Current Clinical and Medical Education

Received 25 Jun 2024 | Revised 29 Jun 2024 | Accepted 18 Jul 2024 | Published Online 14 Aug 2024

Published By: Vision Publisher

CCME 02 (8), 254-265

ISSN 2942-0792

Sex Hormonal Imbalance in Patients with CVD

Safaa Adnan Khalaf Abboud[1], Asawer Abd Alkareem Shamel[2], Rashid Arshad Akef[3], Hamad Ali Najeim[4], Noora Latif Rasheed[5], Marwa Khalid Hasan[6], Srour Mohammed Ahmed[7]

[1]University Dhi Qar, College of Science/ Chemistry Department, Iraq

[2,3,7]Tikrit University, College of Science, Department of Biology, Microbiology, Iraq

[4]University of Samarra, College of Aplied Sciences/ Department of Pathological Analysis, Iraq

[5]University of Al-Qadisiyah, College of Sciences, Department of Chemistry, Iraq

[6]Samarra University/ College of Applied Science, Department of Pathological Analysis, Iraq

Abstract:

The present study was include elect a group of heart disease medicine that use to treatment people with heart diseases and the most common drugs in Heart diseases hospital (Propanolol) to study their effect on sex hormones in both sexes.The current study also included 60 patients with heart disease, including 20 males and 20 females. 20 controls 10 of each sex. The high concentration of FSH, LH, Prolactin Estradiol, and Progesterone were detected in male of patients and increased significantly, in contrast the lowa concentrations were detected in male of control, also a significant differences were recorded between patients groups and control groups, with except Estradiol not sign difference between patients and between control according to gender. While Testosterone concentration decreased in male of control, and increased significantly in female of patients. The hematological parameters included in the current study were recorded. A significant difference in Hb level and HCT was detected within patients, and within control, and non-significant differences between patients and control within the same sex, the number of WBC and PLT were recorded as non significant differences within patients, within control, and between patient and group of control.

Keywords: Cardiovascular disease(CVD), Sex Hormonal Imbalance, Patients

Corresponding Author: Safaa Adnan Khalaf Abboud†, University Dhi Qar, College of Science/ Chemistry Department, Iraq

Introduction

Ischemic heart disease (IHD) is the number one cause of death worldwide, accounting for more than 9 million deaths (47% women) in 2016 according to the World Health Organization. It is affect both men and women and increases with age (WHO, 2019, 2016; Nowbar et al.,2019. The most common pathophysiologic process behind ischemia in the myocardium is disease in the coronary arteries (CAD) as an effect of atherosclerosis (Roger et al., 2012). Oxygen and nutrients, which are required for normal heart function, are supplied to the myocardium (the muscular tissue responsible for the contraction of the heart) by the blood traveling through the coronary arteries. If a coronary artery becomes narrowed or occluded owing to the build-up of plaque (e.g. calcium, fat and cholesterol), the amount of blood flowing to the myocardium is reduced and, thus, less oxygen and nutrients are delivered to these myocardial regions. The restriction in blood and oxygen is called ischemia; atherosclerosis is the condition in which plaques build-up in the coronary artery, and the narrowing of a vessel is referred to as stenosis. (Virmani et al., 2006; Achenbach, 2008.(Hypertension, the most common modifiable risk factor for all-cause mortality and morbidity worldwide, its prevalence rate is 29.2% among males and 24.8% among females (Kang and Park, 2016.(In recent years, greater attention has been placed on the impact of biological sex and hormonal status with regard to predisposition for cardiovascular disease (CVD) and response to therapy. Women generally have a lower risk for developing (Mozaffarian et al.,2016.(CVD compared with men of similar age, but this protection is lost during menopause. (Pérez-López et al.,2009), suggesting the importance of sex steroid hormone signaling. Although estrogens are viewed as female sex hormones and androgens are viewed as male sex hormones, estrogen and androgen signaling govern a multitude of physiological processes in both women and men. Cardiovascular cells contain functional estrogen, progesterone and androgen receptors and are targets for sex hormone action, which can influence many physiological and pathological processes, including vascular and myocardial cell homeostasis (Pierdominici et al., 2011. Antihypertensive drugs are prescribed mainly to reduce the morbidity and mortality caused by hypertension and its complications. Many a time, patients require more than one drug for effective control of hypertension. Various classes of antihypertensive drugs like diuretics, inhibitors of the renin-angiotensin system, calcium channel blockers (CCB) and beta blockers (BB) have been shown to reduce complications of hypertension and may be used for initial drug therapy (Baigent et al., 2009). Clinical evidence suggests that lowering blood pressure (BP) with antihypertensive drugs reduces the risk of myocardial infarction, stroke, heart failure in hypertensive patients (James et al., 2014.

Aim of the Study

- Evaluation the levels Sex hormones (testosterone, FSH, LH and Estradiol) and study effect cardiovascular disease on level and activity of sex hormones .
- Evaluate the physiological effect of cardiac drugs such as Propanol on sex hormone activity in both sexes to assess the effect of treatments. the level and efficacy of sex hormones.

The Heart

The heart is a muscular organ that pumps blood throughout the body. It is located in the middle cavity of the chest, between the lungs. In most people, the heart is located on the left side of the chest, beneath the breastbone the heart is about the size of a closed fist, weighs between 250 and 350 g, and beats approximately 100,000 times a day and 2.5 billion times during an average lifetime. The muscular heart consists of two atria and two ventricles. The atria are upper receiving chambers for returning venous blood. The ventricles comprise most of the heart's volume, lie below the atria, and pump blood from the heart into the lungs and arteries. Deoxygenated blood enters the right atrium, flows into the right ventricle, and is pumped to the lungs via the pulmonary arteries, where wastes are removed and oxygen is replaced. Oxygenated blood is transported through the pulmonary veins to the left atrium and enters the left ventricle. When the left ventricle contracts, blood is ejected through the aorta to the arterial system (Marieb and

Hoehn, 2007; Tortora and Derrickson, 2018. The heart is one of the most vital and delicate organs in the body. If it does not function properly, all other organs - including the brain begin to die from lack of oxygen within just a few minutes (Moore et al.,2018)

Cardiovascular disease(CVD)

Cardiovascular disease refers to a group of diseases that affect the heart, brain, or blood vessels. Cardiovascular disease can broadly be sub-classified into stroke, heart failure, coronary artery disease (which includes myocardial infarction and angina pectoris), peripheral artery disease, and cardiomyopathies, among others. Cardiovascular disease accounted for one third of all deaths in 2017.(Roth et al., 2018) and the burden is expected to increase due to an aging population, sedentary lifestyle, and poor diet. (Ingelsson, 2014)

Major risk factors for cardiovascular diseases:

Family history of cardiovascular disease

Family history of cardiovascular disease is a risk factor for the presence of coronary heart disease, and may be used to identify younger patients who may benefit from early intervention (Kones, 2011). Family history is considered coronary heart disease in a first-degree relative (parent, sibling, or offspring) (NCEP, 2002). Among adults in the United States 20 years and older, 12.6% reported a parent or sibling that had a myocardial infarction or angina prior to the age of 50 (Schmid et al., 2015)

Age

Already in the 17th century, Thomas Sydenham, an English physician remarked that "a man is as old as his arteries". Various physiological processes in the human body deteriorate along with ageing (Cecelja and Chowienczyk, 2012. Also in the vasculature, a gradual change in the structural and functional properties of blood vessels are seen with increasing age (Kotsis et al., 2011(). Differentiation of vascular smooth muscle cells from a contractile to a secretory or osteogenic phenotype may lead to increased vascular tone and increased arterial wall calcification (Van Varik et al., 2012). Changes in the vasculature of elderly people seem to be more substantial in the presence of hypertension or atherosclerosis at an earlier age (Parkand Lakatta, 2012). This finding led to the development of a pathophysiological concept called early vascular ageing (EVA) (Nilsson, 2014.

Sex

Sex differences exist in CVD and cardiovascular function (Hayward et al., 2000). Due to factors such as body size, sex hormones and the mechanical properties of arteries, the progression of large artery stiffness may differ for men and women (Rossi et al., 2011). Furthermore, sex differences in the manifestation of obesity, low-grade inflammation, fibrosis and endothelial dysfunction could contribute to sex disparities in arterial stiffness beyond the differences accounted for by body size and age (Duprez and Jacobs, 2012(. While CVD risk in men develops linearly across the lifespan women experience a sharp increase in CVD risk at the onset of menopause (Narkiewicz et al., 2006.

Hypertension

hypertension constitutes a major determinant of the overall risk of CVD (Yusuf et al., 2004). Blood pressure is the force that blood exerts against a unit area of the vessel wall and it is measured in millimetres mercury (mmHg)(Guyton and John, 2011). Or is defined as an average systolic blood pressure greater than or equal to140 mmHg or an average diastolic blood pressure of greater than or equal to 90 mmHg (Coulter, 2011). Hypertension, the syndrome denoting high blood pressure, is associated with damage to the vasculature, kidneys, heart and brain, which may lead to premature morbidity and mortality(Giles et al., 2005; World Health Organization, 2013.

Smoking

The devastating effects of smoking on the body, in particular on the cardiovascular system, are well known. Smoking is regarded as the most important preventable risk factor for cardiovascular disease (Anderson et al., 2013) with cessation significantly reducing the risk of coronary heart disease and cardiovascular disease morbidity and mortality. Of the 5 million deaths caused by tobacco, approximately 1.6 million are CVD related (Lewis et al., 2012),

Physical Inactivity

Physical activity is an integral part of weight reduction but more importantly physical inactivity and a sedentary lifestyle are closely linked to an elevated risk of CV mortality (Richardson et al., 2004; Warren et al., 2010). The American Heart Association recommends at least 150 minutes of moderate exercise per week or 75 minutes per week of vigorous exercise to promote cardiovascular fitness, since regular physical activity reduces the risk of dying from CVD (Barnes et al., 2010 .

Overweight or Obesity

The terms "overweight" and "obesity" refer to a person's overall body weight. The NIH defines "overweight" as having extra body weight from muscle, bone, fat, and/or water and "obesity" as having a high amount of extra body fat (Centers for Disease Control and Prevention, 2011). Obesity can have significant effects on the body, especially the cardiovascular system; coronary heart disease, hypertension, and stroke are some of the major effects of obesity One widely used measure of whether an individual is overweight or obese is body mass index (BMI). BMI is based on height and weight and can be used for men and women of all ages obesity has been associated with all-cause mortality and several established CV risk factors and its high prevalence has been described as a modern global epidemic (Prospective Studies Collaboration, 2009; Pack et al., 2014.

Diet

Dietary patterns have been studied extensively, -called Mediterranean diet (including vegetables, fruits, unsaturated fatty acids, fish, wholegrain, nuts, and a low intake of red meats) may be beneficial in patients with CHD (Mihaylova et al.,2012

Sex hormones

A hormone is a chemical messenger produced in one cell or gland that affects the function of its target cell or organ in another part of the body. The term hormone is derived from the Greek word 'horme' meaning 'impulse'. The major reproductive hormones, also termed sex hormones, control the growth and function of the reproductive organs and the development of secondary sex characteristics (Shah, 2015). Oestrogens and progestogens are typically referred to as female sex hormones while androgens are termed male sex hormones. However, these hormones are present in both sexes but at different concentrations, also varying with age and phases of menstrual cycle in females (Barton and Charlesworth, 1998

Role of sex hormones in adult physiology

Androgens and oestrogens are present in both sexes but at different concentrations and there are temporal changes in concentrations as well e.g. during menstrual cycle, menopause. Further, sex hormone receptors are distributed in reproductive (including testes, prostate, uterus, ovaries) as well as many non-reproductive organs e.g. brain, bone, heart etc (Michael et al., 2005). The biological role of sex hormones in adults is therefore, not limited to reproduction and they affect all tissues where their receptors are distributed (Shirtcliff et al., 2009),

Sex hormones and Cardiovascular system

The expression of ERs and AR in hearts and blood vessels suggests a role of sex hormones in cardiovascular system (CVS) physiology (Luczak and Leinwand, 2010). Studies have demonstrated an atheroprotective role of oestrogen, facilitated by its beneficial effects on lipid profile (reduced low- density lipoprotein and elevated high-density lipoprotein) as well by its mediation of vasodilation through increased production of nitric oxide and decreased production of endothelin-1 from arterial endothelium and decreased intracellular calcium in arterial smooth muscle (Bharthi et al., 2017). Premenopausal women have a relatively lower incidence of CVS disease than age matched men but the rates become similar with the loss of oestrogen in postmenopausal women (Bracamonte and Miller, 2001.(

The role of androgens in CVS physiology is complex and far less studied than oestrogen. Androgens have been associated with atherosclerotic CVS disease in men through their adverse effects on lipids metabolism and hypertension (Liu et al.,2003). Conversely, the gradual decline in androgen levels in elderly males as a result of the ageing process has also been linked to hypertension, diabetes and atherosclerosis (Ling et al., 2009). Studies using

anabolic steroids have suggested detrimental effects of testosterone on heart function, showing it to be associated with cardiac hypertrophy, impaired cardiac function and an increased risk of myocardial infarction However, studies of long-term testosterone replacement in hypogonadal elderly men have demonstrated reduced risk of CVS morbidity and mortality (Haring, 2012)

Propanolol drug

Propranolol, sold under the brand name Inderal among others, is a medication of the beta blocker class. It is used to treat high blood pressure, a number of types of irregular heart rate, capillary hemangiomas, performance anxiety, and essential tremor (Steenen et al., 2016) .It is used to prevent further heart problems in those with angina or previous heart attacks. It can be taken by mouth or by injection into a vein (Schraufnagel et al., 2008)

Common side effects include nausea, abdominal pain, and constipation. It is a non-selective beta blocker which works by blocking ß-adrenergic receptors (Chinnadurai et al., 2016.

Materials and Method

Materials

Equipment and Instruments

The instruments and equipment have been used in this study are listed in table (3-1)

Table (1): The equipment and instruments that used in this study with their companies and countries of origin.

No.	Instrument	Company and Origin
1	Centrifuge	Hettich / Germany
2	Rolling Mixer (Tube sheaker)	Aspania
3	Hematology analyzer (Coulter)	Sysmex/ Germany
4	Printer	DCP-T310 (Brother)
5	Spectrophotometer	UNICO/ Germany
6	Kit FSH	Homburg-Germany.
7	Kit LH	Homburg-Germany.
8	Kit Estradiol	Homburg-Germany
9	Kit Testosterone	Homburg-Germany
10	Refrigerator	Concord /Lebanon
11	Fully-auto chemiluminescence immunoassay analyzer	MAGLUMI / London
12	Timer watch	Korea
13	Freezing Drier	Concord /Lebanon

Table (2): Materials that used in this study with their companies and countries of origin.

No.	Materials	Company and Origin
1	Disinfectant(Alcohols)	Turkey
2	Tourniquet	Turkey
3	Cotton	Turkey
4	Disposable syringe 5µL	Sterile EO. / China
5	Adhesive wounds	Turkey
6	Gloves,Mask	Mac / China
7	Eppendorf tubes	Sterellin Ltd. UK
8	Marker	Deli /China
9	EDTA Blood collection tube	Sun / Jourdan
10	Gel tube	Sun / Jourdan
11	Micropipettes 10-100µL, µL100-1000µL	Brand /Germany
12	Rack	China
13	Micropipette tips	Sterellin Ltd. / UK
14	Stickers	Mac / China
15	Sterile test tube	Sterile EO. / China

Method

Study population

This study has been conducted on a group of patients at Heart Diseases Hospital - during the period from November 2023 to March 2024. The target population was 60 samples which were include (40) patients who are already diagnosed as (IHD) patients by the consultant medical staff in the Heart-Center with age ranged (20-65) year and Control group is composed of (20) healthy people with the same age range and both divided into two groups (men) and (women). the practical side was completed in the Clinical Biochemistry and the blood diseases Laboratories at Heart Diseases Hospital. A total number of the present study includes 60 persons that were divided into three groups based on age categories:

- The first age group (men and women (married) involved persons with range ages of 20 to 35 years.
- The second age group (both gender married) included persons with range ages of 36 to 50 years.
- The third age group (both gender married) included persons with range ages of 51 to 65 years.

Collection of Blood samples

Blood samples (5 ml) were obtained after 9-12 hours of fasting were obtained from by vein puncture using a sterile disposable syringe from patients and the control group. The samples were separated individed to two parts groups, the first group samples for the purpose of testing complete blood count. the second group for the purpose of testing hormones, the blood designed to study hormones, was dispensed in a gel tube and left for 10 minutes at room temperature to clotting sample. Then, it was centrifuged at 5000 rpm for 10 minutes to collect serum and kept in the freezer (- 20 C) until use unless used immediately to analyze hormonal parameters.

Complete Blood Count test (CBC)

The complete blood count (CBC) is one of the most commonly ordered blood tests, the complete blood count is the calculation of the cellular (formed elements) of blood, these calculations are generally determined by special machines that analyze the different blood in less than a minute, a major portion of the complete blood count is the measure of the concentration of white blood cells, red blood cells, and platelets in the blood. (CBC) test was performed by obtaining a few milliliters of blood sample directly from patients with heart diseases.

The Measurement of Some Serum Hormone Concentrations

The Hormones concentration (Testosterone, FSH, E2 and LH) are Measurement by a system fully automated quantitative test for use with Auto analyzer MAGLUMI instruments were used for the determination of (Testosterone, FSH, E2 and LH) in human serum using chemiluminescence immunoassay technology

Estimation of Luteinizing Hormone (LH) Concentration (pg/mL)

The kit is an in vitro chemiluminescence immunoassay, for the quantitative determination of Luteinizing Hormone (LH) in human serum with the MAGLUMI series Fully-autochemiluminescence immunoassay analyzer.

Procedure:

Preparation of the Reagent

Resuspension of the magnetic microbeads takes place automatically when the kit is loaded successfully, ensuring the magnetic microbeads are totally Resuspension homogenous prior to use.

To ensure proper test performance, strictly adhere to the operating instructions of MAGLUMI series Fully-autochemiluminescence immunoassay analyzer. Each test parameter is identified via a RFID CHIP on the Reagent kit.

The Result

Calculation of Results

The analyzer automatically Calculates the LH concentration of each sample by means of a calibration curve which is generated by a 2-point calibration master curve procedure. The results are reported in the unit of mlU/mL.

Estimation of Testosterone Hormone Concentration (ng/mL.(

The kit is an in vitro chemiluminescence immunoassay, for the quantitative determination of Testosterone in human serum with the MAGLUMI series Fully-autochemiluminescence immunoassay analyzer.

Procedure

Preparation of the Reagent

Resuspension of the magnetic microbeads takes place automatically when the kit is loaded successfully,ensuring the magnetic microbeads are totally Resuspension homogenous prior to use.

To ensure proper test performance, strictly adhere to the operating instructions of MAGLUMI series Fully-autochemiluminescence immunoassay analyzer. Each test parameter is identified via a RFID CHIP on the Reagent kit.

The result

Calculation of Results

The analyzer automatically Calculates the Estradiol concentration in each sample by means of a calibration curve which is generated by a 2-point calibration master curve procedure The results are expressed in pg/mL Conversion factor:pg/mL*3.67=pmol/L..

Statistical Analysis

The data of the current study was statically analysis using SPSS (statistical Package of Sociot Science version 25) based on using one way (ANOVA) for median variation,least significant difference, independent T-test and person correlation at P. value >0.05.

Results and Discussion

Concentration of FSH, LH, Estradiol and Testosterone in Patients and Control according to Gender

The results of current study recorded that their where a significant difference was detected in concentration of FSH and LH within patients and between patient male and control, and non-significant differences between control according to gender.

The concentration of estradiol was recorded a significant differences within patients and within control and between patient and control at P. value < 0.05.

Table 1. Concentration of FSH, LH, estradiol and Testosterone in patients and control.

Gender / Parameters	Male / female				P. value	LSD
	Patient	Patient	Control	Control		
FSH	43.8 ± 15.7^{b}	6.70 ± 2.23^{a}	3.55 ± 1.81^{a}	4.86 ± 1.77^{a}	< 0.01	4.1/5.0/NS
LH	20.8 ± 5.80^{c}	8.20 ± 3.57^{b}	5.71 ± 1.94^{a}	6.87 ± 2.53^{ab}	< 0.01	1.8/2.2/NS
Testosterone	0.78 ± 0.31^{a}	2.13 ± 0.75^{c}	0.70 ± 0.33^{a}	1.29 ± 0.80^{b}	< 0.01	.23/.29/.33
Estradiol	45.1 ± 16.2^{b}	43.6 ± 11.9^{b}	25.6 ± 4.81^{a}	41.2 ± 14.5^{b}	< 0.01	5.7/7.0/8.1
Patient male = 20, Patient female = 20 : Control male = 10, Control female = 10						

Concentration of Hematological Parameters in Patients and Control according to Gender

The results of current study recorded that their where a significant difference was detected in level of Hb and percentage of HCT within patients,and within control, and non-significant differences between patients and control within same gender. The count of WBC and PLT was recorded a non-significant differences within patients and within control and between patient and control at P. value < 0.05.

Table 2: Concentration of hematological parameters in patients and control

Gender / Parameters	Male / female				P. value	LSD
	Patient	Patient	Control	Control		
Hb	13.1 ± 1.38[b]	12.1 ± 1.70[a]	13.4 ± 1.59[b]	12.3 ± 1.58[a]	< 0.01	.69 /.85 /.97
PCV	40.4 ± 4.14[b]	37.5 ± 5.10[a]	39.6 ± 4.59[b]	35.7 ± 3.67[a]	< 0.01	2.0 / 2.4 / 2.8
PLT	284.9 ± 63.1[a]	275.1 ± 79.6[a]	239.2 ± 58.8[a]	261.6 ± 67.2[a]	0.203	Non-Sig
WBCs	8.26 ± 2.65[a]	8.02 ± 1.71[a]	7.49 ± 2.01[a]	7.48 ± 1.84[a]	0.431	Non-Sig
Patient male = 20, Patient female = 20 : Control male = 10, Control female = 10						

Concentration of FSH in Patients and Control According to Age group and Gender

The results of indicated that their where the concentration increased in the second age group, and significantly decreased in the control group in both gender male and female.

The results also recorded a significant differences between male and female within same age group.

Table 3: Concentration of FSH in patients and control.

Gender / FSH	Cases No.	Mean + SD		T test P. value
		Male	Female	
1st Age Group	8 / 9	43.8 ± 16.6[b]	6.38 ± 2.1[ab]	< 0.01
2nd Age group	14 / 16	45.4 ± 19.4[b]	7.06 ± 2.2[b]	< 0.01
3rd Age Group	18 / 15	42.5 ± 12.7[b]	6.50 ± 2.3[b]	< 0.01
Control	10 / 10	3.55 ± 1.8[a]	4.86 ± 1.7[a]	< 0.05
P. value		< 0.01	< 0.05	
LSD		N.S / N.S / 11.0 /N.S / 9.2 / 8.5	N.S/ N.S/ N.S / N.S / 1.4/ 1.3	
1st Age G = 20-35 year, 2nd Age G = 36-50 year, 3rd Age G= 51-65 year Age mean + SD = 47.2 ± 10.5, Max Age = 65 year, Min Age = 20 year				

Concentration of Testosterone in Patients and Control According to Age group and Gender

The results of indicated that their where the concentration significantly increased in control group, and significantly decreased in all groups of patient

in male group, while decreased significant in control groups in groups of female and increased significantly in age groups of patients.

The results also recorded a significant differences between male and female within same age group.

Table 4: Concentration of testosterone in patients and control.

Gender Testosterone	Cases No.	Mean + SD		t test P. value
		Male	Female	
1st Age Group	8 / 9	0.69 ± 0.31^{a}	2.56 ± 0.62^{c}	< 0.01
2nd Age group	14 / 16	0.83 ± 0.23^{a}	1.99 ± 0.78^{b}	< 0.01
3rd Age Group	18 / 15	0.78 ± 0.38^{a}	2.01 ± 0.74^{b}	< 0.01
Control	10 / 10	1.25 ± 0.46^{b}	0.70 ± 0.33^{a}	< 0.01
P. value		< 0.01	< 0.01	
LSD		N.S/ N.S/ 0.31 / N.S/ 0.26/ 0.24	0.5/ 0.53/ 0.50 / N.S/ 0.42/ 0.43	

Concentration of Estradiol in Patients and Control According to Age group and Gender.

The results of recorded that their where the concentration significantly increased in all patient groups, and significantly decreased in control group in male group, while non- significant was noted between control and patient in groups of. The results also recorded a significant differences between male and female within same age group.

Table 5: Concentration of estradiol in patients and control.

Gender Estradiol	Cases No.	Mean + SD		t test P. value
		Male	Female	
1st Age Group	8 / 9	45.0 ± 16.8^{b}	42.8 ± 14.9^{a}	0.783
2nd Age group	14 / 16	40.4 ± 10.2^{b}	46.1 ± 12.8^{a}	0.192
3rd Age Group	18 / 15	48.8 ± 19.2^{b}	41.3 ± 8.89^{a}	0.177
Control	10 / 10	25.6 ± 4.8^{a}	41.2 ± 13.1^{a}	< 0.01
P. value		< 0.01	0.642	
LSD		N.S/ N.S/ 11.3 / N.S/ 9.4/ 8.7	Non-Sig	

Discussion

Hormones Disturbance and Cardiovascular Disease

Follicle Stimulation Hormone and Estradiol

The pathways by which premenopausal-estrogen reduces the development of atherosclerosis are thought to be related in part to the well-established roles of endogenous estrogen in improving the lipid/lipoprotein profile, endothelial function, and arterial vasodilation, and a potential independent role of lifetime exposure to high or increasing FSH, a cardinal marker of menopause, on the vasculature (Ouyang et al., 2016). The High estrogen-early decline group had a better CVD risk profile at both baseline and visit. Adjusting for baseline risk factors rather than those from visit 12 did not change our findings, suggesting that atherosclerosis present after menopause could potentially be influenced by the premenopausal-estrogen exposure independent of CVD risk factors (D'urzo, 2016(

The concentration of follicle stimulation hormone was increased significantly in male patients than female and with both male and female control, while their level not recorded difference between patient female with both categories of control, and not significant within control gender. According to age groups and gender their level has not significant difference in both male and female, but was recorded highly significant difference between male and female within same age group.

The concentration of estradiol was non-significantly increased in male and female patients compare with female of control, while their level recorded significant difference between patient female, female and female control compare with control male. According to age groups and gender their level has not significant difference in both male and female, also was recorded non- significant difference between male and female within same age group. Previous study was performed by Wang et al., (2017), in China, their study included association between sex hormones with cardiovascular risk factors, their results show the concentration of FSH was decreased in women with heart disease for ten years, who are taking heart disease treatments. The study of Khoudary et al., (2017), their study included estradiol and FSH pathways during the transition to menopause and early signs of postmenopausal atherosclerosis, and show women with higher estradiol levels before their menopause, but lower estradiol thereafter, also show women with low FSH rise over their menopause transition may be at lower risk of atherosclerosis than women with medium or high FSH rises.

Testosterone and Luteinizing Hormone

The result of this study indicated that a non-significant increase of testosterone hormone in the male of patients compare with male control, and significant increase in female of patients compare with female control, according to age groups and gender, in age group the hormone increased significantly in the first and second age group of female and decreased in the first age group of patient, according to gender the level of the hormone increased in all age group of female compare with matching groups of male. The luteinizing hormone increased significantly in male of patients compare with other patients and both control categories, also reutilizing hormone increased significantly in female of patients compare with both control categories, whereas non-significant was noted between control groups, according to age groups and gender, in age group the hormone increased significantly in the first age group of male and second age group of female and decreased in the control, according to gender the level of the hormone increased in all age group of male compare with matching groups of female.

The previous study of Qu et al., (2021), in China, their study involved association of testosterone and luteinizing hormone with blood pressure and risk of cardiovascular disease, and their study finding the testosterone hormone was significantly decreased with grade two of high-blood pressure patients compare with other categories of patients with grade one and slightly increased blood pressure, the luteinizing hormone increase in patient with high blood pressure, also noted a total testosterone and free testosterone were inversely associated with the prevalence of hypertension, age >65 years or body mass index ≥ 24 negatively impacted the inverse correlation between testosterone levels and hypertension, whereas smoking and family history of hypertension strengthened the correlation, with grade two hypertension, a total testosterone was positively associated with the presence of stroke, and luteinizing hormone was also positively correlated with cardiovascular and cerebrovascular diseases.

Conclusion

The current study concluded the following:

- The FSH, Estradiol and LH hormone increase significantly in male patients, and decreased in male control.

- The testosterone hormone increased significantly in female of control, and decreased significantly in male of control.
- The hematological parameters Hb and PCV increased in male of patients than control.

Recommendation

- The study recommends conducting additional studies related to the incidence of the disease and its relationship to race.
- .The study recommends conducting a study related to nerve impulses and their role in increasing fat and the effect of the latter on hormones
- Healthy nutrition is the best solution to maintain a healthy body.

REFERENCES

1. Baigent, C., Blackwell, L., Collins, R., Emberson, J., Godwin, J., Peto, R., and Zanchetti, A. (2009). Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials. Lancet, 373(9678), 1849-1860.
2. Cecelja, M., and Chowienczyk, P. (2012). Role of arterial stiffness in cardiovascular disease. JRSM cardiovascular disease, 1(4), 1-10.
3. Duprez, D., and Jacobs Jr, D. R. (2012). Arterial stiffness and left ventricular diastolic function: does sex matter?. Hypertension, 60(2), 283- 284.
4. D'Urzo, K. A. (2016). Does estrogen fluctuation throughout the menstrual cycle impact flow-mediated dilation during exercise in healthy premenopausal women? (Doctoral dissertation, Queen's University (Canada.((
5. Hayward, C.S., R.P. Kelly, and P. Collins. (2000). The roles of gender, the menopause and hormone replacement on cardiovascular function. Cardiovascular Research. 46: p. 28-49.
6. Ingelsson, E. (2014). The grand challenge of cardiovascular epidemiology: turning the tide. Frontiers in cardiovascular medicine, 1, 2.
7. James, P. A., Oparil, S., Carter, B. L., Cushman, W. C., Dennison- Himmelfarb, C., Handler, J., and Ortiz, E. (2014). 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). Jama, 311(5), 507-520.
8. Kang, H., and Park, H. A. (2016). A mobile app for hypertension management based on clinical practice guidelines: development and deployment. JMIR mHealth and uHealth, 4(1), e4966.
9. Kones, R. (2011). Primary prevention of coronary heart disease: integration of new data, evolving views, revised goals, and role of rosuvastatin in management. A comprehensive survey. Drug design, development and therapy, 5, 325.
10. Kotsis, V., Stabouli, S., Karafillis, I., and Nilsson, P. (2011). Early vascular aging and the role of central blood pressure. Journal of hypertension, 29(10), 1847-1853.
11. Marieb, E. N., and Hoehn, K. (2007). Human anatomy and physiology. Pearson education.
12. Moore, K. L., and Dalley, A. F. (2018). Clinically oriented anatomy. Wolters kluwer india Pvt Ltd.
13. Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., and McGuire, D. K. (2016). American heart association statistics committee; Stroke statistics subcommittee. Heart disease and stroke statistics-2016 update: a report from the American Heart Association. Circulation, 133(4), e38-e60.
14. Narkiewicz, K., Kjeldsen, S. E., and Hedner, T. (2006). Hypertension and cardiovascular disease in women: Progress towards better understanding of gender-specific differences?. Blood pressure, 15(2), 68- 70.

15. Nilsson, P. M. (2014). Hemodynamic aging as the consequence of structural changes associated with early vascular aging (EVA). Aging and disease, 5(2), 109.

16. Ouyang, P., Wenger, N. K., Taylor, D., Rich-Edwards, J. W., Steiner, M., Shaw, L. J., Berga, S. L., Miller, V. M. and Merz, N. B. (2016). Strategies and methods to study female-specific cardiovascular health and disease: A guide for clinical scientists. Biology of Sex Differences, 24-1

17. Park, S., and Lakatta, E. G. (2012). Role of inflammation in the pathogenesis of arterial stiffness. Yonsei medical journal, 53(2), 258-261.

18. Pérez-López, F. R., Chedraui, P., Gilbert, J. J., and Pérez-Roncero, G. (2009). Cardiovascular risk in menopausal women and prevalent related co-morbid conditions: facing the post-Women's Health Initiative era. Fertility and sterility, 92(4), 1171-1186.

19. Pierdominici, M., Ortona, E., Franconi, F., Caprio, M., Straface, E., and Malorni, W. (2011). Gender specific aspects of cell death in the cardiovascular system. Current pharmaceutical design, 17(11), 1046- 1055.

20. Qu, M., Feng, C., Wang, X., Gu, Y., Shang, X., Zhou, Y., Xiong, C. and Li, H. (2021). Association of serum testosterone and luteinizing hormone with blood pressure and risk of cardiovascular disease in middle-aged and elderly men. Journal of the American Heart Association, 10(7), 1-11.

21. Roger, V. L. (2012). Go AS Lloyd-Jones DM Benjamin EJ Berry JD Borden WB Bravata DM Dai S Ford ES Fox CS Fullerton HJ Gillespie C Hailpern SM Heit JA Howard VJ Kissela BM Kittner SJ Lackland DT Lichtman JH Lisabeth LD Makuc DM Marcus GM Marelli A Matchar DB Moy CS Mozaffarian D Mussolino ME Nichol G Paynter NP Soliman EZ Sorlie PD Sotoodehnia N Turan TN Virani SS Wong ND Woo D Turner MB. Heart disease and stroke statistics-2012 update: a report from the American Heart Association Circulation, 125, e2.

22. Rossi, P., Francès, Y., Kingwell, B. A., and Ahimastos, A. A. (2011.(Gender differences in artery wall biomechanical properties throughout life. Journal of hypertension, 29(6), 1023-1033. 7.

23. Roth, G. A., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., and Borschmann, R. (2018). Global, regional, and national age-sex- specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet, 392(10159), 1736-1788.

24. Schmid, A. A., Arnold, S. E., Jones, V. A., Ritter, M. J., Sapp, S. A., and Van Puymbroeck, M. (2015). Fear of falling in people with chronic stroke. American Journal 6903350020p1-6903350020p5. of Occupational Therapy, 69(3(

25. Van Varik, B., Rennenberg, R., Reutelingsperger, C., Kroon, A., de Leeuw, P., and Schurgers, L. J. (2012). Mechanisms of arterial remodeling: lessons from genetic diseases. Frontiers in genetics, 3, 290.

26. Virmani, R., Burke, A. P., Farb, A., and Kolodgie, F. D. (2006). Pathology of the vulnerable plaque. Journal of the American College of Cardiology, 47(8S), C13-C18.

27. World Health Organization. (2019). Suicide in the world: global health estimates (No. WHO/MSD/MER/19.3). World Health Organization.

28. Yusuf, S., Hawken, S., Õunpuu, S., Dans, T., Avezum, A., Lanas, F., and Interheart Study Investigators. (2004). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. The lancet, 364(9438), 937-952.