.95. With a mean BMI of 27.04, the majority of the individuals were overweight. The homogeneity of the study's groups was also shown by the absence of statistically significant differences in the AAS group's age, height, weight, or BMI compared to the control group.

***Table 3.*** *After stopping the usage of AAS, the frequency distribution of the negative effects on reproduction becomes apparent.*

| Reproductive Side Effects | F. | % |
|---|---|---|
| Erectile Dysfunction (ED) | 14 | 35 |
| Impaired Libido | 13 | 32 |
| Premature Ejaculation (PE) | 5 | 12 |
| No side effect | 8 | 20 |
| Total | 40 | 100 |

According to Table 3, 35% of the AAS group reported erectile dysfunction after stopping AAS use, and 32% reported decreased emotions of sexual interest or desire.

***Table 4.*** *Mann–Whitney U test for the serum level of FSH, LH, and Free Testosterone for both AAS group and control groups.*

| Variables | AAS Group (n=40) | | Control Group (n=40) | | Statistics | |
|---|---|---|---|---|---|---|
| **Hormonal Assay** | $\bar{x}$ | **SD** | $\bar{x}$ | **SD** | ***Z*** | ***P*-value** |
| FSH (mIU/ml) | 1.28 | 1.78 | 4.29 | 1.77 | 6.11 | 0.000** |
| LH (mIU/ml) | 1.79 | 2.32 | 6.12 | 2.51 | 5.99 | 0.000** |
| Free T. (pg/ml) | 11.93 | 14.02 | 23.18 | 7.30 | 5.25 | 0.000** |

Note: ** = Significance at P. < 0.01.

According to Table 4, the total mean for the AAS group's serum levels of FSH, LH, and Free T was 1.28, 1.79, and 0.93, respectively (11.93). The total mean of the control group's serum levels of LH, Free T, and FSH was 6.12, 4.29, and 6.12, respectively (23.18). Additionally, there were statistically significant variations in the hormonal assay between the study's control group and the AAS group at (P>0.01).

***Table 5.*** *Descriptive statistics and Z- value of Mann–Whitney U test for the average of the semen parameters in the control and AAS groups.*

| Variables | AAS Group (n=40) | | Control Group (n=40) | | Statistics | |
|---|---|---|---|---|---|---|
| **Semen Parameters** | $\bar{x}$ | **SD** | $\bar{x}$ | **SD** | ***Z*** | ***P*-value** |
| Abstains Periods (days) | 3.45 | 1.50 | 3.78 | 1.56 | 1.01 | 0.310 |
| Semen Volume (ml) | 3.00 | 0.75 | 3.52 | 0.71 | 3.02 | 0.003** |
| Semen PH | 7.71 | 0.29 | 7.74 | 0.27 | 0.40 | 0.682 |
| Liquification (min.) | 29.88 | 4.86 | 29.25 | 4.87 | 0.62 | 0.531 |
| Sperm Concentration*$10^6$\ml | 6.50 | 9.41 | 41.25 | 11.05 | 7.31 | 0.000** |
| Total Sperm Count*$10^6$\ eja. | 18.19 | 24.39 | 139.9 | 24.66 | 7.70 | 0.000** |
| Active Sperm Motility (%) | 23.63 | 18.60 | 63.88 | 8.04 | 7.49 | 0.000** |
| Sluggish Sperm Motility (%) | 22.25 | 18.46 | 21.38 | 6.30 | 0.70 | 0.479 |
| Immotile Sperm (%) | 41.63 | 30.85 | 14.25 | 5.37 | 4.53 | 0.000** |
| Normal Sperm Morphology (%) | 53.38 | 22.54 | 75.63 | 22.54 | 6.42 | 0.000** |
| Abnormal Sperm Morphology | 34.13 | 16.16 | 24.38 | 4.55 | 4.46 | 0.000** |

Note: ** = Significance at P. < 0.01.

Table 5 demonstrates that there were statistically significant variations between the study groups at in the semen volume (ml), sperm concentration, total sperm count, sperm motility, and sperm morphology (P>0.01).

***Table 6.*** *Measures of Relative Risk and the Interval of Confidence for a Significant Risk Factor.*

| The Variable | Relative Risk | 95% Confidence Interval | | P. value |
|---|---|---|---|---|
| | | The Lower | The Upper | |
| An Oligospermia | 5 | 2.7 | 9. 3 | 0.000** |

Note: ** = Significance at P. < 0.01.

Table 6 demonstrates that gym-goers who use anabolic steroids have a five-fold higher risk of developing low sperm counts than those who do not.

***Table 7.*** *ROC Analysis for Analysis of Semen.*

| Criterion Variable | AUC | 95% Confidence Limits | | P- Value |
|---|---|---|---|---|
| | | Lower | Upper | |
| Sperm Count | 0.9818 | 0.9137 | 0.9963 | 0.0000 |
| Active Motility | 0.9420 | 0.8592 | 0.9767 | 0.0000 |
| Sluggish Motility | 0.7037 | 0.5262 | 0.8224 | 0.0032 |
| Non-Motile | 0.2596 | 0.1025 | 0.4041 | 0.9990 |
| Normal Morphology | 0.8622 | 0.7607 | 0.9225 | 0.0000 |
| Abnormal Morphology | 0.3301 | 0.1754 | 0.4689 | 0.9879 |

Note: ROC: Receiver Operating Characteristic, AUC: Area Under the Curve. ** = Significance at P. < 0.01.

Table 7 shows that AUC for sperm count, and active motility were excellent predictor value, normal morphology is a good predictor value, and sluggish motility fair predictor value for fertility, as depicted in the figure below that reveals the sensitivity of total sperm count was 96.15 at criterion ≤ 16 million.

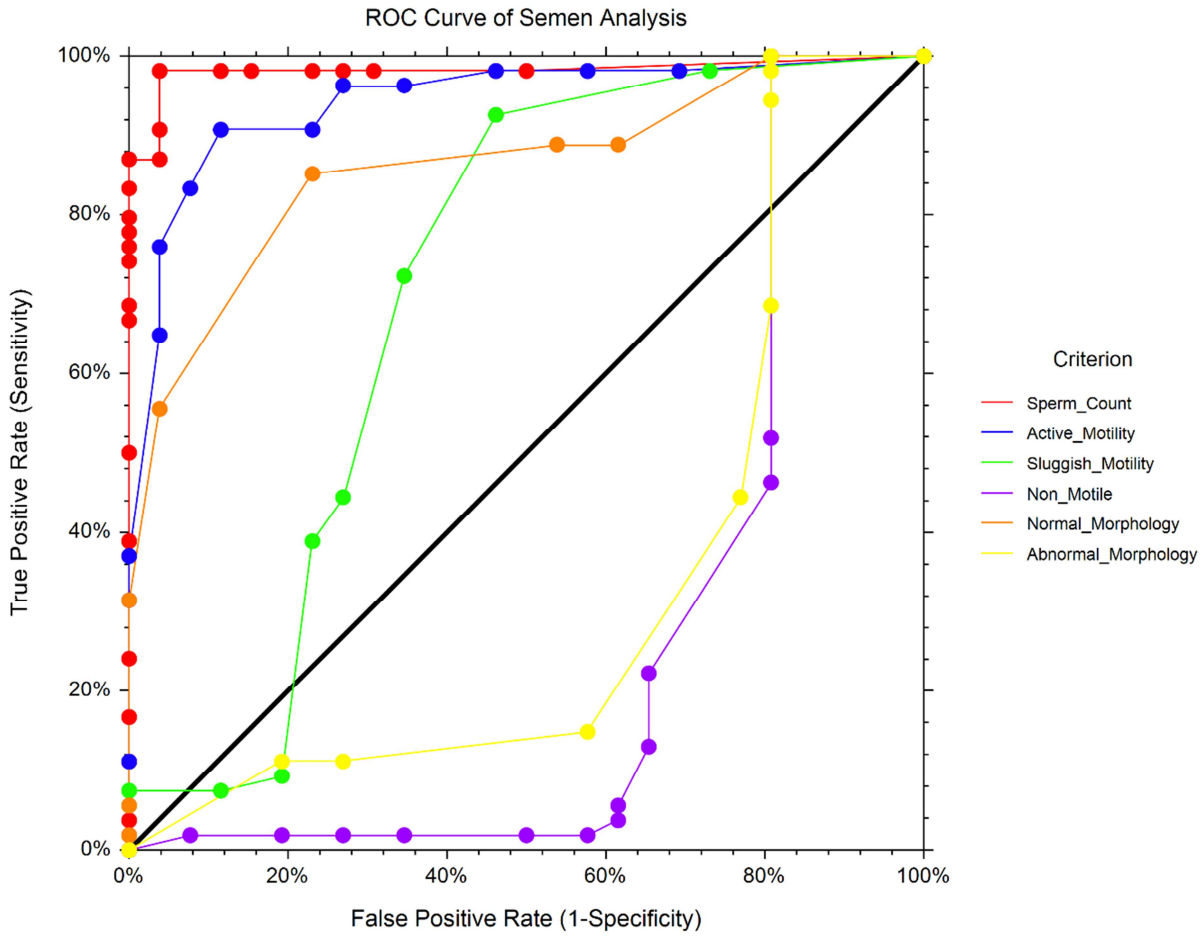


***Figure 2.*** *ROC Analysis of Semen Analysis.*

## 4. Discussion

During recent years in our city, the use of anabolic steroids (AAS) has customary increased interest among male adults, in which many sport center goers are trending to use AAS in an attempt to increase muscle size, and improve their performance, due to increases in the availability of sports facilities. The gyms included in this study were chosen from different locations within Mosul city; during this study, we noticed that gyms-goers self-administrate testosterone hormone derivatives injection secretly and without medical care supervision, Additionally, some of them combine various AAS kinds at different doses. The current study's statistical analysis reveals differences between the AAS group and control group in the blood concentrations of FSH, LH, and free testosterone as well as semen parameters.

The participant's mean height is shown in table 2 as being (172.33±8.03) cm, weight mean was (80.53±11.61) kg, in terms of body mass index (BMI), the majority of individuals had an average BMI of (27.04±3.03) kg/m$^2$. Additionally, there were no statistically significant variations in the AAS and control groups' age, height, weight, or BMI, indicating that the study's groups were homogeneous. In a study by [19], these characteristics were assessed to rule out the impact of obesity on the hormonal concentrations of (FSH, LH, Free T.), as well as the quality of semen., an observed mean of the BMI was (29.9±3.33), and this concordant with our study finding.

Table 3 from the current study confirms findings from a study of [20] that used the International Index of Erectile Function (IIEF) and reported that (69.4%), mild (22.1%), mild-moderate (5.4%), moderate (1.4%), and severe ED (0.5%) among study participants who were taking AAS suffered from erectile dysfunction after ceasing to use AAS. In addition, (32%) suffered from impaired libido or sexual desire. When a user quits taking these steroids, problems like ED and other problems like reduced libido may start to go away.

FSH serum levels significantly dropped, as shown in Table 4. (1.8±1.78) mlU/ml, LH (1.79±2.32) mlU/ml, and Free T. (11.93±14.02) Pg/ml FSH was used to compare the AAS group to the control group (4.29±1.77) mlU/ml, LH (6.12±2.52) mlU/ml, and Free T. (23.18±7.30) Pg/ml. The Mann-Whitney U test between the groups demonstrated strong significance (P-value= 0.000) at the level of (P. < 0.01). These results are in line with those of [21] and [22], who found that the random effect model predicted a significant drop in total testosterone levels after the use of anabolic steroids and in LH and FSH concentrations during

the use of anabolic steroids in athletes. These results can be explained by the possibility that anabolic steroids may suppress the hypothalamic-pituitary-gonadal axis.

The Mann-Whitney U test between the groups demonstrated strong significance (P-value= 0.000) at the level of (P. < 0.01). These results are in line with those of [21] and [22], who found that the random effect model predicted a significant drop in total testosterone levels after the use of anabolic steroids and in LH and FSH concentrations during the use of anabolic steroids in athletes. These results can be explained by the possibility that anabolic steroids may suppress the hypothalamic-pituitary-gonadal axis. Table 5 displays the overall mean and standard deviation of the semen parameters for the AAS group and the control group; the sperm concentration of the semen parameters is highly significantly lower in the AAS group (P 0.01) than in the control group (6.5±9.41) 106/ml, total sperm count (18.19±24.39) 106/ejaculate, active sperm motile (23.63±18.6)%, non-motile sperm (41.63±30.85)%, normal sperm morphology (53.38±22.54)%, abnormal sperm morphology (34.13±16.16)%, was within the normal ranges as compared to the control group. Using the Mann-Whitney U test, the sperm count of the AAS users group shows a significant difference, and the sperm count of the steroid users group shows a highly significant decrease when compared to the control group (P-value =0.00); comparable information was obtained from a different study carried out by [23]. I concur with the results regarding sperm numbers, but I disagree with the results about sperm motility and morphology. But all of our findings involving sperm count, motility, and morphology are in agreement with another study [24] on the specific effects of Nandrolone on semen quality.

The use of AAS by bodybuilders directly affects sperm counts; the decline in sperm counts can be attributed to the hormonal imbalance brought on by AAS abuse; this suggests that AAS users' testes are negatively impacted by this downregulation of sperm production while the sperm counts of the control group are unaffected, suggesting that weightlifting exercise without taking AAS or taken just protein supplements has no discernible impact on spermatogenesis or semen quality characteristics [25].

Table 6 demonstrates that gym-goers who use anabolic steroids have a five-fold increased risk of developing low sperm counts (severe, moderate, or mild oligospermia) compared to those who do not (RR: 5; 95 percent CI: 2.690-9.293; P = 0.000), and a recent study by [26] supported our findings, stating that "The group of androgen users had a 26 percent lower fertility rate than the controls over.

With a significant and excellent predictor value for the test's accuracy regarding sperm count and active motility, which was (AUC= 0.9818), (AUC= 0.9420) sequentially with (P. = 0.000), it has a significant diagnostic ability to ascertain the impact of AAS use on male bodybuilders' fertility, which is in line with our findings and the findings of the study conducted. Table 7 and Figure 2 illustrate the Reserve Operating Characteristic (ROC) test of Semen Analysis.

# 5. Conclusions and Recommendations

Follicle stimulating hormone, LH, and Free T. serum levels in the AAS group were significantly lower than those in the control group, which were all within normal ranges. While the control group had normal sperm densities, more than two-thirds of AAS consumer gym-goers had oligospermia. Sperm motility in the AAS group was much lower than in the control group, but it was still within normal limits. Gym-goers who abuse AAS are five times more likely to see a decline in fertility than those who do not use these steroids, and two-thirds of study participants who used AAS experienced erectile dysfunction after stopping their usage as well as diminished libido or sexual desire.

Based on the findings and recommendations of the study, the researcher recommended that the Iraqi Ministry of Health activate the monitoring function over the abuse of AAS in gyms by gym patrons and even amateur athletes. The Iraq Pharmacists Association must prohibit pharmacies from offering anabolic steroids without a prescription since they have been used illegally or unreasonably. Additional research studies for a larger sample, including both genders, and the effects of the AAS on other body systems, as well as community health education programs for gym goers about the long-term detrimental effects of using AAS, particularly on fertility, are required to more accurately assess the issue of AAS abuse in Iraq.

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