The Study of Effect the Covid-19 Virus and the Vaccine Against it on Men's Sex Hormones

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Abstract
Background: The covid-19 disease pandemic, due to the new intense acute SARS-CoV-2, has caused a global unexpected and essential increase in hospitalizations for pneumonia with other organs disease. Vaccines against COVID-19 has, quickened, at an unbelievable progress. there are 184 nominee vaccines in preclinical development and 104 in clinical stages of development. The study aims to know the effect of the Covid-19 virus and its vaccine on male hormones Findings: The results obtained from the current study showed tha FSH, LH and prolactin hormones of healthy male vaccinated (8.74±1.37 mlu/ml) 9.14±1.72 mul/L) and (27.86±4.35 ng/L) were higher than other groups of male groups (Non-vaccinated (6.73±3.06 mlu/ml) , (5.35±1.59 mul/L) and (5.35±1.59 ng/L) and covid-19 patients (5.92±3.58 mlu/ml) , (3.85±2.04mlu/L) and (16.65±6.15 ng/L) respectively with significant effect (P<0.01). The results of the current study showed a decrease in the mean concentration testosterone hormone for vaccinated healthy groups (1.27±0.31ng/dl) and COVID-19 patients (1.66±0.34 ng/dl) with a significant effect (P<0.01) in comparison to the non-vaccinated healthy control group (4.81±1.81ng/dl) Conclusions: Covid-19 virus and its vaccine influences hormones in one way or another.
Keywards: Covid-19 virus, vaccine, male hormones

1. Introduction

Coronaviruses are big, enveloped, ssRNA viruses found in many mammals, such as pets, birds, cattle, and pigs. Coronaviruses cause disease for many systems like gastrointestinal, respiratory, and neurological disease. The strains 229E, OC43, NL63, and HKU1, are the most common coronaviruses which typically cause common flu symptoms in individuals having a normal immune response. The third coronavirus is SARS-CoV-2 that has caused severe viral disease in man globally in the past two decades.[1] SARS-CoV-2 is prevalence firstly through respiratory droplets during closely contact. Asymptomatic, presymptomatic, and symptomatic carriers can spread the infection. The average incubation period of the disease is 5 days, and 97. Dry cough, fever and shortness of breath are the most common symptoms. X-ray and laboratory abnormalities, such as decrease of lymphocyte and elevated the enzyme lactate dehydrogenase, are common, but nonspecific. [2]
In mid-November 2002, Covid-19 was identified as SARS for the first time in China and in early 2003 the World Health Organization became aware of the disease, and it continued until 2003, spreading around the world, affecting 24 countries in Asia including Cambodia and Hong Kong Singapore, Hanoi and Canada in North America, and other countries to a lesser extent, recorded 8,437 SARS cases and 813 deaths [3]
In December 2019, the novel coronavirus disease (COVID-19) was detected in China in Wuhan Province and Hubei Province and spread rapidly in China and around the world rapidly [4].
The first case of COVID-19 In Iraq, was detected in Najaf Governorate on February 24, 2020, and 4 other cases of the disease were detected in Kirkuk Governorate. In the Sulaymaniyah Province, on March 3, 2020, a 69-year-old patient with COVID-19 was reported to have died [5].
Vaccines against COVID-19 has, quickened, at an unbelievable progress. actually, there are 184 nominee vaccines in preclinical development and 104 in clinical stages of development. [5].
Recently, 18 vaccines against COVID-19 virus have been used around the world and are approved [5,6].
Vaccines against COVID-19 are divided into four primary types that use different forms: (1) whole virus body vaccines, (2) protein fragment-based vaccines, (3) virus vector vaccines, and (4) RNA or DNA vaccines.

2. Patients and Methods

During the period September 2021 to March 2022, samples were taken from three groups of men aged within the reproductive period from 25 years to 45 years old: the first group (40) were vaccinated against Covid 19 uninfected, the second group (30) were infected with Covid 19, and the third group (25) were healthy, unvaccinated and uninfected in each, from Baghdad and Diyala governorates, 5 ml of venous blood was taken into a plane tube, after separating the serum the measurement of the sex hormone (FSH, LH, prolactin and testosteron) for the three groups was carried out using the ELISA device.

3. Results and Discussion

Covid-19 pandemic swept the world at the end of

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2019 and started from the Chinese province of Wuhan and then all other regions of China and spread at an unreasonable speed to almost all parts of the world. The corona virus disease -19 (COVID-19) pandemic, is an in progress worldwide pandemic of the virus, caused by severe acute respiratory syndrome coronavirus 2(SARS-CoV-2). [7]

Severe acute respiratory syndrome (SARS) is the first new disease of the 21st century that poses a menace to global health with international epidemic potential. The disease first stands out in mid-November 2002 in Guang doing Province, China [8]. After about three months, the disease appeared in Iraq after it spread to neighboring countries.

Scientists have tried hard to create a vaccine against the virus in several regions of the world, such as the United States, European countries, China and Russia, and many international companies for the manufacture of vaccines. Headlines have appeared across multiple social media stands questioning the effects of newly authorized COVID-19 vaccines on fertility. Although the influence on future fertility were not studied in the initial trials, at present, there is no proof that the COVID-19 vaccine has any impact of future fertility [9]. Many studies have discussed the effect of the vaccine on the recipients, The Lancet journal published research on the activity of the vaccine against the COVID-19 virus and lowering of the immunity subsequently with time [10]. Research revealed an activity of the immunity among vaccinated healthy peoples, 8 months after the admiration of couple doses of the vaccine was lowered in comparison with unvaccinated peoples. [11].

The current study looks at the effect of the COVID-19 vaccine on male sex hormones.

Blood samples were taken from three groups of individuals, one vaccinated healthy group (50 males), another infected with Covid-19 virus (30 males), and a third healthy, unvaccinated group (25 males).

COVID-19 poses a threat to the reproductive systems of both males and females. The existence of SARS-CoV-2 virus in the female reproductive system (vagina and placenta) underlies the failure of female fertility [12].

It is not known when this pandemic will end for this reason there are more questions related to the female reproductive system, particularly issues related to fertility. The aim of this research is to clarify the conceivable link between COVID-19 virus and vaccine against this virus and male fertility. This study confirms the influence of SARS-CoV-2 on male hormones, Carp-Veliscu et.al.2022 study conducted that the results extracted from the research showed endometrial samples did not express SARS-CoV-2 RNA. As for the menstrual cycle, there are significant changes, including increased levels of follicle-stimulating hormone (FSH) [13].

Distribution of studied groups according of age groups

Those who were subjected to the study were approved to be within the fertile age, and the highest frequency of age group of those studied is between 30-39 years (25 (62.5%),16 (64.0%),18 (60.0%)) and lowest frequency of age groups were for group ≥ 40 years (5 (12.5%), 2(8.0%),6 (20.0%)) respectively as showing in tables and figures (1).

Table (1): Distribution of Studied groups according to the age groups (Years)

Age groups (years)	Studied groups		
	Healthy Vaccinated (n=40)	Healthy Non-Vaccinated (Control) (n=25)	COVID-19 Patients(n=30)
(20-29)	10 (25.0%)	7 (28.0%)	6 (20.0%)
(30-39)	25 (62.5%)	16 (64.0%)	18 (60.0%)
(40≤)	5 (12.5%)	2(8.0%)	6 (20.0%)
Total	40 (100.0%)	25 (100.0%)	30 (100.0%)

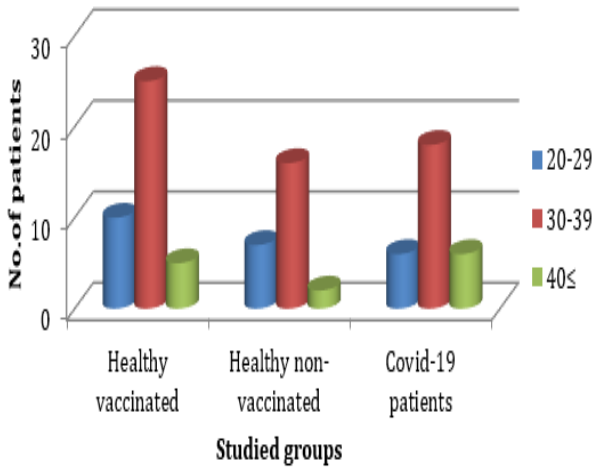

Figure (1): Distribution of Studied male groups according to the age groups (Years)

The above results were obtained depending on the number of patients and healthy people from whom the saples were obtained. The result could be otherwise if the samples were taken from a larger number and for a longer period.

Distribution of Fertility hormones among the studied groups

It appears that firtility hormones are among the main factors related to the fertility-specific response to COVID-19 [14,15], The current study worked to find out the effect of the Covid-19 vaccine on male hormones.

Comparison among male groups according to the concentration of FSH hormone

Results presented in table & figure (2) showed that results of FSH hormone of healthy male vaccinated (8.74±1.37 mlu/ml) were little higher than other groups of male groups (non-vaccinated (6.73±3.06 mlu/ml) and covid-19 patients (5.92±3.58 mlu/ml)).

This results in agreement with the result of study

conducted by Xu, Hui et.al 2021 how revealed that there is no effect of covid- 19 on male infertility [16], and also the results agree with the result of the Iraqi study done by Mays Adnan Abbas 2022 who reveal that the levels of LH and FSH among recovered COVID-19 patients did not effected during 6 months recovery[17].

Table (2): Comparison among the three male groups (Healthy non-vaccinated healthy vaccinated and COVID-19 Patients) according to level of Follicle Stimulating Hormone (FSH) **mlu)(ml**					
Groups	(Mean± Std.)	Compared With healthy vaccinated		Compared with COVID-19 Patients	
		t-test	P-Value	t-test	P-Value
Healthy Non-Vaccinated (Control)	6.73±3.06				
Healthy Vaccinated	8.74±1.37	0.740	.462(P>0.05 NS)		
COVID-19Patients	5.92±3.58	0.890	.378(P>0.05 NS)	1.128	263(P>0.05 (NS)

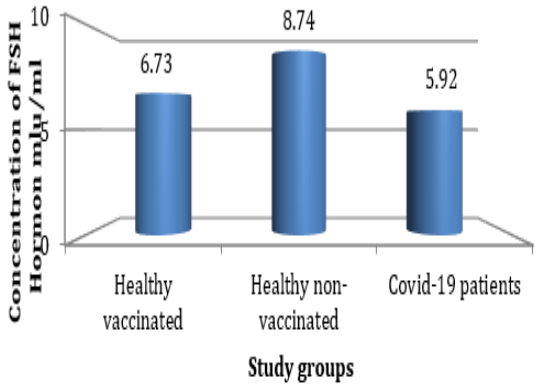

*Figure (2): Comparison among the three male groups (Healthy non-vaccinated healthy vaccinated and COVID-19 Patients) according to the level of Follicle Stimulating Hormone (FSH) **mlu)(ml***

Comparison among male groups according to the concentration of LH hormone

The LH hormone production is organized by gonadotropin-releasing hormone from the hypothalamus.[18] In women, an sever increase of LH excite ovulation [19] and growth of the corpus luteum. In men, where Lutennizing Hormone had also been called interstitial cell–stimulating hormone,[20] it stimulates Leydig cell production of testosterone. It works synergistically with follicle-stimulating hormone (FSH) [21].

Table and figure (3) showed the mean concentration of male LH hormone and present an increase of vaccinated healthy group (9.14±1.72 mul/L) with non- significant in comparison with healthy non-vaccinated control (5.35±1.59 mul/L) while when compared with covied-19 patients (3.85±2.04mlu/L) which showed decreased in mean concentration, showed high significant (P<0.01). There are 7 cases (30.4%) suffer from decreased in LH level, that may be exposed to stress because COVID-19 infection [22]. The stress reduces gonadotropin secretion with gonadotropin-inhibitory hormone in dependly of Prolactin [23].

Table (3): Comparison among the three male groups (Healthy non-vaccinated, healthy vaccinated and COVID-19 Patients) according to the level of Lutemizing Hormone (LH) (mlu\ml)					
Groups	(Mean± Std.)	Compared With healthy vaccinated		Compared with COVID-19 Patients	
		t-test	P-Value	t-test	P-Value
Healthy Non-Vaccinated (Control)	5.35±1.59				
Healthy Vaccinated	9.14±1.72	1.606	.113(P>0.05 NS)		
COVID-19 Patients	3.85±2.04	2.978	.004(P<0.01 HS)	2.442	.017(P<0.05 S)

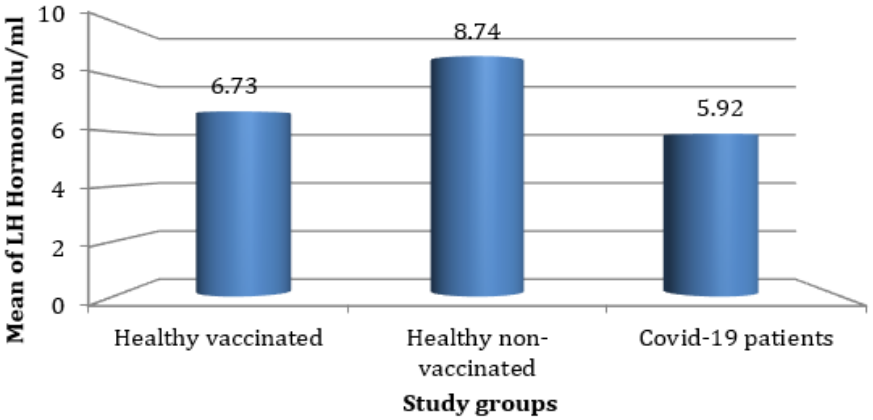

*Figure (3): Comparison among the three male groups (Healthy non-vaccinated, healthy vaccinated and COVID-19 Patients) according to the level of Lutemizing Hormone (LH) (mlu**(ml***

Comparison among male groups according to the concentration of prolactin hormone

The current study showed significant differences (P<0.01) for the mean concentration of prolactin hormone for males among three groups, as the mean concentration of prolactin for healthy vaccinated male group was (27.86±4.35 ng/L) and

the male infected with Covid-19 (16.65±6.15 ng/L) was high significant in comparison to the healthy non-vaccinated male (5.35±1.59 ng/L) table and figure (4)

Table (4): Comparison among the three male groups (Healthy non-vaccinated, healthy vaccinated and COVID-19 Patients) according to the level of Prolactin (ng\ml)					
Groups	(Mean± Std.)	Compared With healthy vaccinated		Compared with COVID-19 Patients	
		t-test	P-Value	t-test	P-Value
Healthy Non-Vaccinated (Control)	5.35±1.59				
Healthy Vaccinated	27.86±4.35	2.779	.007(P<0.01 HS)		
COVID-19 Patients	16.65±6.15	8.936	.000(P<0.01 HS)	1.508	.136(P>0.05 NS)

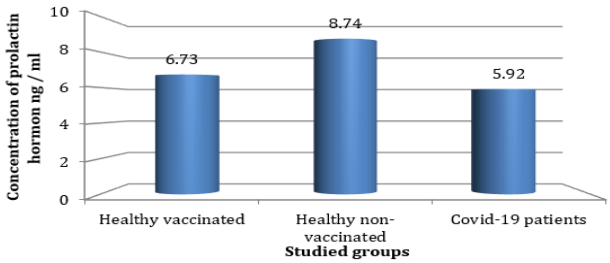

Figure (4): Comparison among the three male groups (Healthy non-vaccinated, healthy vaccinated and COVID-19 Patients) according to the level of Prolactin (ng(ml

Comparison among groups according to the concentration of testosterone hormone:

In male's testosterone is the primary sex hormone and anabolic steroid. In humans, testosterone plays a key role in the development of male reproductive tissues such as testes and prostate, [24].

The overview showed that low testosterone level is associated with the severity of COVID-19, and this may be due to the high inflammatory and oxidative stress burden with ACE2 down regulation due to SARS-CoV-2 to injury to the testicle and reduce the production of testosterone.[25].

The results of the current study showed a decrease in the mean concentration testosterone hormone for vaccinated healthy groups (1.27±0.31ng/dl) and COVID-19 patients (1.66±0.34 ng/dl) with a significant effect (P<0.01) in comparison to the non-vaccinated healthy control group (4.81±1.81ng/dl) (table and figure 5).

Table (5): Comparison among the three male groups (Healthy non-vaccinated, healthy vaccinated and COVID-19 Patients) according to the level of Testosterone (ng/dl)					
Groups	(Mean± Std.)	Compared With healthy vaccinated		Compared with COVID-19 Patients	
		t-test	P-Value	t-test	P-Value
Healthy Non-Vaccinated (Control)	4.81±1.81				
Healthy Vaccinated	1.27±0.31	13.554	.000(P<0.01 HS)		
COVID-19Patients	1.66±0.34	9.354	.000(P<0.01 HS)	5.403	.000(P<0.01 HS)

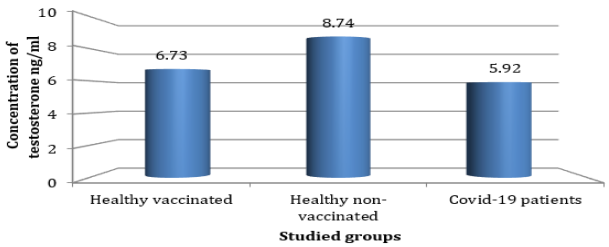

Figure (5): Comparison among the three male groups (Healthy non-vaccinated, healthy vaccinated and COVID-19 Patients) according to the level of Testosterone (ng/dl)

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Conclusion: From the previous results obtained from the current study, we conclude that there is an effect of the Covid-19 virus and the vaccine against the virus has an effect on male sex hormones.

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