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To access the prevalence, complications, diagnostic tools, and treatment of cholelithiasis in the age group of 20 to 60 Years

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Abstract

The prevalence of cholelithiasis among 20 to 60 years was unknown. We aimed to access the prevalence among this corresponding age group. As cholelithiasis is a gall stone disease and it is one of the common gall bladder diseases. In this disease, gall stones are formed which are hyperechoic in structure and they are three types like cholesterol stones, pigment stones, and mixed stones. Numerous diagnostic methods are used for the diagnosis of cholelithiasis are ultrasound scan, CT imaging, ERCP or MRCP, and HIDA tests. Among all of them, and Ultrasound scan was considered best in this study because of its specificity which was 99%. It was observed that Gall stone disease had an association with the patient age family history and gender.

Introduction

Cholelithiasis is a condition in which stones are formed in the gall bladder of human bodies. This condition in simple terms is called gallstones formation. These stones are hard in structure and are formed by an accumulation of digestive fluid bile in the gall bladder. The gall bladder is a tiny organ which is located just under the liver. The liver secretes a digestive fluid called bile which helps in digestion, it stores in the gall bladder and leaks into the duodenum for digestion. Cholelithiasis is a long-lasting hepatobiliary disease. The foundation of Gallstone disease (GD) is

the decreased metabolic reactions of cholesterol, bilirubin, and bile acids, which form stones in the bile duct of the liver or gall bladder. Cholelithiasis is a very prevalent disease in gastrointestinal diseases and causes a severe load to health care systems. (Stinton, 2012)

Gall stone disease as the name indicates the formation of gall stones in the human body. The components from which these stones are made are cholesterol in which there is no ester formation, bilirubin which is a waste product of blood, bilirubin calcium salts, mucin glycoproteins, fatty acids, phosphates, and calcium carbonates. Numerous types of gallstones are present in the human body. Some cholesterol stones are whitish or yellowish in color present in the gall bladder. These stones are round in shape, light in weight. The composition of cholesterol stones and mixed stones is chiefly dependent on cholesterol monohydrates and a mixture of calcium salts, glycoprotein, bile acids, and pigments. This mixture of salts and proteins is present in the gall bladder and radially precipitates. Scanning and transmission electron microscopic studies of the microstructure of lithogenic bile have indicated that lamellar vesicles with incorporated lipophilic and hydrophilic compounds are not only a precursor but also a major structural component of cholesterol stones. (Portincasa, 2021)

Symptoms of the gall stone include both symptomatic, and asymptomatic. Asymptomatic gallstones are gall stones with no symptoms. In this case, patients should require to take a consultation session with the doctor regarding their problem. Gall stone disease with no symptoms can be cured by using oral or parenteral analgesia. Doctors should also advise some dietary tips to patients to decrease the chance of persistent sessions of this disease. If there is a chance of recurring repeated occurrence of this disease then in this case doctor recommends the patient to a surgeon for elective laparoscopic cholecystectomy. Today, laparoscopic cholecystectomy is the standard of care and most patients are managed as outpatients. Symptomatic gall stones patients will require hospital care in their treatment. They need intravenous antibiotics for their cure. Choledocholithiasis require consultation from the gastrointestinal department of the hospital and ERCP or MRCP. Patients with cholangitis are usually ill-appearing and septic. They often also require aggressive resuscitation and ICU-level care in addition to surgical intervention to drain an infection in the biliary tract. (Ros, 2020)

Factors that Responsible for the Disease among these age groups.

1. Overweight and obese.

Overweight and obese personalities must possess an ability to suffer from cholelithiasis. Overweight and obesity are joined by expanded union and discharge of cholesterol into bile. Simultaneously, the measure of delivered cholesterol is straightforwardly relative to being overweight. Weightiness increases the risk factor of cholelithiasis in men. Bigger weight vacillation and more weight cycles are related to more noteworthy risks. ADRB3 is called beta3-adrenergic receptor is a transmembrane receptor that is located or present in fat tissue and has a role in lipolysis regulation. This receptor is also present in gallbladder tissue for its contraction. It is observed that the ADRB3 Trp64Arg polymorphism is related to gallstone infection, in this manner addressing a hereditary marker that recognizes subjects at higher danger for gallstone arrangement. . Low-caloric food slims down obese patients bring about salve like bile and stones in 25% of cases. On account of sidestepping a medical procedure for weight, the probability of cholelithiasis is significantly higher: half of the patients are found to include cholelithiasis postoperatively. Weight reduction is joined by the raised degrees of mucin and calcium in the cystic bile, in this manner leading to biliary ooze and stones in the gallbladder. (Everhart, 2013)

2. Diet

A high level of cholesterol in food increases the level of bile. A low-fiber diet eases back travel of the gastrointestinal substance, which advances the expanded arrangement and retention of optional bile acids and the improved lithogenic properties of bile. Refined sugars increment cholesterol immersion of bile while little portions of liquor have the contrary impact. A research study in the US has shown that drinking 2-3 cups of coffee on daily basis diminishes the effect of having gallstone disease. Long haul parenteral sustenance advances gallbladder dilatation and hypokinesia and brings about gallstones. (Ellegård, 2017)

3. Liver and pancreatic diseases.

Liver cirrhosis is a disease of the liver which is called liver cancer. Patients with liver cancer have a chance of gall stone disease. 30% of patients were detected with Gall Stone disease. Patients with hepatitis C and Hepatitis B have an expanded risk of gall stone disease. A study has shown that in biliary cirrhosis disease 39% of patients were experienced stones formation in bile ducts. Fatty liver is a cause of gall stone disease. Sugar patients or patients having Diabetes mellitus are in danger of having gall stone disease which is linked with hypercholesterolemia. In adipocytes,

tissues polymorphism of genes code for retinoid X receptor and peroxisome proliferators-activated receptor enhances the cause of occurring cholelithiasis in humans. (Ellegård, 2017)

Side effects because of the prescribed medicine among the patients.

(1) Octreotide.

Octreotide is equivalent to somatostatin and it decreases the release of cholecystokinin which is a hormone that plays an important role in the inhibition of gall stone formation but this drug inhibits the release of this hormone causing gall stone disease. It also reduces the movement of the gall bladder and results in stasis of the gall bladder. By decreasing the release of cholecystokinin stasis also occurs in the intestines and this stasis causes the release of secondary bile acid named deoxycholic acid. Deoxycholic acid increases cholesterol secretion, mucin formation, and accumulation of cholesterol crystals and causes the formation of stones. Greater than 50% of patients receiving octreotide accordingly will develop cholelithiasis, although the majority are asymptomatic. (Portincasa, 2021)

(2) Ceftriaxone.

Ceftriaxone is an antibiotic, not properly metabolized in the liver and secreted in bile cause pseudolithiasis in persons who are in taking this medicine. (Cuzzolin, 2021)

(3) Thiazide diuretics.

A research study has shown that taking thiazide increases the level of cholesterol in a body and causes a high risk of acute cholecystitis in one research study has indicated that those women who take this medicine have a 57% of chance of getting cholecystectomy. (Cuzzolin, 2021)

(4) Statins.

Statins are the drugs that reduce the HMG-CoA reductase enzyme which prevents cholesterol secretion and decreases its secretion in bile resulting in reduced gall stone disease in patients. (Cuzzolin, 2021)

Diagnostic Approaches.

Many methods are used for the diagnosis of cholelithiasis like CBC, CMP, PT/PTT, lipase, amylase, Alk Phos, total bilirubin, urine analysis. Ultrasound is the best diagnostic method to diagnose gall stones. It is a good method because its sensitivity was 84% and specificity was 99%. Under the ultrasound scan method radiology ultrasound is used to detect gall stone disease.

Different research studies have shown that one other type of ultrasound which was point-of-care ultrasound is a good method to diagnose gall bladder disease. Hyperechoic structure is a gall stone structure which was appeared in ultrasound scans according to different studies and these stones also showed distal acoustic shadowing. Gallbladder sludge can also be seen with the ultrasound method but sludge cannot show any acoustic shadowing's. If all the above-mentioned symptoms or scans appeared then it means a person is suffering from acute cholecystitis: thickened anterior gallbladder wall the presence of pericholecystic fluid or positive sonographic Murphy's sign. Choledocholithiasis is a disease in which the common bile duct increases in size and this can also be measured in an ultrasound scan. Common Bile Duct normal range is 4mm in persons of 40 years of age. Post-Cholecystectomy patients are allowed up to 10 mm in diameter after the gall bladder and at this time bile duct becomes the main duct. (Hay, 2010)

HIDA Scan is also called nuclear medicine cholescintigraphy scan is used to find out cholecystitis. In this scan, a radioactive tracer is injected into the peripheral vein of the liver from where it enters the bile and reaches into the gall bladder within 4 hours. If the gall bladder is diseased or has stones then it prevents the entry of radioactive tracer from getting enter in the gall bladder. HIDA scan has 97% sensitivity and specificity of 94% in diagnosing acute cholecystitis. CT imaging is done for common bile duct dilation and it can also be used in the detection of pancreatic inflammation. This Ct Imaging is also useful in finding reasons for abdominal pain if an ultrasound scan rejects the biliary disease. ERCP or MRCP are tests called endoscopic or magnetic retrograde cholangiopancreatography are useful in patients suffering from jaundice, common bile duct disease, or cholangitis but these tests are used after an ultrasound scan. ERCP is an intrusive test and it requires a dye for diagnosis of gall stone disease. This test is very effective in diagnosing stenting, stone extraction, biopsy, etc. MRCP, on the other hand, is non-intrusive and contrast dye is not required for a diagnosis of disease. (Hay, 2010)

Methodology

We designed a cross-sectional study for the patients who were between 20 years and below 60 years. These patients were those participants who were come to the Radiology Department in between the duration of 2020-2021 for the abdominal ultrasonography (USG). Our target participants were those who sign the consent form. Patients' demographic information was taken, and the other crucial data that were collected from the patient was recorded. Patients' weight was

measured with the use of a mechanical scale, height was measured with the use of the graduated paper strip that was attached to the wall. With the use of ultrasound machines gallbladder was assessed. All the sonographic investigations were under the supervision of the radiologist consultant. Corresponding data were accessed with the use of the Microsoft database. After that statistical analysis was performed with the use of SPSS. Continuous variables were reported as the mean and the standard deviation. Whereas categorical variables were reported as the proportions. We defined Cholelithiasis as the presence of gallstones after performing the Ultrasound practices. Prevalence of the gallbladder was reported as 95% with confidence intervals. It was observed that there was a linkage between cholelithiasis and the demographic variables. This study was approved by the ethical review committee.

Results:

Patient demographics are summarized in Table 1. There were 2000 patients in the study. 53% were female. The mean age was between 60 ± 18 years, and the mean, body mass index mean was 24.0 ± 5.5 . It was observed that the prevalence was higher among females than males as it were 6 in females, and 4 in males. Prevalence in the young age group was more than in later age as it was 5% in 20-35 group and in 36-60 group it was 3.

Table 1. Demographic Information of the Participants.

Variable	Female	Male	Total.
Age, Mean SD	60.9 ± 10.9	60.0 ± 10.9	60 ± 10.9
>60	550	250	800
>20	690	455	1200
Missing	10	5	15
BMI	Male	Female	Mean
<18.5	12.7	13.1	12.9
18.5-24.9	41.3	54.0	47.1
25.0-29.9	22.0	21.6	21.8

>30.0	18.7	6.9	13.3
Missing	5.3	4.4	4.9
Family History	Yes	No	Mean
Female	1.5	1.2	1.3
Male	1.2	1.5	1.3

This table presents the age of the participants and their mean. Moreover, BMI is presented for the male, and female, and its mean. Also, family history about the diseased in males, and females and its mean.

Table 2. Findings of the gallbladder for the participants.

Finding	Frequency	Prevalence with CI (95%)
Normal	1900	95%
Gallstones	100	5%

This table presents the data of the gallbladder finding which shows that 95% of people have healthy gallbladder whereas, 5% were shows the gallstones in their gallbladder.

Table 3. Prevalence of cholelithiasis.

Prevalence	Female. (95%CI)	Male. (95% CI)	Total. (95% CI)
Sex	6	4	5
Age			

<20	3	3	3
<40	9	5	7
BMI			
<18.5	6	7	6
18.5-24.9	5	4	5
25.0-29.9	7	2	5
>30.0	9	5	8

Discussion

Gallstone disease is also called cholelithiasis and it is one of the common medical problems which leads a person to surgery. In the US five lakh cholecystectomies have been performing. This gall stone disease affects almost 10% of the population consists of adults. Gall stone disease has a clear relationship with age. A research study has demonstrated that people over 40 years of age and 30% of people who are above 70 years of age suffer from biliary calculi. This disease is present more in females as compared to males during their reproductive years 4:1 ratio. (Portincasa, 2016.) A research study has shown that 6% of men and 9% of women have gallstones in the United States but with no symptoms means asymptomatic. These patients were asymptomatic and they found this disease accidentally and the occurrence of symptoms of gall stone disease in asymptomatic patients is 1 to 2 % in one year. Asymptomatic gall bladder does not need treatment unless they develop symptoms. 20% of patients having asymptomatic gall bladder will be able to develop a disease after 15 years. After 15 years they become symptomatic and cause different diseases like cholecystitis, cholangitis, choledocholithiasis, gallstone pancreatitis, and rarely cholangiocarcinoma. (Everhart, 2013)

Cholelithiasis disease is also caused due to cytostatic therapy during organ transplantation. In a research study, it has been noticed that 13%-60 of gall stone formation in acromegaly patients taking octreotide medicine. Ceftriaxone is a medicine and it causes precipitation of bile in children who are above 12 years and dose of ceftriaxone is more than 2 g/d, and if intake of ceftriaxone is more than five days because this medicine is used to treat infections in children. Its elimination pathway is in urine but sometimes it is not properly metabolized in the liver and becomes secreted in bile. Cholelithiasis risk becomes an increase in obese patients and insulin resistance. **(Cuzzolin, 2021)**

Gall stone disease is not very common in children but is not exceptional. It is found in children but with no symptoms. After 20 years of age, the risk of getting cholelithiasis increases with time. Under the age of 50 years gall stone disease is 7 -11% and calculi disease is detectable in 11 to 30% of 70 years of age. A relationship occurs between age and bile synthesis but a positive relationship exists between cholesterol levels and age. With the age there is hemoperfusion exists in the gall bladder wall due to sclerotic changes. This hemoperfusion causes disturbance in the function of the gall bladder and its inflammation with exudation into an organ lumen. (Ros, 2020)

Conclusion.

Cholelithiasis is a condition in which stones are formed in the gall bladder of human bodies. This condition in simple terms is called gallstones formation. These stones are hard in structure and are formed by an accumulation of digestive fluid bile in the gall bladder. The gall bladder is a tiny organ which is located just under the liver. The liver secretes a digestive fluid called bile which helps in digestion, it stores in the gall bladder and leaks into the duodenum for digestion. Cholelithiasis is a long-lasting hepatobiliary disease. The foundation of Gallstone disease (GD) is the decreased metabolic reactions of cholesterol, bilirubin, and bile acids, which form stones in the bile duct of the liver or gall bladder. Cholelithiasis is a very prevalent disease in gastrointestinal diseases and causes a severe load to health care systems.

Patients who are suffering from gall stone disease suffered from right upper quadrant pain and diagnosis reveal that the person suffering from quadrant pain has gall stones. How gall stones could be managed depends on the symptoms of patients. Asymptomatic patients are guided by doctors to use a low-fat diet, exercise, and weight loss. Asymptomatic patients with gall stones do

not require surgery. The doctor and nurse have a duty to tell patients that just only 50% of persons become symptomatic patients means they develop symptoms with gall stones. Doctors must guide patients that a low-fat diet, exercise, and weight loss are very important for them to prevent gall stone disease. The pharmacist must tell patients that getting treatment by using ursodeoxycholic acid has some pros and cons and it is time taking and dissolves only some stones which are made by cholesterol and works only for 50% of cases. Symptomatic patients need surgery and standard care is using laparoscopic cholecystectomy which is performed as an outpatient. Some patients with gallstones may develop bile duct stones or cholangitis and need admission. After surgery, the patients must have to visit a nearby clinic to check themselves to prevent themselves from any complications.

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