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ANTIHYPERLIPIDEMIA DRUGS

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ABSTRACT

Hyperlipidemia is a condition occurs when the level of lipid increased in the blood. These condition also known as hyperlipoproteinmia and hypercholesterolemia. Sometimes it is a family disorder that is characterized by abnormally high level of lipid in the blood. In that there are also increases in cholesterol, triglycerides and lipoprotein including very low-density lipoprotein and low-density lipoprotein along with reduced high-density lipoprotein level. This increases level of lipid is the leading risk factor related with cardiovascular diseases. There are some antihyperlipidemia drugs that reduce the level of lipid which increased. Here are the all details about some drug which used in hyperlipidemia condition i.e. mechanism of action, contraindication, side effects, drug interaction of each drug. And there are many treatments to control or maintain the lipidemia condition with the help of diet modification, daily routine exercise, avoid bad habits.

1. INTRODUCTION

Hyperlipidemia or high cholesterol generally refers to increased level of fats in the blood. Any symptoms are not experienced by the most of the people, but having hyperlipidemia increased the risk of developing heart disease and increase the risk of stoke and death. In the united states, about 1 in 3 people have hyperlipidemia.[1] Hyperlipidemia means there is cholesterol in blood in large quantity[4].

Cholesterol

Cholesterol is the greasy substance that produces by liver. Essential component of mammalian cell membrane of all tissue is cholesterol and is also a precursor of steroid hormones. It is necessary for healthy cell membranes, functioning of brain, production of hormone and storage of vitamin [3]

Triglycerides

The most abundant of all lipids are triglycerides. It is largely found in adipocytes. These are major fundamental of storage fats in plant and animal cell. Generally, excess calories, alcohol and sugar in the body get converted into triglycerides and stored in the whole body. Chemically triglycerides are ester of glycerol with 3 fatty acid molecule. The generic formula is shown. Data obtained from national institute of health, limits triglycerides value to 200mg/dl as the normal range. Range higher than 500 mg/dl is think about dangerous for the development of cardiovascular diseases [3]. In the blood another type of fat is triglycerides. These are not type of cholesterol, but have a strong relation with heart disease. as such, doctor also measure triglyceride level in people with hyperlipidemia at the time of diagnosis[4].

Lipoprotein:

An oily core of non-polar lipid contain by the large globules particle of lipoprotein surrounded with a polar coat of phospholipids free cholesterol and apoprotein. Transport of cholesterol to the cell by the lipoproteins[3]. They are two type of lipoprotein that is low-density- lipoprotein and high-density-lipoprotein. LDL has damaging effect on health. HDL however, counteracts the effect of LDL. HDL carries excess cholesterol back to the liver for excretion, hence that is not good for health. The liver then eliminates cholesterol through by bile.

Allows excess cholesterol to build up in the blood for the longer duration they damage health[4]. Six class of lipoprotein are there that are differ from each other in size, density and properties of triglycerides and cholesterol.[3]

TABLE 1: characteristics of major lipoprotein classes

Lipoprotein class	Density (g/ml)	Diameter (nm)
Chylomicrons	<<1.006	500-80
VLDL	<1.006	80-30
IDL	1.006-1.019	35-25
LDL	1.019-1.063	25-18
HDL	1.063-1.210	5-12
Lp(a)	1.055-1.085	30

Chylomicron: both in size as well as in density are the largest particle and the dietary triglycerides contents are directly correspond with the concentration of it.

VLDL: very low-density-lipoprotein are smaller particle content than chylomicron and are secreted from the liver. VLDL carries cholesterol from the liver to organ and tissue in the body. They formed the combination of cholesterol and triglycerides.

IDI: VLDL particle after degradation by lipase enzyme in the capillaries of adipose tissue and muscle give rise to intermediate density lipoprotein.

LDL: according to Lee et al., and galeano et al., low density lipoprotein are synthesized in intestine chyle and partly after lipolysis of VLDL.

HDL: it is common referred as good cholesterol. High-density lipoproteins are synthesized in the liver. It carries cholesterol and other lipids from tissue back to the liver for degradation. It plays an antitherogenic level.

Studies by nago et al., conclude that Lp(a) level were higher in female in contrary to male and statistically significatant incase were observed in Lp(a) plasma level concentration with age. They also reported the lower Lp(a) plasma level in alcohol drinker, contrary to non-drinker.

2. Classification of hyperlipidemia

Hyperlipidemia classify on the basis of lipid type

Hypercholesterolemia- There is level of cholesterol is increased.

Hypertriglycerides-There is an increased level of triglycerides.

Hyperlipidemia classify on the basis of causing factor

Primary (familial) hyperlipidemia

It caused by specific genetic abnormalities. It is due to single gene defect: it is familial and called as monogenic or genetic. Polygenic gene defect: multiple genetic defects, dietary and physical activity are caused due to it[2]. According to Frederickson primary (familial) hyperlipidemia is classified into five types on the basis of electrophoresis or ultracentrifugation pattern of lipoprotein[6]. Table 2. Studies by Nago et al., conclude that Lp(a) levels were higher in females in contrary to males and significant increase were observed in Lp(a) plasma level concentration with age. They also reported the lower Lp(a) plasma level in acohol drinkers, contrary to non-drinker.[3]

Acquired (secondary) hyperlipidemia

Acquired hyperlipidemia is also called secondary dyslipoproteinemias. It often mimic primary forms of hyperlipidemia and can have similar consequences. They may result in increased risk of premature atherosclerosis or when associated with marked hypertriglycerides, may leads to pancreatitis and other complication of the chylomicronemia syndrome[3]. It is when resulting from another underlying disorder that leads to alteration in plasma lipid and lipoprotein metabolism.

3. Causes

The main cause of hyperlipidemia includes change in lifestyle habits in which risk factor is mainly poor diet that is with a fat intake greater than 40% of total calories, saturated fat intake greater than 10% of total calories; and cholesterol intake greater than 300 milligram/day[2].

Other risk factors include:

1. Excessive alcohol consumption
2. Obesity
3. Diabetes
4. Metallic syndrome
5. Premature menopause
6. Pregnancy
7. An underactive thyroid gland

4. Symptoms

Generally any symptoms are not experienced by people with hyperlipidemia. However, with familial or inherited hyperlipidemia may develop yellow, fatty around the eyes or joint. The doctor usually detects hyperlipidemia during a routine blood test or following a cardiovascular event.

Symptoms may include:

1. Chest pain (angina)
2. Heart attack
3. Stroke
4. Growth around eyes
5. Pancreatitis

5. Complication of hyperlipidemia

5.1 Atherosclerosis

Atherosclerosis, as mentioned, is a disease where plaques from in the walls of an individual's arteries that cause them to become excessively narrowed, thick and hard. The narrowed blood vessels holder the proper flow the heart to the rest of the body. The plaques that build up inside of an affected individual's arteries is made from a mixture of immune substance, fats and cholesterol. These types of high-fat levels in the blood can be result of an unhealthy diet that is rich in saturated fat, cholesterol and trans fat. Poor exercise habits and generic may also play a role in the development of hyperlipidemia include atherosclerosis [2].

Coronary Artery Diseases

Atherosclerosis is the major cause of CAD. It is characterized by the narrowing of the arteries that supply blood to the myocardium and result in limiting blood flow and insufficient amount to meet the needs of the heart. The narrowing may progress to the extent that the heart muscle would sustain damage due to lack of blood supply. Elevated lipid profile is correlated to the development of coronary atherosclerosis [2].

Angina Pectoris

Angina is not a disease but a symptom of an underlying heart condition. It is charterised by chest pain, discomfort or a squeezing pressure. Angina occurs as a result of a reduction or a lack of blood supply to a part or the entire heart muscle. Poor blood circulation is usually due to CHD when partial or complete obstruction of coronary arteries is present [2].

Myocardial Infarction (MI)

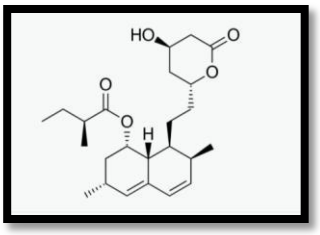
MI is a condition which occurs when blood and oxygen supplies to the cardiac arteries are partially or completely blocked, resulting in damage or death of heart cell. The blockage is usually due to the formation of a clot in an artery. This condition is commonly known as heart attack [2].

HYDROXY METHYL GLUTARYL CO-ENZYME A (HMG Co A) REDUCTASE INHIBITOR:

These class include those drugs which are inhibits HMG Co-A reductase that collectively known as HMG CoA inhibitor. These drug are used to lowering the level of cholesterol as means of reducing any kind of the risk for cardiovascular diseases.

This group include following drugs: Lovastatins, atorvastatin, rosuvastatin, pravastatin, pitavastatin and simvastatin. Red yeast rice extract, one of the fungal source from which the statin were discovered.

LOVASTATIN



These is the first statin that was clinically used orally acts as cholesterol lowering agent. It is recommended to be used only after other measures, such as diet, exercise and weight reduction, have not improved cholesterol levels.

Fig.1

MECHANISM OF ACTION: It is an inhibitor of 3-hydroxy-3-methyl glutaryl-coenzyme A reductase, an enzyme that catalyzes the conversion of HMG Co-A to mevalonate. Mevalonate is a required building block for cholesterol biosynthesis and lovastatin interferes with its production by acting as a reversible competitive inhibitor for HMG Co-A, which bind to the HMG Co-A reductase[7].

CONTRAINDICATION : Hypersensitivity to any component of this medicine. Active liver diseases or unexplained persistent elevation of serum transaminases exceeding 3 times the upper limit of normal. It is to be used with caution in children[8].

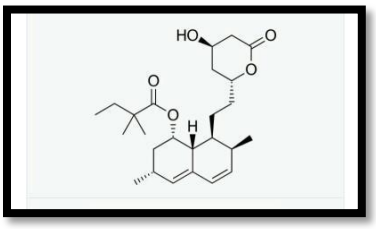
SIDE EFFECTS : Generally, it is well tolerated, with most common side effect being. In approximately descending order of frequency: creatine phosphokinase elevation, abdominal pain, constipation, diarrhea, muscle pains, nausea, indigestion, weakness, dizziness and muscle cramps. Other common side effect that should be promptly mentioned to either the prescribing doctor or an emergency medical service include: Muscle pain, Lack of energy, Fever, Jaundice: yellowing of skin or eye, Flu-like symptoms, Difficult to breath, Hematologic, Renal, Dermatologic, Hypersensitivity[8].

DRUG INTERACTION: As with atorvastatin, simvastatin and other stating drugs metabolized by CYP3A4. Drinking grapefruit juice during lovastatin therapy may incrases the risk of side

effects. Atorvastatin, Ibuprofen, Erythromycin (E.ES., EryC), Nefazodone (serzone), Niacin, Amiodarone, Diltiazem, Verpamil[8].

BRAND NAME: Mevacor, advicor, altocor[28].

SIMVASTATIN



These drug are two times potent than as lovastatin. It is administered orally as a cholesterol lowering agent. It is recommended to be used as an addition to a low-cholesterol diet.

Fig. 2

MECHANISM OF ACTION : It is specific inhibitor of 3-hydroxy-3-methyl glutaryl- coenzyme A reductase,the rate limiting enzyme of the HMG_CoA reductase pathway, the metabolic pathway responsible for endogenous production of cholesterol. It is reductase VLDL and TG and increase HDL[9]].

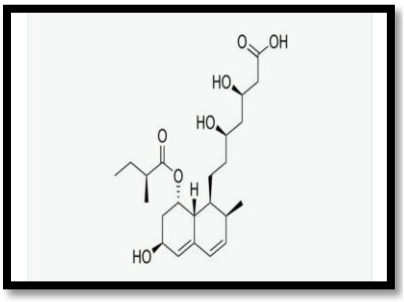
CONTRAINDICATION: It is contraindicated with pregnancy, breast feeding and liver diseases. In pregnancy must be avoided while on simvastatin due to potentially serve birth defects. Limit alcoholic beverage. Daily use of alcohol risk of liver problem. Nursing mother: It is known whether simvastatin is excreted into human milk; however, a small amount of another drug in this class does pass into breast milk. Because statin have the potential for series adverse reaction in nursing infants[10].

SIDE EFFECTS : A small no. of people taking simvastatin nat have mild confusion. Statin may cause or worsen diabetes. They cause muscle problem. This medication may cause liver problems. A very serious allergic reaction to this drug is rare[10].

DRUG INTRACTION: The risk of myopathy, including rhabdomyolysis is increased by concomitant administration of cyclosporine. Amiodarone, Dronedsrone, Calcium channel blockers, Verpamil, Diltiazem[10].

BRAND NAME: zocor[28].

PRAVASTATIN



It is also administered orally. Pravastatin is generally weaker than other statins. it used to preventing cardiovascular diseases in those at high risk and treating abnormal lipids. It also increases the level of good cholesterol, and lower the level of triglycerides which is harmful substances in the blood when in excess amount.

Fig.3

MECHANISM OF ACTION : It act as a lipoprotein-lowering drug by two pathway. In major pathway, it inhibit the function of hydroxyl methyl glutaryl coA reductase. As a reversible competitive inhibitor, it hinder the action of HMG CoA reductase by occupying the active site of the enzyme. Also inhibit the synthesis of very-low-density lipoprotein, which are the precursor to low-density lipoproteins. These reduction increases the number of cellular LDL receptor, thus LDL uptake increase, removing it from bloodstream[11].

CONTRAINDICATION : It is contraindicated in patient with active hepatic diseases. Assess liver function tests prior to initiation of pravastatin therapy and repeat as clinically indicated. It may contraindicate or temporarily withheld in condition that can cause decreasesd renal perfusion since renal failure is possible if pravastatin induced myopathy and rhabdomyolysis occurs[11].

SIDE EFFECTS : There are some uncommon side effect should be promptly reported to the prescribing doctor or an emergency medical service. Muscle pain, Lack of energy, Loss of appetite, Extreme tiredness. These symptoms should be reported to the prescribing doctor it they persist or incrases in severity: Heartburn, Headache, and Confusion[11].

DRUG INTERACTION : Medication that should not taken with pravastatin include, but are not limited to: Cinetidine (tagamet), Colchicines(colcrys). Additional cholesterol-lowering medication such as: fenofibrate, gemfibrozil, cholestyramine and niacin. Specific HIV protease inhibitor such as: lopiavir, ritonavir taken with darinavir and spirolactone[11].

BRAND NAME : Pravachol[28].

ATORVASTATIN

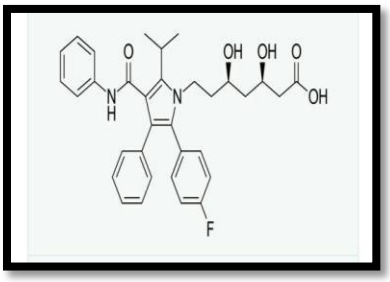


Fig 4

This dug is recent origin of statin is more potent. It has highest low density lipoprotein cholesterol lowering capacity. It acts as anti-hyperlipidemia. It is for adults and children who are at least 10 years old.

MECHANISM OF ACTION : As with other statin, these is a competitive inhibitor of HMG-CoA reductase. Unlike most others, however, it is a completely synthetic compound. HMG-CoA reductase catalyze the reduction of 3- hydroxyl-3 methyl glutaryl coenzyme A to mevalonate, which is the rate limiting step in hepatic cholesterol biosynthesis. Inhibition of the enzyme decreases dr novo cholesterol synthesis, increasing expression of low-density lipoprotein receptor of hepotcytes. This increases LDL uptake by the hepatocyted, decreasing the amount of LDL cholesterol in the blood[12].

CONTAINDICATION : It is contraindicated with active liver diseases that is cholestasis, hepatic encephalopathy, hepatitis and jaundice. Unexplained elevation in AST or ALT level. It also contraindication pregnancies it may cause fetal harm by affecting serum cholesterol and triglycerides level are essential for fetal development[12].

SIDE EFFECTS : Myopathy with elevation of creatine and rhabdomyolysis are the most series side effect, occurring rarely at a rate of 2.3 to 9.1 per 10.000 person years among people taking atorvastatin. The following side effects have been shown to occur in 1-10% of people taking atorvastatin in clinical trials: Joint pain, loose stool, muscle pain, Indigestion[12].

DRUG INTERACTION : Atoravastatin has seriousinteraction with at least 45 different drug. It moderate interaction with at least 173 different drugs. Mild interaction include: Alvimopan, Colestipol, Isratadine, Trazodone, Armodafinil, Aspirin, cipro[12].

BRAND NAME : Lipitor[28].

BILE ACID SEQUENTANT

Bile acid are synthesized from cholesterol, disruption of bile acid reabsorption will decreases cholesterol level, in particular low density lipoprotein in blood. Cholestyramine and colestipol are drug direct increase hepatic metabolism of cholesterol to bile acid with that intermit density of lipoprotein is reduced where as LDL density is increased. These drugs have poor acceptability.

COLESTYRAMINE

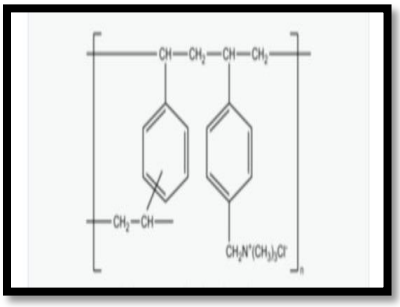


Fig.5

It can also be used to treat the prurite or itching, that often occurs during liver failure and other type of cholestasis where the ability to eliminate bile acid is reduced acid sequenstant such as colestyrame were first used to treat hypercholesterolemia.

MECHANISM OF ACTION : It bind with bile acid and impair their absorbtion and reduce entrehepatic circulation trutilization of bile acid. It also decreases the absorbtion of dietary cholesterol. In this way, cholestyramine decrease the absorbtion of cholesterol and blood level of cholesterol is decreased.

CONTRINDICATION : It is contraindicated with pregnancy and patient with hypothyroidism, diabetes, obstructive liver diseases, kidney diseases or alcoholic consult their doctor before taking this medicine. Other drugs should be taken at least one hour before or six hour after it reduce possible with absorption[14].

SIDE EFFECTS : These side effect have been noted: Most frequent constipation and Increased plasma triglycerides. Intestinal obstruction has been reported in patient with previous bowel surgery who should use it cautiously. It induce hyperchloremic metabolic acidosis has been reported rarely. Patient with hypothyroidism, diabetes, obstructive liver diseases, kidney diseases or alcoholic consult their doctor before taking this medicine. Other drugs should be taken at least one hour before or four to six hour after it ti reduce possible with absorption[13].

DRUG INTERACTION: Most interaction are due to the risk of decreased absorption of these drugs. The duration of treatment is nit limited, but the priscribing physician should reassess at regular interval if continued treatment is still necessary. The principle overdose risk is blockage of intestine or stomach. Interaction with these drugs have been noted : Digitalis, Estrogen, Penicillin, Phenobarbital, Tetracycline, WarfariN[13].

BRAND NAME : Questran, Questran light[28].

COLESTIPOL

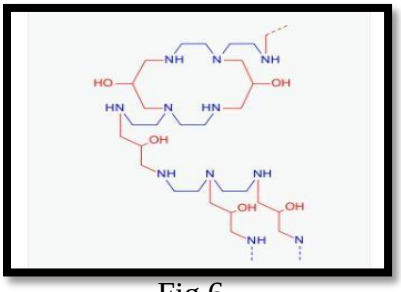


Fig.6

It used to lower the cholesterol, specifically low-density-lipoprotein. It also used to reduce stool volume and frequency and in the treatment of chronic diarrhea.

MECHANISM OF ACTION : It is oral cholesterol lowering drugs that is not absorbed from their intestine into the body. Rather, it works by binding to bile in intestine and promoting the elimination of bile acid in the stool. Bile acid is formed in the liver form cholesterol, secreted into bile and with the bile enters the intestine.

CONTRAINDICATION : It is contraindicated in hypertriglyceridemia. These tablets are contraindicated in those individual who have shown hypersensitivity to any of their component. It is not expected to cause fetal harm when administered during pregnancy in recommended dosages[16].

SIDE EFFECTS : Side effect may occur as follows: GIT disturbance, especially constipation. Sometime increased in VLDL and triglycerides synthesis. Other less frequent side effects are as follows Abdominal pain, Diarrhea, Dizziness, Indigestion, Vomiting. Rarely ulcers, reduced

absorption of nutrient, fatty stool and stomach or intestinal bleeding may occur. Other series side effect of it that are fecal impaction, Gallstones, Esophageal obstruction, Gallbladder inflammation[15].

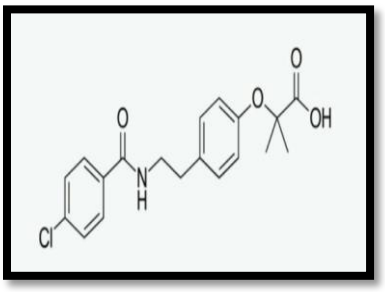
DRUG INTERACTION : Repeated doses of colestipol hydrochlorides given prior dose of propanolol in human trials have been reported to decreases propanolo absorption. The absorption of tetracycline, furosemide, penicillin G, hydrothiazide was singnificatly decreased when given simultaneously with clestipol hydrochloride: these drugs were not tested to determine the effect of administered one hour before colestipol hydrochloride[15].

BRAND NAME : Colestid[28].

FIBRIC ACID DERIVATIVES

Fibrates also known as fibric acid derivatives are a class of lipid-lowering drugs that have the ability to affect all aspects as lipid profile. The manner by rich fibrates lower cholesterol is complex. Fibrates activate a protein called peroxisome proliferator-activated receptor alpha (PPAP-alpha). This protein can activate another enzyme, lipoprotein lipase, which decreases the amount of apolipoprotein C-III in the body.

BEZAFIBRATE



It acts as antihyperlipideamic drug. It suppresses endogenous cholesterol synthesis causes increase low density lipoprotein which leads to lower plasma cholesterol. It is a second generation fibric acid derivatives used in mixed hyperlipidemia. It improves markers of combined hyperlipidemia, effectively reducing LDL and triglycerides and improving HDL level.

Fig.7

MECHANISM OF ACTION : It is generally accepted that bezafibrate is likely an agonist of PPAR-alpha. However, certain other investigation has also suggested that the substance might also elicit some effects on PPAR-gamma and PPAR-delta too[18].

SIDE EFFECT : Stomach pain, gas or nausea may occurs the first several days as body adjusts to the medication. Itchy skin, redness, headache and dizziness have also been reported. If any of this effect continues then inform the doctor. Notify doctor if individual develop: muscle pain, muscle weakness, chest pain, vomiting[19].

DRUG INTERACTION: Use caution if the following drugs are combined with benzafibrate because serious side effect such as muscle injury infrequently could occur: statin (lovastatin, atorvastatin), higher dose of niacin. Inform doctor of any over counter or prescription medication you may take including: blood thinner, cyclosporine, antidepressant, estrogen, birth control pills [17].

BRAND NAME: Benzalip[28].

FENOFIBRATE

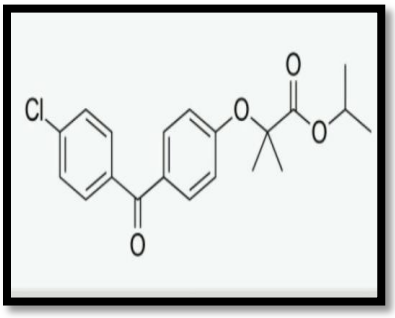


Fig. 8

It is lipid lowering drug, possessing a prominent action of serum triglycerides. It reduce uric level, by increasing the urinary excretion of uric acid. It is mainly used for primary hypercholesterolemia.

MECHANISM OF ACTION : Enhanced catabolism of triglycerides-rich particle and secretion of VLDL underlie the hypotriglycerides effect of fibrates, where as their effect on HDL metabolism is associated with change in HDL apolipoprotein expression. It is fibric acid derivatives, a prodrug comprising fenofibric acid linked to an isopropyl ester. It is lower lipid level by activating peroxisomes proliferator activated alpha (PPARα) PPARα activates lipoprotein lipase and reduce apoprotein C-III, which increase lipolysis and elimination of triglycerides-rich particle from plasma[21].

SIDE EFFECT : This medication may rarely cause gallstones, liver problems and muscle problem. Rarely, this medication has caused severe lowering of HDL level. Side effect includes: sudden pain /redness/swelling usually in the leg, sign of infection. A very series allergic reaction to this drug is rare. However, get medical help right away if you notice any symptoms of a serious allergic reaction including: rash, itching/swelling, severe dizziness, trouble breathing[22].

DRUG INTERACTION : Interaction may change how medication work or increase risk of serious side effect. Some products that may interact with this drug include: “blood thiner” eg. Warfarin. It is very similar to fenofibric acid. Do not use medication containing fenofibric acid while using fenofibrate[22].

BRAND NAME: Antara, Fenoglide, Lipofen, Lofibra[28].

GEMFIBROZIL

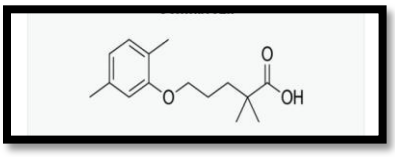


Fig. 9

The fibric acid derivatives it is an antilipemic drug. It lower plasma triglycerides level by increasing breakdown and suppressing hepatic synthesis of glycerides. It is effective in hyperlipoproteinemia and the raised level of blood cholesterol.

MECHANISM OF ACTION : However, several there is regarding the very low density lipoprotein effect; it can inhibit lipolysis and decrease subsequent hepatic fatty acid uptake as well as inhibit secretion of VLDL; together these section decreases serum and increases HDL cholesterol: the mechanism behind HDL elevation is currently unknown[24].

SIDE EFFECTS: GL distress, Muscloskeletal pain, Increased incidence of gallstone, Increased risk of cancer[23].

DRUG INTERACTION: Anticoagulants: gemfibrozil potentiates the action of warfarin and indanedione anticoagulants. Statins dugs: concomitant administration of fibrates with statin drug increases the risk of muscle cramoing, myopathy and rhabdomyolysis. It inhibits the action of the liver's cytochrome-P450 system and CYP2C8, reducing hepatic metabolism of many drugs[22].

BRAND NAME : Lopid[28]

6..4 Miscellaneous

6.4.1.EZETIMIBE

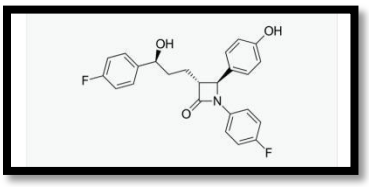


Fig. 10

It's medication used to treat high blood cholesterol and certain lipid abnormalities. Cholesterol synthesis or increases bile acid excretion are not inhibited by these drug. It acts as localized on border of intestine and check absorption of cholesterol which leads to a decrease in delivery of intestine cholesterol to liver.

MECHANISM OF ACTION : Absorption of cholesterol from the small intestine are inhibited by ezetimibe and lowering of cholesterol which is normally available to liver cell, leading them to absorb more from circulation, thus lowering level of circulating cholesterol. The critical mediator of cholesterol absorption is blocked by it[26].

CONTRAINDICATION: The two contraindication to taking ezetimibe are previous allergic reaction to it, including symptoms of rash, angioedema and anaphylaxis and serve liver diseases, especially when taken with statin. It may have significant medication interaction with cyclosporine and with fibrates other than fenofibrates[25].

SIDE EFFECTS: Common adverse drug reaction related to ezetimibe therapy include headache, diarrhea. Infrequent it also includes nyalgia and raised liver function test result. Hypersensitivity reaction occurs. In older adults: Muscle or joint pain, Stuffy nose, sinus pain, sore throat, Diarrhea, Pain in arm or leg[27].

DRUG INTERACTION: It interact with aspir 81 (aspirin), atorvastain , cholestyramine, cyclosporine, fluvastatin[26].

BRAND NAME: Zetia[28]

Conclusion

Nowadays, hypolipidemic drugs are widely used to treat hyperlipidemia and obesity. So, there is an necessity to aware the people about upcoming hazard. Sometimes it is a family disorder that is characterized by abnormally high level of lipid in the blood. In that there are also increases in cholesterol, triglycerides and lipoprotein including very low-density lipoprotein. This increase level of lipoprotein is leading risk factor correlated with cardiovascular diseases so, to treat like this diseases that antihyperlipidemic drugs are helpful.

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