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RESEARCH ARTICLE

GALLBLADDER STONES SPECTRUM IN SAUDI POPULATION BY USING ULTRASONOGRAPHY

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Abstract

Objective: This study was designed with an aim to determine the incidence of gallbladder stonesandto evaluate the accuracy of ultrasonography in the diagnosis of calculus, occur in Saudi patients whom presents at the Radiology and Ultrasound Department.

Materials and method: Retrospective study in the period 22 August 2020 to 22 December 2020, a total of 108 patientsunderwentultrasound. When the gallbladder is investigated using ultrasound imaging (US) modality. Ultrasound instrument used was spatial digital U22 Philips Convex probe 3.5 Data analysis performed using the tables and computerized systems,ultrasound using different types of ultrasound units with 3.5 MHz and 5 MHz curve linear probes.Statistical analysis was performed using Microsoft Excel Software and the Standard Statistical Package for the Social Sciences version 15 for windows.

Result: Out of 108 examined samples [mean age of 29 years; male to female ratio of .9:1].Gallstones in this study were more common in the age range from 2 to 39, (58.3%).The most common causes of gallbladder stones are, 0ral contraceptives44(40.7%),Cholesterol28 (25.9%),Biliary dyskinesia 17 (15.7%),Diabetes 12 (11.1%),and Spinal cord injury7 (6.5%)one of the commonest complaints is upper abdominal pain,52(48.1%) and in majority of the cases the etiology is treatable,Nausea30 (27.8%) andVomiting 26(24.1%).Confirmation is done by CT scan 20 (18.5%) for the cases of small gall stones (<2mm) and impacted stones in cystic duct and operations, Cholecystectomy 14(13%) were done for stones large than (>2 cm), who have a nonfunctional or calcified (porcelain) gallbladder and patients for spinal cord injured.

Conclusion: Ultrasound (US) is the preferred method for evaluating gallstones with 96% accuracy. The number, size and calcification can be evaluated by virtue of US inversion and attenuation. If there are more than five stones, the accuracy decreases.

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Introduction:-

In the US, 10–20% of the adult population has gallstones. Whilst the majority of individuals with gallstones remain asymptomatic, 2–5% of the 20 million individuals with gallstones experience symptoms each year[1]. The majority of the 500,000–750,000 cholecystectomies performed annually in the US are for biliary pain or cholecystitis,

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making it the most common abdominal surgical operation in the US[2].Gallstones are a very common finding in adults of Western industrialised countries. At age 60 almost 30% of women and 20% of men will have developed gallstones Gallstones are rare in children[3]. The prevalence of gallstonesis most probably equal between the sexes until puberty, thereafter prevalence increases faster with increasing age among women than men. Gallstones occur more among women than among men at almost every age. After the menopause, theincrease seems fairly equal in the two sexes with a marked narrowing of the gender gap with advancing age[4]. The vast majority of gallstones are asymptomatic and require no follow-up; however, approximately 10–15% of gallstones will become symptomatic over a period of 10–15 years of follow-up [5, 6]. The symptomatic manifestations of gallstones are variable and range from mild symptoms such as biliary colic to severe acute presentations such as pancreatitis, which can be associated with significant morbidity and mortality.Due to the factthat the symptoms of gallstones are varied and may resembleother disorders, it is important to have tools that accuratelyconfirm or exclude suspected gallstone disease[7].Ultrasonography (US) is the method of choice for evaluation of gallbladder stones with an accuracy of 96%. Number, size and calcification can be assessed by virtue of US reflection and attenuation[8].Calculouscholecystitis refers to infection and inflammation of the gallbladder wall caused by irritation from gallstones, and this can be an acute or chronic process. The typical clinical presentation of acute cholecystitis is of right upper quadrant pain, with or without radiation to the right shoulder, which is more constant compared to the intermittent pain seen in biliary colic[9].There is usually associated pyrexia and other infective symptoms such as nausea and vomiting. The typical imaging features of acute cholecystitis are as follows: gallbladder wall thickening, pericholecystic fluid and a distended gallbladder [10].

Materials and methods:-

Prospectively, All patients are going through ultrasound examination, after clinical investigation. Ultrasound examination is done according the following, measurement of gall stone, tenderness during movement of transducer on the body, due to partial or complete obstruction in gallbladder result from cystic duct stone and case of acutecalculouscholecystitis.

Measurement for thickness of gallbladder wall is done.108 patients referred to the ultrasound departments for abdominal ultrasound either symptomatic or asymptomatic subjected to ultrasound using different types of ultrasound units with 3.5 MHz and 5 MHz curve linear probes. Spatial digital iU22 Philips Convex probe 3.5 Data analysis performed using the tables and computerized systems. Technique patient routinely line supine but use the curvilinear probe for the best image. The gallbladder is your window. Placing the patient in left lateral decubitus position can be veryhelpful. The gallbladder may lie beneath the lower right ribs, obscuring itsview. In this case, the patient may be asked to take and hold a deepbreath in order to move the gallbladder inferiorly.Sound is mechanical energy transmitted by pressure waves in a material medium.This general definition in encompasses all types of sound, including audible sound,Low-frequency seismic waves, and ultra sound used in diagnostic imaging.

Result:-

The study was conducted at the Radiodiagnosis Department 108 patients 50 (46.3%) males and58 (53.7%) females) ratio of males to females is 0.9:1. Presented to ultrasound examination, the mean age of the patients was 29 years (Range 2–96 years) (Figure.1).

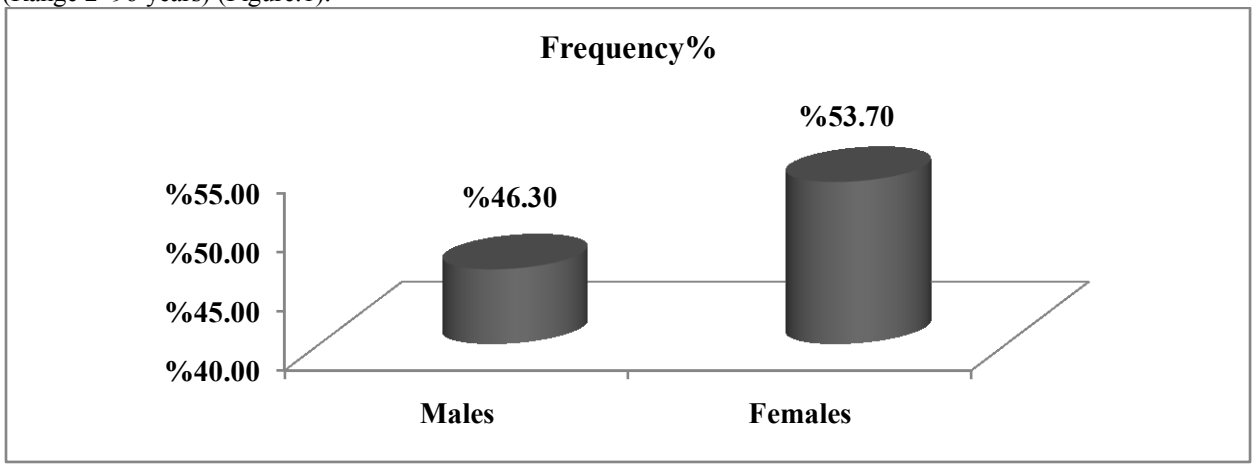

Fig (1):- Show distribution of 108 patients for gallstone according to males and females.

Gallstones in this study were more common in the age range from 2 to 39, (58.3%) and also there is increased incidence with increase of age 59 to 77 years old (22.2%) as well in females more than males.The average of patients with gallstones, are found between the ages of 59 to 77, and less between 78and 96,the prevalence increases with age in females (Figure.2).

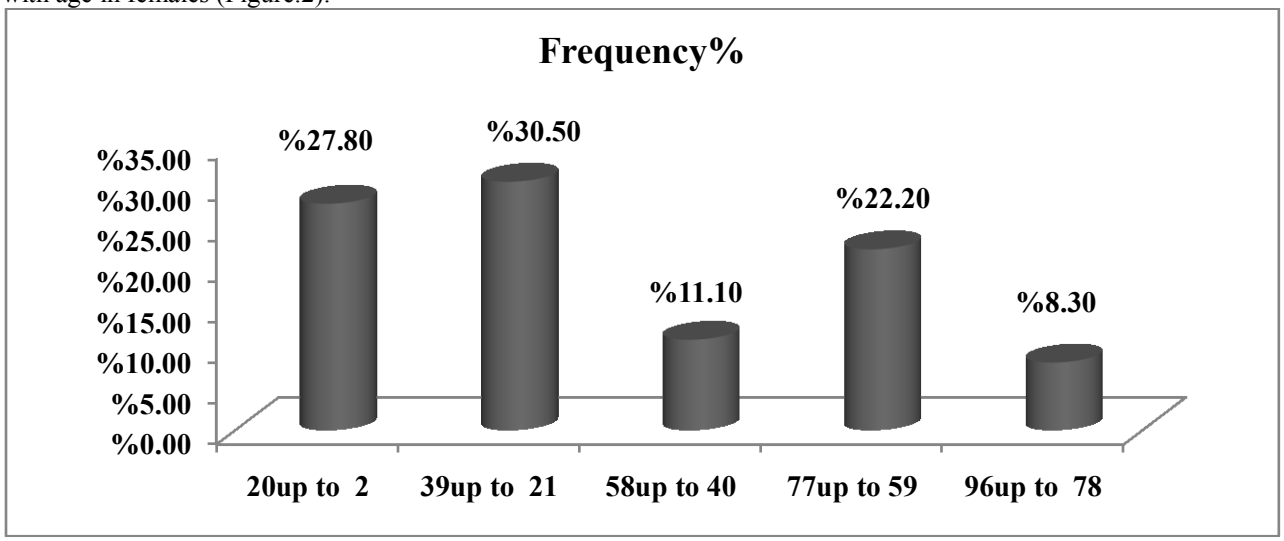

Fig (2):- Illustrate distribution of gallstone according to range of age out of 108 patients.

Normally, the bilecontains enough chemicals to dissolve the cholesterol excretedby the liver. But if the liver excretes more cholesterol than thebile can dissolve, the excess cholesterol may form into crystalsand eventually into stones.Certainconditionscause the liver to make too much bilirubin, including livercirrhosis, biliary tract infections and certain blood disorders.The excess bilirubin contributes to gallstone formation.. If the gallbladderdoesn't empty completely or often enough, bile may becomevery concentrated and this contributes to the formation ofgallstones [11]. The most common causes of gallbladder stones in present study are, 0ral contraceptives44(40.7%),Cholesterol28 (25.9%),Biliary dyskinesia 17 (15.7%),Diabetes 12 (11.1%),and Spinal cord injury 7 (6.5%)(Figure3).

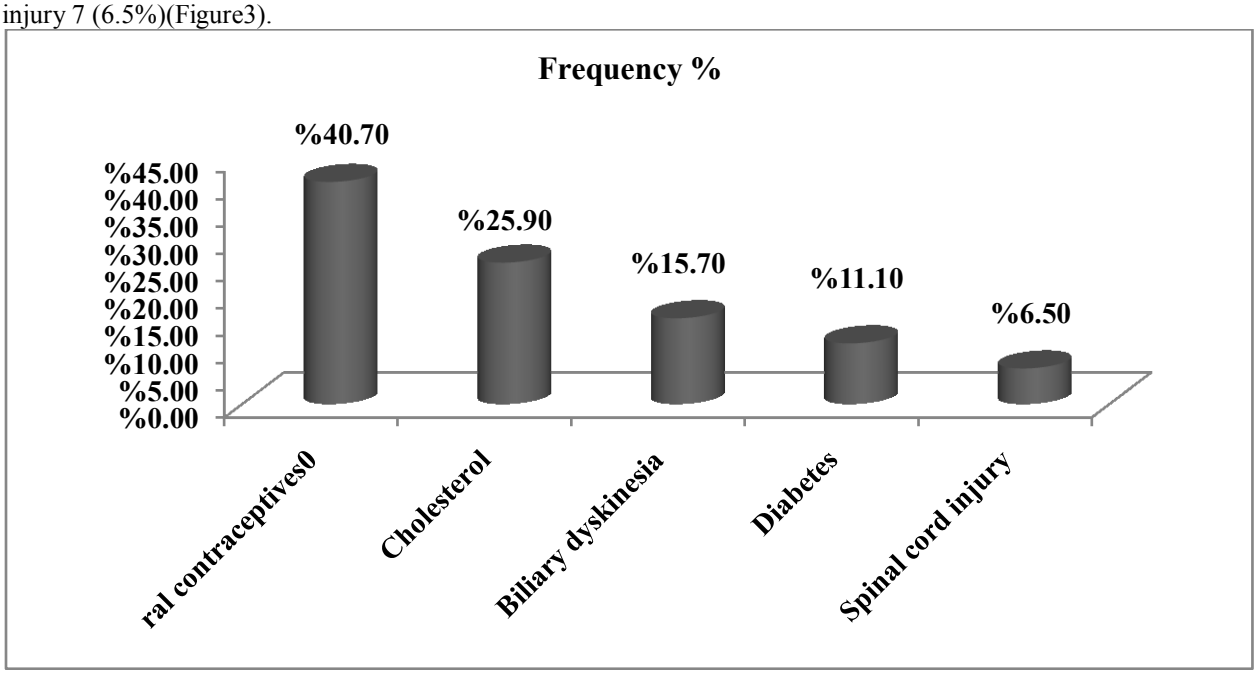

Fig (3):- show distribution of causes for gallstone out of 108 patients.

The most common type of gallstone, called a cholesterol gallstone 75%.These dark brown or black stones form when thebile contains too much bilirubin, calledpigment gallstones. Last type mixed gallstones. In our study the

patients of gallstones have the following symptoms,one of the commonest complaints is upper abdominal pain,52(48.1%) and in majority of the cases the etiology is treatable[12]. Nausea 30 (27.8%) andVomiting 26(24.1%), (Figure 4),

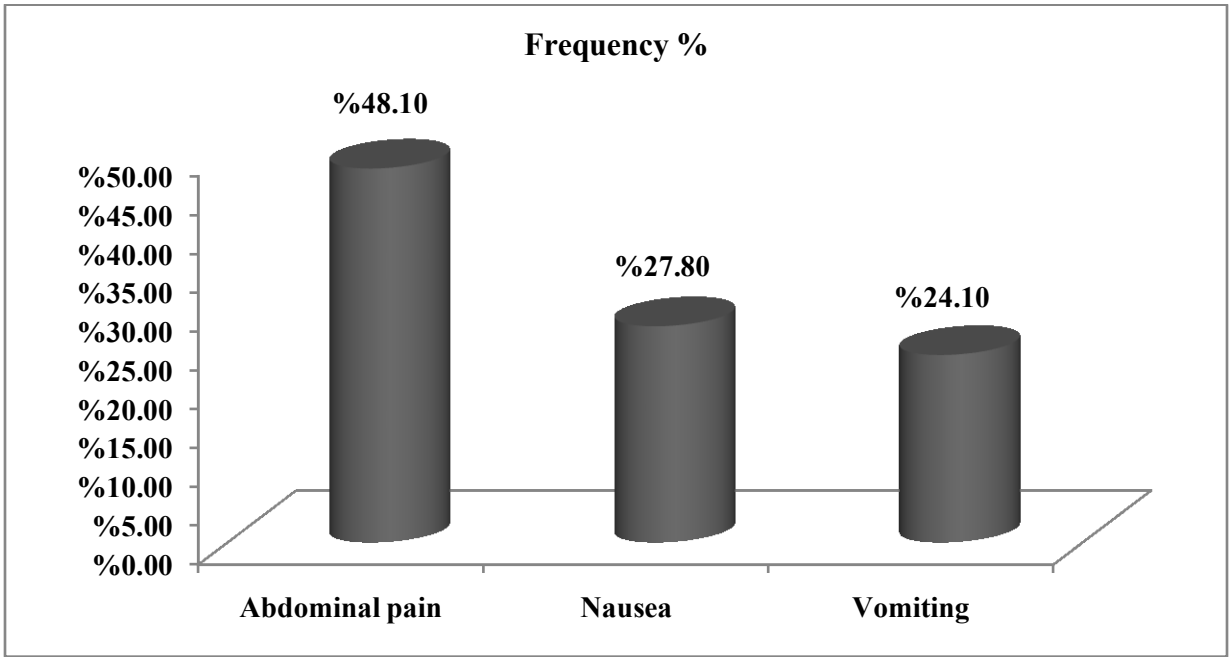

Fig (4):- Show distribution of symptoms for gallstones out of 108 patients.

Because people with diabetes are at an increased risk of developing gallstones, Krikorian says, it's important to know the symptoms of common gallbladder problems, such as gallstones [13].

Gallstones of diabetic patients occurred in 14.8% males and 13% females (Figure.5).

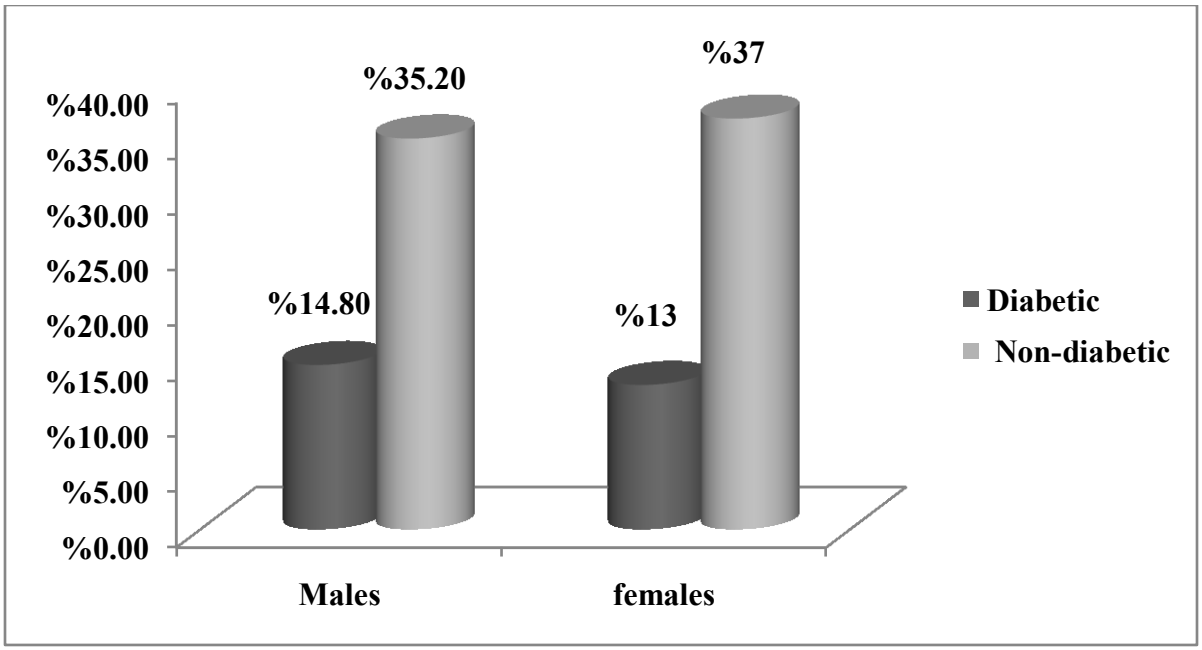

Fig (5):- Show distribution of diabetic and non-diabetic patients according to gender.

Adherent gallstones and gallbladder sludge may beimmobile and mimic true gallbladder polyps.

But the gallstones give posterior caustic shadow while the polyps not give caustic shadow.Gallbladder polyps are growths that protrude from the lining of the inside of the gallbladder. Polyps can be cancerous, but they rarely are. About 95% of gallbladder polyps are benign[14].

In this study polyps presented in 4 (3.7%) cases and calcification in 4(3.7%) patients, beside the measurement of size for gallbladder stones. Some confirmation for diagnosis is done by CT scan and operation (Table.1&Figure6).

Table (1):- Show distribution of gallstones, polyps and calcification according to type of investigation.

Type of examination	**Pathological change**				
US	**stones**			**Polyps**	**calcification**
	Size			4	4
	1-5mm	6-10mm	7-25mm		
	26(24.1%)	67(62%)	7(6.5%)		
	Single	**multiple**			
	64(59.3%)	36(33.3%)			
CT scan	**Cystic duct**	**≤ 2mm**	**Complications**		
	3	8	9		
Confirmation by operation	**< 2cm**	**calcified (porcelain)**	**high risk of gallbladder carcinoma**		
	4	7	3		

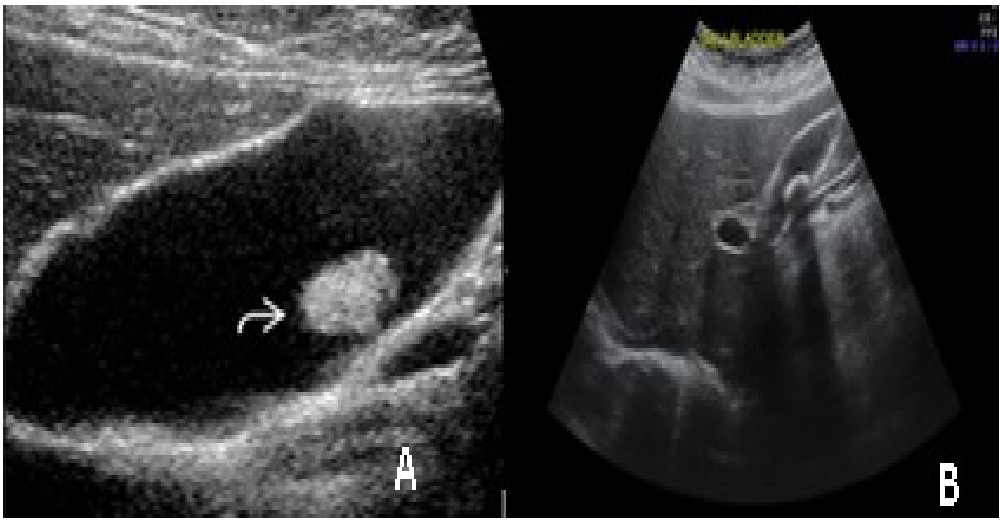

Fig (6):- Show differential diagnosis between polyp (Image A) and gallstone with posterior caustic shadow (Image B).

All single stones plus multiple stones except cystic duct stones (97) plus three polyps and two calcifications, the total 102 assume to be true positive. Other three stones in cystic duct shown in CT scan, plus two cases calcifications and one polyp, have missed in ultrasound examination, assume false negative. The sensitivity of US in the present study fordetecting gallstone 94% and accuracy 96%. Calculouscholecystitis (wall of gallbladder measurement more than 3.5mm) refers to infection and inflammation of the gallbladder wall caused by irritation from gallstones, in this study found in five cases out of 100 patients (Figure. 7)

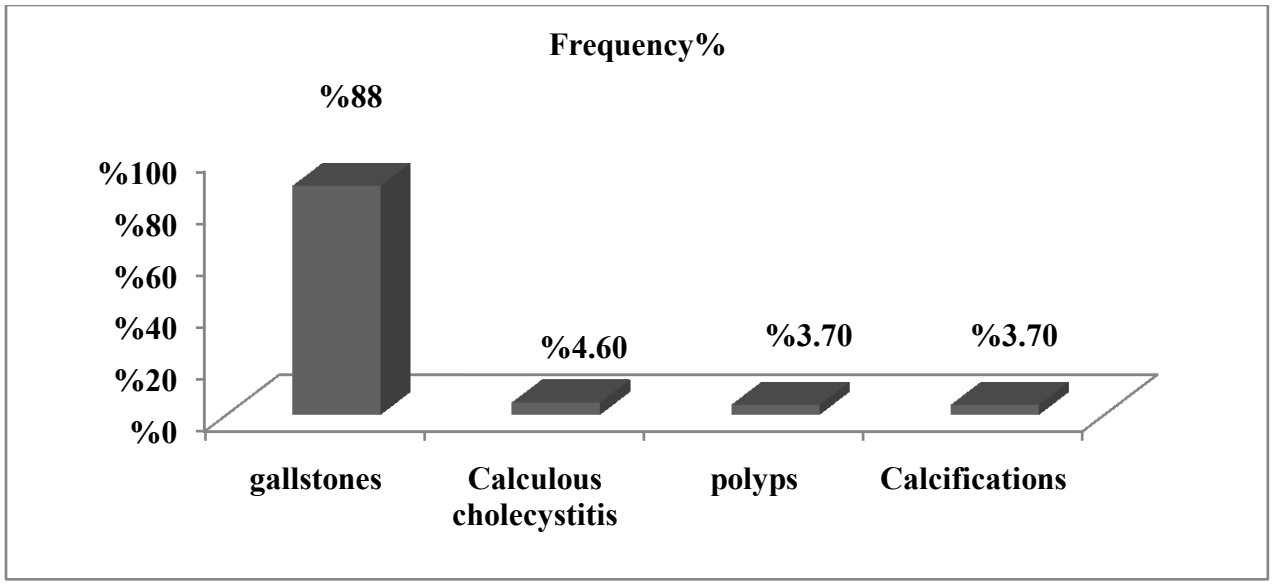

Fig (6):- Show distribution of pathological change out of 108 patients.

Discussion:-

Ultrasound is the method of choice for detection of gallstones , offering several advantages is that it has high sensitivity and accuracy, noninvasiveness, the option of performing a bedside examination, lack of ionizing radiation, relatively low cost, and the ability to evaluate adjacent organs.[15] in this study finding of gallstones were 100 patients (92.6%) and acalculouscholycytitis were 5 patients (4.6%).

Ultrasound has the best sensitivity and specificity for evaluating patients with suspected gallstones [16]. As reported in the literature [17]. Some ultrasonographic findings are more strongly associated with acute cholecystitis than others, positive Murphy's sign (pain is provoked by either the transducer or the sonographer's palpation under guidance, in the exact area of the gallbladder) is reported to have sensitivity as high as 88% [18,19]. Ralls at al.The sensitivity of US in the present study fordetecting gallstone 94% and accuracy 96%.

Visualization of gallbladder wall thickening in the presence of gallstones using ultrasound has a positive predictive value of 95% for the diagnosis of acute cholecystitis . An increased gallbladder wall thickness of > 3.5 mm has been found to be a reliable and independent predictor of acute cholecystitis [20].

The result of this study same as " Muneer Ahmed" result, 2010 [21].The number of men and woman's are the same in number with small variation46.3% for men and 53.7% forwomen but he has found in his study53% for woman and 47% for men.Pinto et al 2013 [22], also they found in their study same result of present study.Although ultrasound has been demonstrated to have an accuracy (>95%) for the identification of gallstones.

Conclusion:-

Ultrasonography is an accepted procedure to establish the presence of gallstones inthe gallbladder. It is fast, it is convenient, there is no radiation risk, the reliability of themethod is high and it is widely available for a broad range of physicians including general practitioners.

A higher rate of accurate diagnosis can be achieved using a triad of positive Murphy sign, elevated neutrophil count and an ultrasound showing cholelithiasis or cholecystitis.If the margins of the gallbladder are indistinct, as in patients with gallbladder carcinoma or xanthogranulomatouscholecystitis, or if perforation or abscess are suspected in case of complicated cholecystitis, CT or MR imaging may be useful to assess the extent and character of the disease process.

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