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STUDY OF FSH & LH CHANGES IN COVID-19 PATIENTS

Physiology

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KEYWORDS

INTRODUTION:-

Coronaviruses are large, roughly spherical particles with unique surface projections[1]. Coronaviruses constitute the subfamily Orthocoronavirinae, in the family Coronaviridae, order Nidovirales and realm Riboviria[2]. They are enveloped viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry[3]. Size of coronaviruses ranges from approximately 26 to 32 kilobases [4]. Human-to-human transmission of SARS-CoV-2 was confirmed on 20 January 2020 during the COVID-19 pandemic[5].Recently, the WHO reported the possibility of airborne transmission, as well as the presence of RNA in urine and semen, increasing the possibility of sexual transmission [6]. Since the 1918 flu pandemic, the novel coronavirus disease COVID-19 has become the fifth documented pandemic till date.

SARS-CoV-2 was first reported in Wuhan City of Hubei Province of China on 17th November 2019[7] and subsequently spreads to 212 countries and territories around the globe infecting millions of people. Almost all countries throughout the world reported the disease spread caused by aerosol penetration into the upper the respiratory tract and lungs via inhalation[8]. The World Health Organisation (WHO) declared a public health emergency of international concern on 30th January 2020 and a Pandemic on 11th March 2020.

SARS-CoV-2 has four proteins, spike , membrane, small membrane proteins and nucleocapsid . The S protein is essential for the virus to fuse to the host cell through the receptor-binding-domain [9]. The key pathway for SARS-CoV-2 to entry the cell is through the S-protein attachment to the angiotensin-converting enzyme 2 (ACE2), which is highly expressed in spermatogonic stem cells, seminiferous duct cells, type II alveolar cells, myocardial cells, bladder urothelial cells and proximal tubule cells[10]. Recently reported that SARS-CoV-2 virus critically depends on angiotensin-converting enzyme 2 (ACE2) and transmembrane serine protease (TMPRSS2 and TMPRSS4), as a receptor to enter cells [11].

As of 20th June 2022, the pandemic has infected more than 540 million cases and 6.32 million confirmed deaths, making it one of the deadliest in history. First case of COVID-19 in India was reported on 30th January 2020. The first case was reported on 24th March 2020 in Manipur. As of 20th June 2022 around 1, 37, 247 cases has been reported along with 2120 deaths from Covid related illness in Manipur. According to WHO, "Post COVID-19 are those conditions occuring in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms last for at least 2 months. Common symptoms include fatigue, shortness of breath, fatigue, cough, cognitive dysfunction but also others that impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time."

Post-COVID syndrome, also known as long-COVID, was described as a clinical entity for the first time in spring of 2020, when COVID-19 patients still had symptoms several weeks after their acute infection[12]. Although there are indications that the evolution of post-COVID syndrome is driven by cytokines, research is needed to elucidate its pathogenesis[13].

The incidence of post-COVID sequelae is estimated between 10 and 35%[14]. Fatigue, shortness of breath, chest pain, mental disorders, olfactory and gustatory dysfunction are amongst the most common symptoms[15,16]. Unfortunately, about 3.6% patients shadily died of multiple organ failure, acute respiratory distress syndrome, shock, heart, or renal failure. Majority of those infected are still alive, although with organ damage, e.g in the reproductive system, especially in those reproductive age women[17] who would likely have sought to become pregnant without concern for related gynaecological complications[18]. Besides the self-reported menstrual cycle changes, ovarian reserve markers and reproductive hormones, including anti-Mullerian hormone (AMH), follicle-stimulating hormone (FSH), the ratio of FSH to luteinizing hormone (LH), estradiol (E2), progesterone (P), testosterone (T), and prolactin (PRL), should be an effective way to reflect the ovarian function[19,20] and possible ovarian injury associated with the COVID-19 diseases.

LH and FSH are the hormones secreted from pituitary gland. At the beginning of the menstrual cycle, LH and FSH levels usually range between about 5-20 mIU/ml. During the early part of their menstrual cycle most women have about equal amounts of LH and FSH. During LH surge amount of LH increases to about 25-40 mIU/ml 24 hours before ovulation occurs. Once the ova are released by the ovarian, the LH levels back down[21].

Menstruation is the cyclic, orderly sloughing of the uterine lining, in response to the interactions of hormones produced by the hypothalamus, pituitary, and ovaries. The menstrual cycle may be divided into different phases – 1. Follicular/ Preovulatory phase: Day 1-5: Menstruation (period) Day 6-14: Follicular growth and estrogen increase. Ovulation occurs around day 14 (release of an egg from the ovary). 2. Ovulatory phase: Day 14-17: Ovulation and peak estrogen levels. 3. Luteal phase: Day 18-28: Corpus luteum forms (empty follicle in the ovary) and progesterone increases. The uterine lining thickens, preparing for a fertilized egg. If the egg isn't fertilized, the corpus luteum breaks down, and menstruation occurs. The average duration of a menstrual cycle is 28 days with most cycle lengths between 25 to 30 days

Various studies have shown that COVID-19 vaccination and SARS-CoV-2 infection temporarily altered menstrual cycles [22,23,24], but there was not much research on COVID-19 infection and changes in menstruation. As more concerns has emerged regarding the effects of the novel Coronavirus on pregnancy outcomes and menstrual changes, determination of serum FSH and LH level during Preovulatory phase in Post-Covid females of reproductive age group and evaluate the association of serum FSH and LH during Pre-Ovulatory phase and Menstrual cycle might help in providing more insights on the effect of novel Coronavirus in females of reproductive age group.

MATERIALS & METHODS:-

Study Design: Cross sectional study
Study Setting: The study will be carried out in the Department of Physiology, Regional Institute of Medical Sciences, Imphal, Manipur.
Duration Of Study: 2 years (October 2022 to September 2024)
Study Population: 18 to 45 years of age females who recovered from Covid-19 infection of Imphal East and Imphal West.
Ethical Issues:- The study was carried out after getting clearance from

the Institutional Ethics Committee, Regional Institute Of Medical Sciences, Imphal.

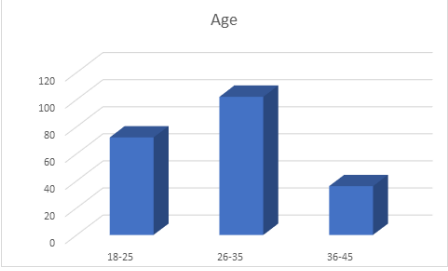
Inclusion Criteria:

1. Females of 18 to 45 years of age who had recovered from covid - 19 infection

Exclusion Criteria:

1. Those who are suffering from PCOS, DUB, Fibroid, Infertility, Thyroid Disease
2. Those who are taking OCP drugs
3. Those who are under any Hormonal therapy
4. Those who are pregnant during study
5. Those who are lactating during study
6. Those who are suffering from any systemic illness
7. Those who had consumed Stevia, caffeine, soy products, dairy products in excess quantity

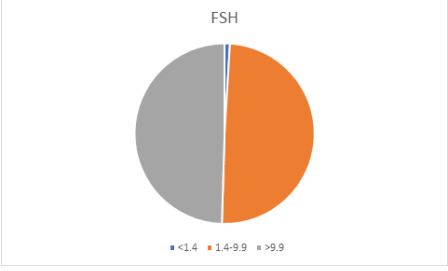
RESULTS & OBSERVATIONS:-



FSH (Follicle-Stimulating Hormone) Levels

The FSH levels among the patients are nearly equally split between the 1.4-9.9 range and the >9.9 range, each accounting for 49.53% (104 patients). A small minority, 0.96% (2 patients), have FSH levels below 1.4. This distribution indicates a varied hormonal profile within the patient sample.

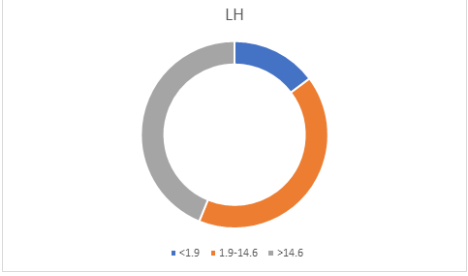
FSH	No of Patients (%)
<1.4	2 (0.96%)
1.4-9.9	104 (49.53%)
>9.9	104 (49.53%)
Total	210 (100%)



LH (Luteinizing Hormone) Levels

The LH levels show that 43.81% of patients (92 individuals) have LH levels greater than 14.6, while 41.43% (87 patients) fall within the 1.9-14.6 range. A smaller portion, 14.77% (31 patients), have LH levels below 1.9. This suggests a slightly higher prevalence of elevated LH levels among the patients.

LH	No of Patients (%)
<1.9	31 (14.77%)
1.9-14.6	87 (41.43%)
>14.6	92 (43.81%)
Total	210 (100%)



DISCUSSION:-

OUR study found that 49.53% of patients had FSH levels within 1.4-9.9 mIU/ml, the LH levels 1.9- 14.6 range was only observed for 41.43%. This suggests a slightly higher prevalence of elevated LH levels among the patients. Covid- 19 patients are often overlooked, yet abnormalities have been noted. Our study was aimed to assess the association of these hormones. It was observed that more than half of the study population had abnormal values for both FSH(50.5%) and LH (58.85%). Similarly other studies exhibited elevated levels of FSH & LH indicating potential ovarian suppression linked to Covid-19 (Li K 2021 & Moradi F et al.,2020). During times of stress, ovarian function can be suppressed to prioritize other essential organ systems, potentially leading to infertility and reduced menstruation in Covid-19 patients. This correlation underscores the observed menstrual changes in patients with severe multi-organ involvement, as documented in clinical studies.

CONCLUSION:-

The current COVID-19 pandemic had a devastating consequence all around the globe. Not only the physical and mental health has been affected but some literature has also reported of deranged ovarian functions. As more concerns has emerged regarding the effects of the novel coronavirus on pregnancy outcomes and menstrual changes.

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