Effect of Contraceptives on Serum Lipid Profile

A thesis submitted in partial fulfillment for the requirements of Master Degree in Laboratory Sciences (Clinical Chemistry)

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2018
الأية

قال تعالى:

«اقرأ باسم ربك الذي خلق خلق الإنسان من علق اقرأ وربك الأكرم الذي علم بالقلم علم الإنسان ما لم تعلم»

سورة العلق – الآية (1-5)
Dedication

To those

Who give me the best of life without payment

To my mother for their patience and Support

To my Brothers my teachers and all my friends
Acknowledgment

All thanks to Allah from the start to the end ...

And pray for prophet Mohammed peace be up on him

I would like to acknowledge the contribution of my 

Supervisor:

Dr: Haj Hamad Allzain Mohamed Bulla

Who guide me throughout my way and helped me to make this 

research as accurate and useful as possible.

And I'm grateful to my friends and all those who contributed 

Their time and helped me.

My thanks also extend to my teachers
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<tr>
<td>AIDS</td>
<td>Acquired immunodeficiency syndrome</td>
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<tr>
<td>ATP</td>
<td>Adenine triphosphate</td>
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<tr>
<td>COCPs</td>
<td>Combined oral contraceptive pills</td>
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<tr>
<td>COC</td>
<td>Combined oral contraceptive</td>
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<tr>
<td>CIC</td>
<td>Combined injectable contraceptive</td>
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<tr>
<td>DMPA</td>
<td>Depot medroxy progesterone acetate</td>
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<tr>
<td>EC</td>
<td>Emergency contraceptive</td>
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<tr>
<td>FSH</td>
<td>Follicle stimulating hormone</td>
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<tr>
<td>FAB</td>
<td>Fertility awareness based methods</td>
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<tr>
<td>HDL</td>
<td>High density lipoprotein</td>
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<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
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<tr>
<td>HMG-CoA</td>
<td>B-hydroxyl B-methyl glutaryl CoA</td>
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<tr>
<td>IDL</td>
<td>Intermediate density lipoprotein</td>
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<tr>
<td>IUD</td>
<td>Intrauterine device</td>
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<tr>
<td>IUS</td>
<td>Intrauterine system</td>
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<tr>
<td>LAM</td>
<td>Lactation amenorrhea</td>
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<tr>
<td>LNG</td>
<td>Levonorgestrel</td>
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<tr>
<td>LNG IUD</td>
<td>Levonorgestrel Intrauterine device</td>
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<tr>
<td>LH</td>
<td>Luteinizing hormone</td>
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<tr>
<td>LDL</td>
<td>Low density lipoprotein</td>
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<tr>
<td>Mg/dl</td>
<td>Milligram per deciliter</td>
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<tr>
<td>NET</td>
<td>Norethisterone</td>
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<tr>
<td>OD</td>
<td>Optical density</td>
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<tr>
<td>POD</td>
<td>Peroxidase</td>
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<tr>
<td>POP</td>
<td>Progesterone only pill</td>
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<tr>
<td>S. cholesterol</td>
<td>Serum cholesterol</td>
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<tr>
<td>S. triglycerides</td>
<td>Serum triglycerides</td>
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<td>SPSS</td>
<td>Statistical Package for social science</td>
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<tr>
<td>STD</td>
<td>Standard</td>
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<tr>
<td>VLDL</td>
<td>Very low density lipoprotein</td>
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<td>VTE</td>
<td>Venous thromboembolism</td>
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Abstract
This is a case control study conducted in Shendi city in the period between March to August, 2018, to compare total cholesterol, triglycerides, HDL-c and LDL-c between women using hormonal contraceptives and women who are not.

The study include 40 of venous blood sample were obtained from apparently healthy women using hormonal contraceptives as case group, and 20 of venous sample blood were obtained from apparently healthy women who not using as control group.

Statistical analysis was done by using SPSS showed a significant increase in means of serum levels of total cholesterol, triglycerides, low density lipoprotein cholesterol and decrease of high density lipoprotein cholesterol of test group when compared to control group.

The study show slightly increases in serum of total cholesterol 169.8mg/dl, triglycerides 120mg/dl, low density lipoprotein cholesterol 89.7mg/dl with Age group 20-39years old.

The study show slightly increase in serum of total cholesterol 171.6mg/dl, triglycerides 123.82mg/dl, low density lipoprotein cholesterol 91.53mg/dl with combined oral contraceptives.

Also slightly increase in serum of total cholesterol 170.7mg/dl, triglycerides 123.47mg/dl, low density lipoprotein cholesterol 88.7mg/dl with increase duration of intake. and show slightly increase in serum of total cholesterol 169.78mg/dl, triglycerides 123.47mg/dl, low density lipoprotein cholesterol 90.65mg/dl with parity >5.
الملخص

أجريت هذه الدراسة المقطوعة بمدينة شندي في الفترة ما بين مارس حتى أغسطس (2018) لمقارنة الكولسترول الكلي، ثلاثي الجلسراد، كولسترول البروتينات الدهنية عالية الكثافة، وكولسترول البروتينات الدهنية منخفضة الكثافة بين النساء اللاتي يستخدمن هرمون منع الحمل والنساء اللاتي لا يستخدمن هرمون منع الحمل كمجموعة ضابطة.

اشتملت الدراسة على 40 عينة دم وريدي من نساء أصحاء يستخدمن هرمون من الحمل و200 عينة من نساء لا يستخدمن هرمون منع الحمل كمجموعة ضابطة.

التحليل الإحصائي باستخدام برنامج الحزم الإحصائية للعلوم الاجتماعية. أظهر أن هناك زيادة ذات دلالة إحصائية في متوسط الكولسترول الكلي، ثلاثي الجلسراد، كولسترول البروتينات الدهنية منخفضة الكثافة وكولسترول البروتينات الدهنية عالية الكثافة مقارنة مع المجموعة الضابطة.

بينت الدراسة أن الكولسترول الكلي 169,8 مليجرام/ديستر، ثلاثي الجلسراد 120,9 مليجرام/ديستر، كولسترول البروتينات الدهنية منخفضة الكثافة 89,7 مليجرام/ديستر في المصل يزيد في النساء اللاتي يتراوح أعمارهن ما بين (20-29). كما بينت الدراسة أن الكولسترول الكلي 171,6 مليجرام/ديستر، ثلاثي الجلسراد 123,8 مليجرام/ديستر، كولسترول البروتينات الدهنية منخفضة الكثافة 91,5 مليجرام/ديستر في المصل يزيد في النساء اللاتي يستخدمن حبوب منع الحمل.

 أيضاً لوحظ أن الكولسترول الكلي 170,7 مليجرام/ديستر، ثلاثي الجلسراد، مليجرام/ديستر 123,47، كولسترول البروتينات الدهنية منخفضة الكثافة 88,7 مليجرام/ديستر في المصل يزيد بزيادة مدة الاستخدام. كما لوحظ أن الكولسترول الكلي 169,78 مليجرام/ديستر، ثلاثي الجلسراد مليجرام/ديستر 123,47، كولسترول البروتينات الدهنية منخفضة الكثافة 90,65 في المصل يزيد بزيادة عدد الولايات أكثر من خمسة.
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1.1 Introduction

Contraceptives are devices or techniques that permit sexual union without resultant pregnancy.\(^1\) There has been interest in recent years about alterations in various metabolic processes and lipid profiles associated with the use of hormonal contraceptives. The effects of estrogens and progestagens on lipoprotein metabolism are of importance because of the involvement of lipoproteins in endothelial damage and arterial occlusions.\(^2\) Lipids critical role in almost all aspects of biological life they are structural components in cells the major lipids present in the plasma are fatty acids, phospholipids and cholesterol. The alterations in lipid metabolism that occur with the use of hormonal contraceptives have aroused considerable concern that hormonal contraceptives might increase the risk of premature atherosclerosis.\(^3\)

Hormonal contraceptives are available in various dosage forms and for different routes of administration: oral, intramuscular, transdermal, subdermal implants and associated with the intrauterine system.\(^4\)

Their mechanism of action is to block ovulation by inhibiting the secretion of follicle stimulating and luteinizing hormone; they thicken the cervical mucus, forming it difficult for sperm to go into the uterus.\(^5\)

The continual use of hormonal contraceptives among women within reproductive age has been on the increase.

The effects of these contraceptives on lipid metabolism vary depending on the type of hormonal contraceptive, therefore, the relationship between contraceptive and lipid profile (triglyceride, total cholesterol, high density lipoprotein-cholesterol and low density lipoprotein-cholesterol) need to be investigated.
1.2 Rationale

Contraceptives are worldwide use to control pregnancy, it has many types, constituents and mode of action, it has large benefit in control of pregnancy and there for birth, but many studies show that contraceptive cause disturbance in many body function and parameters such as glucose, lipid profile, and trace element. I want to determine effect of contraceptives on lipid profile (total cholesterol, Triglycerides, high density lipoprotein-cholesterol and low density lipoprotein-cholesterol) in Sudanese women in Shendi Locality.
1.3 Objectives

1.3.1: General Objective:
To evaluate the effect of contraceptives on serum lipid profile (triglyceride, total cholesterol, HDL-C, LDL-C).

1.3.2. Specific objectives:
   1. To measure triglyceride levels on women that used contraceptives.
   2. To measure total cholesterol level in the same women.
   3. To measure HDL-C in the same women.
   4. To measure LDL-C in the same women.
   5. To assess the effects of the different contraceptives on triglyceride, total cholesterol, HDL-C and LDL-C.
2. Literature review

2.1 Contraceptives:

Today, millions of women are using oral contraceptives for various reasons. Since most delay pregnancy and have few children overall, the average woman has approximately 450 menstrual cycles in her lifetime.\(^6\) The use of hormones in preventing reproduction began in 1937 when Makepeace, showed that ovulation could be prevented by injecting progesterone into rabbits. Almost twenty years later, large-scale clinical trials testing the efficacy of oral contraceptives began. In 1959, oral contraceptives were approved in the United States for use as birth control. The use of oral contraceptives has allowed women to control these cycles. In order for the effects of oral contraceptives to be properly presented, an overview of menstruation and the ability of oral contraceptives to manipulate the menstrual cycle is essential.\(^7\)

The characteristics of the ideal contraceptive method are:

Highly effective, no side effects, cheap, independent of intercourse rapidly reversible, widespread availability, acceptable to all cultures and religions, easily distributed, can be administered by non-healthcare personnel.\(^8\)

There is enormous variation in the uptake and use of methods of contraception in different countries worldwide. More than 95 per cent of women in the UK will do not want to become pregnant will use contraception, some couples may use more than one method at the same time, such as the taken of the oral contraceptive pill in conjunction with using condoms. Some method of contraception can only be prescribed by a doctor, whereas other can be used without ever having to seek medical advice.\(^9\)

Virtually all method of contraception occasionally fail and some are more effective than others. Failure rate are traditionally expressed as the number of failures per 100 women-years . the number of pregnancies if 100 women were to use the method for 1 year. Failure rate for some method vary considerably, largely because of the potential for failure caused by imperfect use (user failure) rather than an intrinsic failure of method itself.\(^4\)
2.2-Methods of contraception:

2.2.1-Hormonal contraception:

2.2.1.1-Combined oral contraceptive pills:

The contraceptive pills contain hormones that thicken cervical mucus, which makes it difficult for the sperm to enter the womb and reach an egg. Also, these pills alter the lining of the womb to make sure an egg cannot implant there should it get fertilized.\(^4\)

Combined oral contraceptives cause slight increases in some precoagulant factor and reduce the levels of some natural anticoagulant in articular anti thrombin and proteins. Their effect is more marked with third-generation pills (containing degestrol or gestodene) other with second-generation pills (containing levonorgestrel).\(^{10}\)

Most of the commonly used COCPs are ‘low dose’ and contain ethinyl oestradiol in a dose of 15–35 µg COC formulations also contain one of many different synthetic progestogens. The most widely available COCs in the public sector contain the progestogens levonorgestrel (LNG) or norethisterone (NET) which is also known as norethindrone.\(^{11}\)

Some newer pills contain oestradiol valerate or oestradiol hemihydrate, which is more similar in structure to the ‘naturally occurring’ oestradiol, but confers no other proven benefits. Most ‘traditional’ preparations contain 21 pills followed by a 7-day pill-free interval (or 7 placebo tablets in place of a 7-day pill-free interval).

Some preparations contain 24 days of pills with a shorter pill-free interval.\(^4\)

Three types of preparation are currently available:

- Monophasic combination tablets, contain a single synthetic oestrogen / progestogen dose combination and are taken daily (from a ‘blister’ pack) starting on the first or fifth day of menstruation, for 21 days followed by a 7-day interval of dummy (placebo) tablets (or pill-free days) during which the sudden removal of progestogen initiates (the latter may be psychologically reassuring to
some women’s withdrawal menstruation, that pregnancy has indeed been prevented); the cycle is then repeated.

It is essential that the tablets are taken at the same time each day, as their effectiveness can fall if they are taken late or missed (i.e. taken more than 12 hours late).

Effectiveness can also be reduced if they are taken in combination with other drugs that influence oestrogen/progestogen metabolism (e.g barbiturates, phenytoin, phenylbutazone, rifampicin, griseofulvin) or certain broad-spectrum antibiotics that affect the gastrointestinal flora (ampicillin and tetracyclines).(12)

-Biphasic or triphasic combination tablets contain oestrogen/progestogen combination doses that vary throughout the cycle; (this may be more suitable for some women, than the monophasic preparations) The tablets are started on day 1 or day 5 of a period and must be taken in the correct order to be effective (1 daily for 21 days, then 7 tablet-free [or placebo] days).(12)

**Mode of action of Combined oral contraceptive pills:**

Combined oral contraception acts both centrally and peripherally.

Inhibition of ovulation is by far the most important effect. Both oestrogen and progestogen suppress the release of pituitary follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which prevents follicular development within the ovary and therefore ovulation. Peripheral effects include making the endometrium atrophic and hostile to an implanting embryo and altering cervical mucus to prevent sperm ascending into the uterine cavity.(13)

**Side effect of oral contraceptive pills:**

Serious side effect are rare in healthy female who do not smoke cigarettes. However, oral contraceptive may cause problem such as liver cancer, non carcenuos liver tumors and blood clots. The most common minor side effects are nausea, vomiting, abdominal cramping or bloating breast, pain, tenderness or swelling, swollen ankles or feet, tiredness and acne.

These problem, usually go away as the body adjusts to the drug and don’t need medical attention unless they continue or they interfere with normal activities.(10)
Complications of Combined oral contraceptive pills:
Absolute contraindications of Combined oral contraceptive pills includes circulatory diseases (ischemic heart disease, cerebrovascular accident, significant hypertension, arterial or venous thrombosis, any acquired or inherited pro-thrombotic tendency, any significant risk factors for cardiovascular disease) Acute or sever liver disease, Oestrogen-dependant neoplasm particularly breast cancer and Focal migraine. Relative contraindications of Combined oral contraceptive pills includes Generalized migraine, Long-term immobilization, Irregular vaginal bleeding (until a diagnosis has been made), Less sever risk factor for cardiovascular disease, e.g. obesity, heavy smoking, diabetes.\(^4\)

Venous thromboembolism:
Oestrogens alter blood clotting and coagulation in a way that indices a pro-thrombotic tendency, although the exact mechanism of this is poorly understood. The higher the dose of oestrogen within COC, the greater the risk of venous thromboembolism. Type of progestogen also affects the risk of VTE, with user of COC containing third-generation progestogens being twice as likely to sustain aVTE.\(^4\)

Arterial disease:
The risk of myocardial infarction and thrombotic stroke in young, healthy women using low-dose COC is extremely small. Cigarette smoking will, however, increase the risk, and any women who smokes must be advised to stop COC at the age of 35 years. Around 1 per cent of women taking COC will become significantly hypertensive and they should be advised to stop taking COC.\(^4\)

Breast Cancer:
Advising women about the association between breast cancer and COC is Very difficult. Most data do show a slight increase in the risk of developing breast cancer among current COC user (relative risk around 1.24) this is not of great
significance to young women, as the background rate of breast cancer is very low at their age.\(^{(13)}\)

### 2.2.1.1.2-Combined injectable contraceptives (CICs):

CICs are similar to COCs since they contain both a progestogen and an estrogen. However in addition to their different modes of administration, CICs also differ from COCs because the active estrogenic compound is estradiol as opposed to ethinyl estradiol. Ethinyl estradiol binds to estrogen receptors with its active ethinyl group attached, thereby potentially inducing an increase in the production of hepatic globulins. Increase in hepatic globulins is the mechanism through which rare thromboembolic phenomena have been associated with COCs.\(^{(11)}\)

Three types of monthly administered CICs are commonly available:
- one contains 25 mg of depot-medroxyprogesterone acetate (DMPA) and 5 mg of estradiol cypionate.
- one contains 50 mg of norethisterone enanthate and 5 mg of estradiol valerate.
- one contains 150 mg of dihydroxyprogesterone acetophenide and 10 mg of estradiol enanthate.\(^{(11)}\)

### 2.2.1.1.3- Patch:

The combined hormonal transdermal patch releases 33.9\(\mu\)g ethinyloestradiol/day and norelgestromin 203 \(\mu\)g/day. It is applied to the skin of the lower abdomen, buttock or arm for 7 days, although it can be applied to any skin covered area, except the breast. The regimen usually involves application of patches for a total of 21 days followed by a 7-day hormone-free interval. Continued use (tricycling or tailored use) is also possible. Some women may experience problems with patch adherence or skin sensitivity to the patch.\(^{(4)}\)

### 2.2.1.1.4- Vaginal Ring:

It is of latex-free plastic and has a diameter of 54 mm. It releases a daily dose of ethinyl estradiol 15 \(\mu\)g and etonorgestrel 120 \(\mu\)g. Insertion and removal of the ring is easy and it does not need to fit in any special place in the vagina. A new
ring is inserted into the vagina one week after the last was removed it is only available in one size and required a special fitting or placement.\(^{(4)}\)

**2.2.1.2-Progestogen-only contraceptive methods:**
Progestogen-only methods are available as oral, injectable, implant and intrauterine system. The mechanism of action of the method and the bleeding pattern appear to depend on the dose of progestogen and also the route of administration.

**2.2.1.2.1-Progestogen-only pill:**
The progestogen-only pills (pop) is ideal for women who like the convenience of pill taking COC. it is ideal for women at times of lower fertility. If the pop fails, there is a slightly higher risk of ectopic pregnancy There is a small selection of brands on the market and they contain the second-generation progestogen norethisterone or norgestrel (or their derivatives) and the third-generation progestogen desogestrel.
The POP is taken every day without a break. Particular indication for the POP includes: breastfeeding, older age, cardiovascular risk factors diabetes.\(^{(14)}\)

**2.2.1.2.2-Progestogen-only injectables:**
Two injectable progestogens are marketed. The Depot methroxyprogesterone acetate 150 mg (Depo-provera or DMPA) and norethisterone enanthate 200 mg (Noristerat). Most women choose depo-Provera and each injection lasts around 12-13 weeks.
Norethisterone enanthate only lasts for 8 weeks and is not nearly so widely used. Depo-Provera is a highly effective method of contraception and it is given by deep intramuscular injection. Most women who use it develop very light or absent menstruation. Depo-Provera will improve PMS and can be used to treat menstrual problems such as painful or heavy periods.\(^{(14)}\)
Particular side effects of Depo-Provera are weight gain of around 3 kg in the first year, delay in return of fertility-it may take around 6 months longer to conceive compared to a women who stops COC, persistent menstrual
irregularity, very long-term use may slightly increase the risk of osteoporosis (because of low estrogen levels).

2.2.1.2.3 Implant:
Implanon consist of single silastic rod that is inserted subdermally under local anesthetic into the upper arm. It releases the progestogen etonogestrel 25-75 micrograms daily (the dose released decreases with time), which is metabolized to the third generation progestogen desogestrel. Implanon was introduced into the UK in the late 1990s and has superseded the six-rod implant Norplant, which withdrawn from the market. It is highly effective and, to date, there have been no genuine failure reported with it. It lasts for 3 years and thereafter can be easily removed or a further implant inserted. Implanon is particularly useful for women who have difficulty remembering to take a pill and who want highly effective long-term contraception. There is a rapid return of fertility when it is removed.

2.2.2 Intrauterine contraception:
Modern IUDs are highly effective methods of contraception. Fitting an IUD should be performed by trained healthcare personnel only and is a brief procedure associated with mild to moderate discomfort. A fine thread is left protruding from the cervix into the vagina and the IUD can be removed in due course by traction on this thread. An IUD is ideal for women who want a long-term method of contraception independent of intercourse and where regular compliance is not required. IUD protect against both intrauterine and ectopic pregnancy occurs, there is a higher chance than normal that it will be ectopic.

-Types of Intrauterine Contraception:
Intrauterine methods of contraception include the copper intrauterine device Cu-IUD and the LNG-IUS.

The Cu-IUD duration of use is between 3 and 10 years, depending on the device used and age of woman at insertion. If a woman has a Cu-IUD inserted at 40 years or above, it can be left in situ until the menopause.
for women who have a 52 mg LNG-IUS inserted at 45 years or over, the device can be left for contraceptive purposes until the menopause. There are a number of Cu-IUDs available and they vary in size, shape, copper content and duration of use.

The LNG-IUS consists of an elastomere frame with a reservoir on the stem containing levonorgestrel.

With both Cu-IUD and LNG-IUS, threads protrude through the cervical canal into the upper vagina to permit easy removal.\(^4\)

The levonogestrel-releasing intrauterine system (IUS) has advantages includes highly effective, dramatic reduction in menstrual blood loss, protection against pelvic inflammatory disease and disadvantages includes persistent spotting and irregular bleeding in first few months of use progestogenic side effects, e.g. acne, breast tenderness.\(^4\)

**Mode of action of Intrauterine Contraception:**

All IUDs induce an inflammatory response in the endometrium which prevents implantation. However copper-bearing IUDs work primarily by a toxic effect on sperm which prevents fertilization. The intrauterine system prevents pregnancy primarily by a local hormonal effect on the cervical mucus and endometrium.\(^{14}\)

**Side effect of IUDs:**

The side effect of copper-bearing IUDs can lead to increase menstrual blood loss, increased dysmenorrheal, increase risk of pelvic infection in the first few weeks following insertion.\(^9\)

**Contraindications of Intrauterine Contraception:**

The contraindications of IUDs includes previous pelvic inflammatory disease, previous ectopic pregnancy, known malformation of the uterus, copper allergy.\(^{14}\)

**2.2.3 Barrier Methods of Contraception:**

**I. Condoms:**

Male condoms are usually made of latex rubber. There are cheap and are widely available for purchase or free from many clinics. They have been heavily
promoted in the safe sex campaign to prevent the spread of sex usually transmitted disease (STDs), particularly human immunodeficiency virus (HIV), and acquired immune deficiency syndrome (AIDS). Condoms of varying sizes and shapes are available. It is important to use condoms that reach European union standard and within their sell-by date. Couple using condom should be aware of availability of emergency contraception in the event of a condom bursting or slipping off during intercourse. Some men and women may be allergic to latex condoms or spermicide, and hypoallergenic latex condoms and plastic male condoms are available. Men must be instructed to apply condoms before any genital contact and to withdraw the erect penis from the vagina immediately after ejaculation.\textsuperscript{(14)}

\textbf{II. Diaphragm and cap:}

The diaphragm, or Dutch cap, is female barrier used most commonly. Other female barriers includes cervical caps, vault caps an vimules. They should all be used in conjunction with spermicidal cream or gel. Diaphragms are inserted immediately prior to intercourse and should be removed no earlier than 6 hours later.\textsuperscript{(14)}

The effective use of a diaphragm requires careful teaching and fitting. Female barrier offer protection against ascending pelvic infection but can increase the risk of urinary tract infection and vaginal irritation. Female condoms made of plastic are also available (Femidom). They offer particularly good protection against infection, as they cover all of the vagina and vulva and, being plastic, are less likely to burst. However many couples find them unaesthetic and they have not achieved widespread popularity. Although a range of spermicidal agents used to be manufactured, only gels and pessaries are still available in the UK. Spermicidal agents should not be used as a contraceptive method on their won: their main role is to make barrier methods more effective.\textsuperscript{(14)}
2.2.4 Male and female sterilization:
both male and female sterilization are permanent forms of contraception. Young age has been found to be the most important factor associated with sterilization regret. Other factors correlated with regret, such as change in marital status or partners, and child deaths are also more likely to occur over the lifetimes of younger people. for all these reasons, sterilization is not generally considered to be an appropriate contraceptive option for adolescents.

It may be performed only in exceptional circumstances. In such cases, appropriately obtained and verifiable informed choice and consent is mandatory.\(^{(11)}\)

2.2.5 Fertility awareness-based methods (FAB):
Formerly known as ‘natural family planning’, FAB rely on the signs and symptoms that reflect the physiological changes that occur during the menstrual cycle that define the fertile period, with avoidance of intercourse at that time.\(^{(4)}\)

Use of FAB requires motivation and a regular menstrual cycle, and so cannot be used for women at extremes of reproductive age. Typical failure rates are high. The method depends on the use of one or more of the following indicators to enable avoidance of intercourse during the fertile days. The fertile period is calculated by various techniques such as changes in basal body temperature, changes in cervical mucus, changes in the cervix, multiple indices.\(^{(4)}\)

2.2.6 Lactational amenorrhea method (LAM):
LAM may be considered an appropriate contraceptive choice for postpartum adolescents planning to breastfeed. The main physiological variable governing method success is whether the adolescent is exclusively or nearly exclusively breastfeeding the infant. Inhibition of ovulation is the mechanism of action.\(^{(11)}\)

2.2.7 Emergency contraception:
All women deserve a second chance to prevent an unintended pregnancy.

- The most effective method of EC is an IUD (about 99% effective).
- An IUD can be inserted up to 5 days after ovulation for EC.
- Ulipristal acetate (UPA) or levonorgestrel (LNG) are available as oral methods of EC. - UPA can be given within 120 hours of unprotected intercourse. 
- LNG can be used within 96 hours of unprotected intercourse. 
- Effective ongoing contraception should be started after EC. \(^4\)

### 2.3 Lipid:

Lipids are a broad group of naturally occurring molecules including fats wax and sterols. The main biological functions of lipid include energy storage, as structural component of all membranes, and as important signaling molecules. And the lipid transported through the blood in the lipoproteins.\(^{15}\) the major lipids present in the plasma are fatty acids, triglycerides, cholesterol and phospholipids.\(^{16}\)

#### 2.3.1 Fatty acids:

Fatty acids are simply linear chains of carbon–hydrogen bonds that terminate with carboxyl group (–cooh). The majority of plasma fatty acid are instead found as a constituent of triglycerides or phospholipids.\(^{17}\)

#### 2.3.2 Phospholipids:

Phospholipids are a major component of all biologically membrane, a large with glycolipids, cholesterol and proteins. Understanding of the aggregation properties of these molecules is known as lipid polymorphism and form parts of current academic research.\(^{18}\)

#### 2.3.3 Triglycerides:

Triglycerides are more correctly called ‘triacylglycerols’, but this term is not in general use in clinical medicine, and the more colloquial term is used in this book to avoid confusion. They consist of glycerol esterified with three long-chain fatty acids such as stearic (18 carbon atoms) or palmitic (16 carbon atoms) acids.\(^{16}\)

Triglyceride is present in dietary fat, and can be synthesized in the liver and adipose tissue to provide a source of stored energy; this can be mobilized when required for example during starvation. Although the majority of fatty acids in
the body are saturated, certain unsaturated fatty acids are important as precursors of prostaglandins and in the sterification of cholesterol.\textsuperscript{(16)}

Triglycerides containing both saturated and unsaturated fatty acids are important components of cell membranes.\textsuperscript{(16)}

2.3.4 Cholesterol:

Cholesterol is an unsaturated steroid alcohol containing 4 ring (A, B, C, and, D) and it has a single C-H side chain tail similar to a fatty acid in its physical properties. The only hydrophilic part of cholesterol is the hydroxyl group in the A ring.

Cholesterol can also exist in an esterified form called cholesteryl ester.\textsuperscript{(17)}

Sources of cholesterol:
- endogenous cholesterol is formed in the body almost in all nucleated cells from Acetyl-CoA.
- exogenous cholesterol occurs only in food animal origin such as egg yolk, meat, liver, and brain.\textsuperscript{(19)}

Synthesis of cholesterol:
- location:
  - intracellular location (cytosol). organ location liver is the major site of cholesterol synthesis. other tissues, intestine, adrenal cortex, gonads.
- precursor: Acetyl-CoA.
- steps:
  1-formation of acetoacetyl CoA of, by condensation of two molecules of Acetyl CoA.
  2-conversion of acetoacetyl CoA to mevalonate.
  3-conversion of mevalonate to cholesterol.\textsuperscript{(19)}

Regulation of cholesterol synthesis:
HMG CoA reductase is the key enzyme for cholesterol synthesis it is present in two form: active dephosphorylated and in active phosphorylated. It is regulated through:
1-feedback inhibition cholesterol acts as feedback inhibitor of HMG CoA reductase enzyme.
2-feedback regulation cholesterol inhibits HMG CoA reductase gene.
3-hormone regulation and inhibition by drugs.
Function of cholesterol:
cholesterol enters in the structure of everybody cell.
cholesterol is the precursor of vitamin D3, steroid hormone, bile acids.\(^{(19)}\)

### 2.4 Lipoproteins:
Because lipids are relatively insoluble in aqueous media they are transported in body fluids as, often spherical, soluble protein complexes called lipoproteins.\(^{(20)}\) can be derived from food (exogenous) or synthesized Lipids in the body (endogenous). The water-soluble (polar) groups of proteins, phospholipids and free cholesterol face outwards and surround an inner insoluble (non-polar) core of triglyceride and cholesterol esters.\(^{(20)}\)

#### 2.4.1 Classification of lipoproteins:
Lipoproteins are classified on the basis of their densities as demonstrated by their ultra centrifugal separation. Density increases from chylomicrons (of lowest density) through lipoproteins of very low density (VLDL), intermediate density(IDL) and low density (LDL) to high density lipoproteins (HDL).\(^{(16)}\)

#### 2.4.2 Apo lipoproteins:
Apo lipoproteins are primarily located on the surface of lipoprotein particles they help maintain the structural integrity of lipoproteins and also serve as ligands for cell receptors and as activators and inhibitors of the various enzyme that modify lipoprotein particles.
Apo A1 the major protein on HDL, apo B100 (LDL, VLDL ), apo B 48 (chylomicrons).\(^{(17)}\)

### Chylomicrons:
Chylomicrons contain apo B-48, are the largest and the least dense of the lipoprotein particles. Because of their large size, they reflect light and account for the turbidity of postprandial plasma.chylomicrons are produced by the
intestine, once they enter the circulation, triglycerides and cholesteryl esters in chylomicrons are rapidly hydrolyzed by lipases. The principal role of chylomicron is the delivery of dietary lipids to hepatic and peripheral cells.\(^{(17)}\)

2.4.3 Very low-density lipoprotein (VLDL):

is a large triglyceride rich particle consisting also of apoB100, apo C and apo E. Following hepatic secretion, it incorporates additional apo C from HDL particles within the circulation. Like chylomicrons, VLDL is hydrolysed lipoprotein lipase in the peripheral tissues, albeit more slowly. The resulting VLDL remnant or IDL contains cholesterol and triglyceride as well as apoB and apo E and is rapidly taken up by the liver or converted by the action of hepatic lipase to LDL by losing apo E and triglyceride.\(^{(20)}\)

2.4.4 Intermediate density lipoprotein IDL:

This is class of lipoprotein responsible for transport of cholesterol to extra hepatic tissue. They are formed in the circulation when very low density are degraded first to IDL and then to IDL-C by the gain and loss of specific apolipoprotein and the loss of most of liver triglyceride, IDL-C are taken up and catabolized by the both the liver and extra hepatic tissue by specific receptor-mediated endocytosis.\(^{(17)}\)

2.4.5 Low-density lipoprotein (LDL):

is a small cholesterol-rich lipoprotein containing only apoB. It represents about 70 per cent of the total plasma cholesterol concentration. It can be taken up by most cells, although mainly the liver by the LDL or B/E receptor which recognizes and binds apoB100.\(^{(20)}\)

Within the cell, the LDL particles are broken down by lysosomes, releasing cholesterol. This cholesterol can be incorporated into cell membranes or in specific tissue such as the adrenal cortex or gonads and utilized in steroid synthesis. Although most of the plasma LDL is removed by LDL receptors, if the plasma cholesterol concentration is excessive, LDL particles, by virtue of
their small size, can infiltrate tissues by passive diffusion and can even cause damage, as in atheroma formation within arterial walls.\(^{(20)}\)

2.4.6 High-Density Lipoproteins (HDL):

This is a class of lipoprotein, varying somewhat in their size (8-11 nm in diameter), that carry fatty acids and cholesterol from the body's tissue to the liver. About thirty percent of blood cholesterol is carried by HDL-C.

Moreover, HDL-C serve as potent endogenous inhibit of inflammation, platelet adhesion that HDL-C can remove cholesterol from the atheroma arteries and, transport it back to the liver for excretion or re-utilization which is main reason why. HDL-C bound cholesterol is sometimes called "good cholesterol". HDL-C is smallest of lipoprotein. They are the greatest one because they contain high proportion of protein.\(^{(21)}\)

2.4.7 Lipoprotein physiology and metabolism:

The liver plays a central role in lipid transport & metabolism:

1-it facilitates the digestion and absorption of lipids by the production of bile, which contains cholesterol and bile salts synthesized within the liver denovo or after uptake of lipoprotein cholesterol.
2-it actively synthesizes and oxidizes fatty acids and also synthesizes triglycerides and phospholipids.
3-it converts fatty acids to ketone bodies.
4-it plays an integral part in the synthesis and metabolism of plasma lipoproteins.\(^{(22)}\)

-lipid absorption: special mechanism are required to facilitate the intestinal absorption of the 60 to 130g of fat per day, mostly in the form of triglycerides.
-during the process of digestion, pancreatic lipase converts dietary lipids into more polar compounds with amphipathic properties, thus triglycerides are transformed into monoglycerides and diglycerides, cholesterol esters are transformed into free cholesterol, and phospholipid are transformed into lysophospholipids.
-exogenous pathway: the newly synthesized chylomicrons in intestine are initially secreted into the lymphatic ducts then to circulation. Chylomicrons are metabolized in adipose tissue and muscle.\(^{(17)}\)

-endogenous pathway: triglycerides are synthesized in the liver. cholesterol may be synthesized locally or derived from lipoproteins such as chylomicron remnants. These lipids are transported from the liver in VLDL.

-Reverse cholesterol transport pathway: one of the major roles of HDL is to maintain the equilibrium of cholesterol in the peripheral cells by this pathway.\(^{(17)}\)
3. Material and Methods

3.1- Study design:
A case control study conducted during the period between March to August.

3.2- Study area:
The study was conducted in Shendi city.

3.3- Study Population:
Forty women using of contraceptives were enrolled in this study as test group (n=40) and apparently healthy women not using contraceptive as control group (n=20).

3.4- Inclusion criteria:
Apparently healthy women using contraceptives.

3.5- Exclusion criteria:
Females with well diagnosed disease diabetes, cardiovascular disease, hormonal disorders, hypertension, hyperlipidemia, alcohol and smoking habits.

3.6- Ethical consideration:
Participants who informed about the study and accepted to be volunteers are included.

3.7- Data collection technique:
Information from females contraceptive user was collected in performed questionnaire.

3.8- Samples collection:
After approximately 12 hours fasting period 5 ml of venous blood in dry sterile syringe were collected from each subject (patients and controls). The blood was incubated at room temperature for about one hour to clot, then centrifuged at 2000 r.p.m for 5 minutes to separate serum from the cells, sera were stored at -20 C° until analyzed.
3.9- **Statistical analysis:**

Statistical analysis was performed by the use of SPSS (Statistical Package for the Social Sciences) program, P-values < 0.05 are considered statistically significant.

3.10- **Methods :**

3.10.1- **Method used for estimation of serum cholesterol:**

3.10.1.1- **Reaction principle:**

The cholesterol present in the sample originates a colored complex according the following reaction:

\[
\text{Cholesterol esters} + \text{H}_2\text{O} \xrightarrow{\text{CHE}} \text{cholesterol} + \text{fatty acids}
\]

\[
\text{Cholesterol} + \frac{1}{2}\text{O}_2 + \text{H}_2\text{O} \xrightarrow{\text{chol.oxidase}} \text{cholestenone} + \text{H}_2\text{O}_2
\]

\[
2\text{H}_2\text{O}_2 + 4\text{-Aminoantipyrine} + \text{phenol peroxidase} \xrightarrow{\text{Quinoneimine} + 4\text{H}_2\text{O}}
\]

The intensity of the color formed is proportional to the cholesterol concentration in the sample.

3.10.1.2- **procedure:**

1 ml of reagent was mixed with 0.01 ml of sample / standard (STD), incubated for 10 minutes, then optical density was read at 520 nm. Finally concentration was obtained by the following formula:

\[
\text{Concentration of cholesterol (mg/dl)} = \frac{\text{O.D of test}}{\text{O.D of STD}} \times \text{Conc. of STD.}
\]

See appendix (1)

3.10.2- **Method used for estimation of serum triglycerides**

3.10.2.1- **Reaction principle:**

For the enzymatic determination of triglycerides according to the following reaction:

\[
\text{Triglycerides} + \text{H}_2\text{O} \xrightarrow{\text{LPL}} \text{Glycerol} + \text{Fatty acids}
\]

\[
\text{Glycelol} + \text{ATP} \xrightarrow{\text{GK}} \text{Glycerol-3-phosphate} + \text{ADP}
\]

\[
\text{Glycerol-3-phosphate} + \text{O}_2 \xrightarrow{\text{GPO}} \text{Dihydroxyacetone phosphate} + \text{H}_2\text{O}_2
\]

\[
2\text{H}_2\text{O}_2 + 4\text{-AAP} + 4\text{-CHLOROPHENILE POD} \xrightarrow{\text{colored compound} + \text{H}_2\text{O}}
\]

The intensity of the red colour produced is directly proportional to triglycerides in the sample.
3.10.2.2-procedure:
1ml of reagent mixed with 0.01ml of sample /STD, incubated 10 min, then optical density was read at 520 nm, finally concentration was obtained by the following formula:
Conc. of triglyceride (mg/dl) = OD of test /OD of STD x Conc. Of STD
See appendix (2)

3.10.3-Method used for estimation HDL:
3.10.3.1-Reaction principle:
Very low density lipoproteins (VLDL) and low density lipoproteins (LDL) in sample precipitate with phosphotungstate and magnesium ions. The supernatant contains high density lipoproteins (HDL). The (HDL) cholesterol is then spectrophotometrically measured by means of the coupled reactions described below.

Cholesterol esters +H₂O $\xrightarrow{\text{chol.esterase}}$ Cholesterol + fatty acid
Cholesterol +1/2 O₂ +H₂O $\xrightarrow{\text{col.oxidase}}$ Cholestenone + H₂O₂
2H₂O₂ +4-Aminoantipyrine+ phenol $\xrightarrow{\text{peroxidasa}}$ Quinoneimine+ 4H₂O

3.10.3.2-Procedure:
Precipitation
- Pipette into labeled centrifuge tubes 0.2 ml of patient serum and add to 0.5 ml of (HDL) reagent.
- Mix thoroughly and let stand for 10 minutes at room temperature.
- Centrifuge at minimum of 4000 r.p.m for 10 minutes.
- Carefully collect the supernatant.

Colorimetry
- Pipette into labeled test tubes 1 ml of cholesterol reagent into blank, STD, and test.
- Add 0.1 ml of (D.W) in blank, 0.1 ml of (HDL) cholesterol standard in (STD), and 0.1 ml of sample supernatant in test tubes.
- Mix thoroughly and incubate the tubes for 30 minutes at room temperature (16-25) or for 10 minutes at 37.
- Measure the absorbance (A) of (STD) and sample at 500nm against the blank. The colour is stable for at least 30 minutes.

**Calculation:**
- The (HDL) cholesterol concentration in the sample is calculated using the following general formula:
  
  \[
  \text{A sample} / \text{A standard} \times \text{C standard} \times \text{sample dilution factor} = \text{C sample}
  \]

  If the (HDL) cholesterol standard provided has been used to calibrate:
  
  \[
  \frac{\text{A sample}}{\text{A STD}} \times 52.5 = \text{mg/dl (HDL) cholesterol}
  \]

  \[
  \frac{\text{A sample}}{\text{A STD}} \times 1.36 = \text{mmol/l (HDL) cholesterol min.}
  \]

  Then absorbance was read using 520 nm and concentration of s. triglyceride was obtained by using the following formula:

  \[
  \text{Conc. of triglyceride} = \text{O.D of test X conc. of STD/O.D of STD}
  \]

  See appendix (3)

**3.10.4- Method used for estimation LDL:**

**3.10.4.1-Principle of LDL method:**

Low density lipoprotein (LDL) in the sample precipitate with polyvinyl sulphate. Their concentration is calculated from the difference between the serum total cholesterol and the cholesterol in the supernatant after centrifugation. The cholesterol is spectrophotometrically measured by the means of the coupled reaction described below.

\[
\begin{align*}
\text{Cholesterol esters} + \text{H}_2\text{O} & \xrightarrow{\text{cholesterase}} \text{Cholesterol} + \text{fatty acid} \\
\text{Cholesterol} + 1\text{O}_2 + \text{H}_2\text{O} & \xrightarrow{\text{col.oxidase}} \text{Cholestenone} + \text{H}_2\text{O}_2 \\
2\text{H}_2\text{O}_2 + 4\text{-Aminoantipyrine + phenol} & \xrightarrow{\text{peroxidase}} \text{Quinoneimine + 4H}_2\text{O}
\end{align*}
\]

**3.10.4.2-Procedure:**

Cholesterol in supernatant:
- Pipette 0.20 ml of patient serum in clean dry tube and add to it 0.20 ml of LDL reagent.
- Incubate 15 min.
- Centrifuge for 15 min at 4000 r.p.m
- Take 0.02 ml of supernatant in another tube.
- Add to it 1ml of cholesterol reagent.
- Incubate 30 min at RT or for 10 min at 37c.
- Read the absorbance in filter 500 nm.

**Calculation:**

- The cholesterol concentration in the supernatant is calculated using the following general formula:
  
  \[
  \frac{A \text{ sample}}{A \text{ standard}} \times C \text{ standard} \times \text{sample dilution factor} = \text{Conc supernatant}.
  \]

  The (LDL) cholesterol concentration in the sample is calculated as follows:

  \[
  \text{LDL cholesterol} = \text{total cholesterol} - \text{cholesterol in supernatant}
  \]

  **See appendix (4)**
4. Results

This study was conducted in Shendi town to evaluate the effect of contraceptives on lipid profile. The result of study was presented in table and figures.

Table (4-1):- Frequency of age group among cases.

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentage %</th>
<th>Laboratory data</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>12</td>
<td>30</td>
<td>S. cholesterol 167.5 mg/dl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL 36.8 mg/dl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL 87.1 mg/dl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides 118.7 mg/dl</td>
<td></td>
</tr>
<tr>
<td>20-39</td>
<td>28</td>
<td>70</td>
<td>S. cholesterol 169.8 mg/dl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL 35.5 mg/dl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. LDL 89.7 mg/dl</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides 120.9 mg/dl</td>
<td></td>
</tr>
</tbody>
</table>

Figure (4-1): Percentage of age group among cases.
Table (4-2):- Mean and p.value for case and control.

<table>
<thead>
<tr>
<th>Pair</th>
<th>Mean</th>
<th>Sig(p.value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc (control)</td>
<td>136.16mg/dl</td>
<td>0.000</td>
</tr>
<tr>
<td>Tc (case)</td>
<td>168.49 mg/dl</td>
<td></td>
</tr>
<tr>
<td>HDL (control)</td>
<td>95.055 mg/dl</td>
<td>0.000</td>
</tr>
<tr>
<td>HDL (case)</td>
<td>35.93 mg/dl</td>
<td></td>
</tr>
<tr>
<td>LDL (control)</td>
<td>46.13 mg/dl</td>
<td>0.000</td>
</tr>
<tr>
<td>LDL (case)</td>
<td>88.78 mg/dl</td>
<td></td>
</tr>
<tr>
<td>Serum Triglycerides (control)</td>
<td>106.89 mg/dl</td>
<td>0.000</td>
</tr>
<tr>
<td>Serum Triglycerides (case)</td>
<td>120.13 mg/dl</td>
<td></td>
</tr>
</tbody>
</table>

Figure (4-2):- Mean of lipid profile in control and case group.
Table (4-3): Frequency of lipid profile for Type of contraceptive among cases

<table>
<thead>
<tr>
<th>Type of contraceptive</th>
<th>Frequency</th>
<th>Percentage %</th>
<th>Laboratory data</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined oral pills</td>
<td>19</td>
<td>47.5</td>
<td>S. cholesterol</td>
<td>171.6mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>36.10mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>91.53 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>123.82 mg/dl</td>
</tr>
<tr>
<td>Implant</td>
<td>11</td>
<td>27.5</td>
<td>S. cholesterol</td>
<td>165.86 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>36.34 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>85.76 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>118.99 mg/dl</td>
</tr>
<tr>
<td>Injectable</td>
<td>10</td>
<td>25</td>
<td>S. cholesterol</td>
<td>168.55 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>35.25 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>89.36mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>119.6mg/dl</td>
</tr>
<tr>
<td>total</td>
<td>40</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure (4-3): Percentage of Type of contraceptive among cases.
**Table (4-4):** Frequency of duration intake among cases group.

<table>
<thead>
<tr>
<th>Duration</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Laboratory data</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>23</td>
<td>57.5</td>
<td>S. cholesterol</td>
<td>166.90mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>35.6mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>88.3 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>121.7 mg/dl</td>
</tr>
<tr>
<td>2-3 years</td>
<td>17</td>
<td>42.5</td>
<td>S. cholesterol</td>
<td>170.7 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>36.3 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>88.7 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>123.47 mg/dl</td>
</tr>
<tr>
<td>total</td>
<td>40</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure (4-4):** Percentage of Duration of intake among cases.
Table (4-5): Frequency of lipid profile for Parity among cases.

<table>
<thead>
<tr>
<th>parity</th>
<th>Frequency</th>
<th>Percentage%</th>
<th>Laboratory data</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>29</td>
<td>72.5</td>
<td>S. cholesterol</td>
<td>167.93 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>36.03 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>87 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>121.17 mg/dl</td>
</tr>
<tr>
<td>&gt;5</td>
<td>11</td>
<td>27.5</td>
<td>S. cholesterol</td>
<td>169.78 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum HDL</td>
<td>35.67 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Serum LDL</td>
<td>90.65 mg/dl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S. Triglycerides</td>
<td>123.47 mg/dl</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure (4-5): Percentage of parity among cases.
Table (4-6): Mean of Body mass index for case and control.

<table>
<thead>
<tr>
<th>Pair</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass index (BMI) case</td>
<td>40</td>
<td>23.51</td>
</tr>
<tr>
<td>Body mass index (BMI) control</td>
<td>20</td>
<td>22.8</td>
</tr>
</tbody>
</table>

Table (4-7): Mean of atherogenic index of Ratio TC/HDL in case and control.

<table>
<thead>
<tr>
<th>Pair</th>
<th>Mean</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC/HDL(case)</td>
<td>4.39</td>
<td>0.000</td>
</tr>
<tr>
<td>TC/HDL(control)</td>
<td>2.63</td>
<td></td>
</tr>
</tbody>
</table>
Table (4-8): Mean of atherogenic index of Ratio LDL/HDL in case and control.

<table>
<thead>
<tr>
<th>Pair</th>
<th>Mean</th>
<th>Sig=0.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL/HDL (case)</td>
<td>2.30</td>
<td></td>
</tr>
<tr>
<td>LDL/HDL (control)</td>
<td>1.13</td>
<td></td>
</tr>
</tbody>
</table>
5.1 Discussion

Contraceptive is intentional prevention of conception through the use of various devices, sexual practices, chemicals, drugs or surgical procedures becomes a contraception if its purpose is to prevent a woman from becoming pregnant. (9)

The present study aimed to study the effect of hormonal contraceptives on lipid profile (total cholesterol, triglycerides, high density lipoprotein-cholesterol, low density lipoprotein-cholesterol) in women using contraceptives as test group and women who are not as control group.

Statistical analysis of gathered data reveals that, the mean of serum total cholesterol in case group is 168.49mg/dl while it is 136.16mg/dl in control group, the \( p \) value 0.000 indicating for a significant variation between case and control group in serum total cholesterol. Significant increase of serum triglycerides in case group is 120.13mg/dl while it is 106.89mg/dl in control group, the \( p \) value 0.000, significant increase of serum LDL-c in case group is 88.78mg/dl while it is 47.13mg/dl in control group, the \( p \) value 0.000, also showed significant decrease of serum HDL-c in case group is 35.93mg/dl while it is 95.055mg/dl in control group, the \( p \) value 0.000, Table (4-2).

The results shows there is slightly increase in serum cholesterol, triglycerides, LDL-c and decrease in HDL-c of age 20-39 years which form about 70% of cases Table (4-1).

The results shows there is slightly increase in serum cholesterol, triglycerides, and LDL-c of combined oral pill comparing with other types Table(4-3).

The study show there is slightly increase in serum cholesterol, triglycerides, and LDL-c by the increased of the increased of duration Table (4-4).

The results shows there is slightly increase in serum cholesterol, triglycerides, LDL-c and decrease in HDL-c of parity >5 which form about 27.5% of cases Table (4-5).

The study shows there is slightly increase of Body mass index in case comparing with control group Table (4-6).
Observed in this study increase in TC/HDL Ratio in case comparing to control, Table (4-7). Also observed increase in LDL/HDL Ratio in case comparing to control, Table (4-8).

This agree with results done by (Asara GA in a Ghanaian Community (2014); revealed that there is a significant increase in total cholesterol among women using hormonal contraceptives the p.value 0.002, significant increase in triglycerides among women using hormonal contraceptives the p.value 0.026 and significant increase in LDL-c among women using hormonal contraceptives the p.value 0.004 compared to women who are not.

Also agree with some results of parameter conducted in Nigeria (2011) by Rumueme Health Centre and Orogbum Health Centre in Hacourt, Rivers State. They reported that significant change (p<0.05) in triglycerides and LDL-c in women on oral contraceptives, and significant change (p<0.05) in HDL-c and LDL-c in women on injectable contraceptives.

This agree with results done by (F. Naz 2012); revealed that there is a significant differences among user of OCs compared to non-users. Total cholesterol (242.92 mg/dl), HDL-c (58.65 mg/dl), LDL-c (115.84 mg/dl), and triglycerides (105.56 mg/dl) were significantly higher compared to the non-users.

Agree with results conducted in Pakistan (2016), this study demonstrated raise in total cholesterol, triglycerides and decrease in HDL-c in females using hormonal contraceptives compared to the non users.
5-2 Conclusion

On the basis of the study results we can conclude that:

By using contraceptives, levels of s. total Cholesterol, triglycerides and low density lipoprotein increased. while the HDL-c level decreased. Age group (20-39) years show slightly increasing in s.total Cholesterol, triglycerides and low density lipoprotein. The combined oral pills showed slightly increase in s .total Cholesterol, triglycerides and low density lipoprotein. Parity more than 5 showed slightly increase in s .total Cholesterol, triglycerides and low density lipoprotein.
5-3 Recommendations

From this study, we can recommend that:

1. Ladies have to consult doctors before use contraceptives as it may result in adverse effects, in the cases of an existed dislipidemia.
2. Routine follow up after contraceptive initiation is recommended to be done.
3. In future use more sample size and combine the risk of parity among the study.
References


12- Andrew Constanti, Andrzej Bartke, Romesh Khardori, Basic Endocrinology for Students of Pharmacy and Allied Health Sciences , 2005, p (126-130).

13- Trussell J. choosing a contraceptive: efficacy, safety, and personal consideration .in :Hatcher RA, Trussell J Nelson AL, Cates W, Stewart FH,


