ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 12 | December - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ULTRASONOGRAPHIC CHARACTERISTICS OF GALLBLADDER DISEASE IN PREGNANT WOMEN: A CROSS SECTIONAL STUDY

Radio-Diagnosis

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ABSTRACT

Background Gallstones and biliary sludge can make gallbladder disease worse during pregnancy. Although gallbladder disease can also affect men, research has revealed that women are more likely than men to experience this condition. Gallstone illness is not as common among south Indians (4.87%) as it is in western nations and north Indian research. Prenatal physical activity, a high body mass index, and a history of gallbladder illness are risk factors for gallbladder disease during pregnancy. An increase in estrogen during pregnancy that indirectly increases the cholesterol saturation of bile may be the cause of gallbladder disease in pregnant women. **Aim** This study sought to determine the prevalence of gallbladder disease in south Indian women who were pregnant and to clarify any relationships between pregnancy and ABO blood group. **Materials And Methods** About 600 pregnant women were included in this prospective observational study from September 2020 to September 2022. Blood group and hemoglobin levels were noted, and a sonographic examination was carried out using a Siemens ultrasound scanner. Software called SPSS was used for the statistical analysis. **Results** Gallbladder disorders were significantly associated with age (P = 0.01). While 587 (97.8%) of pregnant women had healthy gallbladders, 10 (1.7%) had gallstones and three (0.3%) had biliary sludge. In this study, 9 (3.3%) multigravida women with gallstones were observed, compared to just one (0.5%) primigravida woman. Blood type O was present in all of the pregnant women who had gallstones. Two of the two ladies who had biliary sludge belonged to blood type A, whereas the other belonged to blood type O. **Conclusion** In this investigation, the prevalence of gallbladder illness rose with age. Gallstones were more common than sludge during pregnancy. Additionally, among women who already had gallstones, the likelihood of developing gallstones rose with the number of pregnancies. When performing abdominal sonography while pregnant, the gallbladder needs to be taken into consideration.

KEYWORDS

gallstones, biliary sludge, gallstones, pregnancy, ultrasonography

INTRODUCTION:

Gallstones and biliary sludge can make gallbladder disease worse during pregnancy. Although gallbladder disease can also affect men, research has revealed that women are more likely than men to experience this condition[1]. Compared to non-pregnant patients, pregnant patients experience gallstones more frequently. Pregnant patients with gallstone illness (i.e., symptoms associated with gallstones) are more likely to have maternal and newborn morbidity than pregnant women with asymptomatic gallstone disease[2].

Gallstone disease is divided into uncomplicated (such as biliary colic) and complicated (such as acute cholecystitis, choledocholithiasis, cholangitis, and gallstone pancreatitis) disease, just like in non-pregnant patients. Supportive therapy typically results in the temporary relief of symptoms in pregnant women with biliary colic, although symptoms frequently return later in pregnancy or after delivery[3].

In India, the northern and north eastern states of Uttar Pradesh, Bihar, Orissa, West Bengal, and Assam have the highest rates of gall bladder disease. The most common digestive cancer in women in northern Indian towns is gall bladder, which affects women two times more frequently than men[4,5]. According to data from six cancer registries maintained by the Indian Council of Medical Research (1990–1996), the incidence of gall bladder cancer is 10 times lower in the south of India than in the north, with the age-adjusted incidence rate for females in Chennai in the south and 8.9 in Delhi in the north[6].

A thorough geographic tracking of 773 gall bladder disease patients who visited Tata Memorial Hospital in Mumbai between 1990 and 1995 revealed that the majority of patients, despite the possibility that hospital statistics and cancer registries do not accurately reflect true prevalence[7].

The likelihood of developing gallbladder disease also varies by region. For instance, 10%–15% of adults in the United States have gallstones. Gallstones are more common in some cultures, such as those of Latin American nations, where they can affect up to 50% of adult women[8]. Gallstone illness is not as common among south Indians (4.87%) as it is in western nations and north Indian research. The low prevalence was likely brought on by the low socioeconomic position, diet, and way of life[9]. The most significant risk factors for gallbladder disease are obesity (and the metabolic syndrome that results from it, nutrition, and hormones. Prenatal physical activity, a high body mass index, and a history of gallbladder illness are risk factors for gallbladder disease during pregnancy. An increase in estrogen during pregnancy that indirectly increases the cholesterol saturation of bile may be the cause of gallbladder disease in pregnant women. Inhibition of gallbladder contractility, which may be brought on by a greater progesterone level, may possibly be the cause[3,10].

In order to clarify any associations between gallbladder disease in pregnancy and gravidity or the ABO blood group, this study sought to assess the prevalence, pattern, and characteristics of gallbladder disease in gravid south Indian women.

AIMS AND OBJECTIIVES

This study aims to assess the prevalence, pattern, and traits of gallbladder disease in gravid south Indian women and to clarify any relationships between gallbladder disease during pregnancy and gravidity and ABO blood group.

MATERIALS AND METHODS

This was a prospective observational study of six hundred gravid women at Sree Mookambika Institute of Medical Sciences, Kulasekharam from march 2020 to march 2022. The study was approved by the institutional board. Following the acquisition of informed consent, each subject was subsequently recruited. Only ladies who were asymptomatic and in clinical stability were included. We collected biodata through oral interviews. The individuals' antenatal clinic cards were used to acquire their hemoglobin genotype and blood group information.

The sonographic exams were performed on a Siemens ACUSON X300 scanner.On ultrasonography, the patient with sonographic murphy's sign with/without pericholecystic fluid was considered.

The exclusion criteria included patients with a history of cholecystectomy, ascites, diabetes mellitus, metabolic syndrome, and pre-existing hepatobiliary disorders[11]. The total number of pregnancies (including all live births and pregnancies that ended before six months or did not result in a live birth) was referred to as

gravidity. There were three categories of gestation: primigravida (first pregnancy), multigravida, and (more than one pregnancies).

The SPSS program version 16 for Windows was used to analyze the study's data. The Kolmogorov-Smirnov test was used to determine normality. The presentation of categorical variables, such as blood group and gallbladder status, used frequency tables. Mann Whitney U was used to compare the mean values of age, gestational age, and gravidity. The likelihood-ratio Chi-squared test was used to compare the gallbladder status to age group, gravidity, trimester, genotype, and blood group. The cutoff for statistical significance was P 0.05.

RESULTS

The subjects' demographic information was shown in Table:1. Participants in the study ranged in age from 18 to 44 years, with a mean age of 26.27± 3.498. (table:2). The comparison of the mean ages, gestational ages, and gravidities of pregnant women with and without cholelithiasis was shown in Table 3.

Table: 1 Distribution of demographic variables among study participants

S. No	Demographic variables	Parameters	Frequency (n=600)	Percentage (%)
1.	Age (years)	Less than 20	7	1.2
		20-30	524	87.3
		30-40	69	11.5
		Total	600	100
2.	Gravidity	Primi	218	36.3
		Multi	382	63.7
		Total	600	100
3.	Blood group	A	57	9.5
		B	76	12.7
		O	438	73.0
		AB	29	4.8
		Total	600	100
4.	Gallbladder status	Normal	587	97.8
		Stones	10	1.7
		Sludge	3	0.5
		Total	600	100
5.	Trimester	First	19	3.2
		Second	253	42.2
		Third	328	54.7
		Total	600	100

Table: 2 Patient demographics mean and standard deviation

	N	Mean	Standard Deviation
Age	600	26.27	3.498
Gestational age	600	26.97	2.589
Gravidity	600	1.87	0.765

Table: 3 Pregnant women with and without cholelithiasis are compared as two groups

	Cholelithiasis (n=10)		No cholelithiasis (n=590)		X2	P value
	Mean	SD	Mean	SD		
Age (years)	31.10	3.315	26.18	3.446	14.849	0.001*
GA (weeks)	27.10	2.644	26.97	2.590	0.243	0.993
Gravidity	2.00	0.471	1.87	0.769	6.811	0.033*

Age group showed the strongest correlation with the occurrence of gallbladder illness of all the variables examined (P < 0.001). Five (1%) of the participants with gallstones were between the age of 20 - 30, compared to 5 (7.2%) who were above 30 years of age. The study's pregnant women with biliary sludge were all above 30 years old - 3(100%) (Table:4)

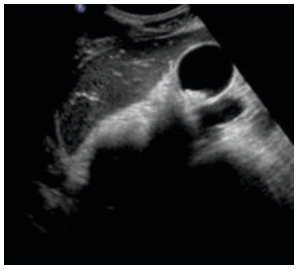
Table: 4 Cross- tabulation of subjects' demographics and gall bladder status

Gall bladder status, N (%)						
	Normal	Stone (s)	Sludge	Total (n=600)	X2	P value
Age group						
<20 years	7(100%)	0 (0%)	0 (0%)	7 (100%)	38.398	0.000*
20-30 years	519 (99%)	5 (1%)	0 (0%)	524 (100%)		
>30 years	61 (88.4%)	5(7.2%)	3(4.3%)	69(100%)		
Gravidity						
Primi	216 (99.1%)	1(0.5%)	1(0.5%)	218(100%)	8.112	0.088
Multi	371 (95.8%)	9 (3.3%)	2 (0.8%)	382 (100%)		
Trimester						
1	17 (89.5%)	2 (10.5%)	0 (0%)	19 (100%)	11.990	0.017*
2	250(98.8%)	3 (1.2%)	0 (0%)	253 (100%)		
3	320 (97.6%)	5 (1.5%)	3 (0.9%)	328 (100%)		
Blood group						
A	55 (96.5%)	0 (0%)	2 (3.5%)	57 (100%)	15.257	0.018*
B	76 (100%)	0 (0%)	0 (0%)	76 (100%)		
O	427 (97.5%)	10 (2.3%)	1 (0.2%)	438 (100%)		
AB	29 (100%)	0 (0%)	0(0%)	29 (100%)		

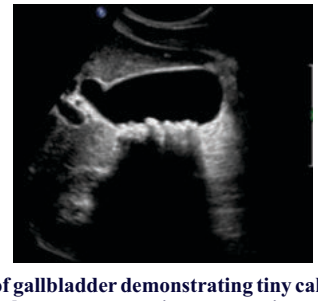
587 (97.6%) of the 600 pregnant women who participated had a normal gallbladder, 10 (1.7%) had gallstones (cholelithiasis), and 3 (0.5%) had sludge. Cholecystitis cases were nonexistent. When compared with gravidity, 382 (63.7%) who had two or more pregnancies, 218(36.3%) were primigravida. Nine (90.9%) of the women with gallstones had two or more pregnancies, compared to one (9.1%) primigravid woman (Tab.4). Each of the gravid groups had one pregnant woman with biliary sludge (Tab. 4).

Blood group O made up the majority of the subjects (438 or 73%), while blood group B made up 76 (12.7%) subjects. Blood group A made up 57(9.5%) patients, while blood group AB made up 29(4.8%). (Tab.1). All of the gallstone-carrying pregnant women belonged to blood type O. Two of the two women who had biliary sludge belonged to blood type A, while the other belonged to blood type O (Table: 4)

In total, 76 (11.6%), 256 (39%) and 317 (48.3%) of the participants were in the first trimester, second trimester, and third trimester, respectively. Of the 11 women who had gallstones, seven (63.6%) were in their third trimester and two (18.2%), their second and third, respectively. In addition, both of the subjects who had biliary sludge were pregnant (Tab.4).



Right upper quadrant transverse image demonstrating tiny calculus within the gall bladder – suggestive of gall stone. No evidence of wall thickening or pericholecystic fluid.



Sagittal view of gallbladder demonstrating tiny calculus within the gall bladder, largest measuring approximately 7.8 mm in diameter.

DISCUSSION

Various gallbladder disorders might develop during pregnancy. The gallbladder and/or biliary tree can be evaluated by CT, MRI, radionuclide imaging, magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), etc.[12]. Ultrasonography is the recommended imaging technique for pregnant women due to its speed, cost, sensitivity, and lack of ionizing radiation. In this investigation, the gallbladder abnormalities observed were cholelithiasis and biliary sludge.

Gallbladder illness was significantly associated with age (P <0.001). The frequency of calculi was 2.9% in patients under the age of 22 and 5.8% in patients over the age of 22 in a study by Ferguson et al., which indicated a significant link between patients' age and an increased prevalence of gallstones (P = 0.031)[13]. According to earlier studies, conditions including obesity and hypertriglyceridemia, as well as the number of pregnancies, all enhance the risk of gallstone disease[13–16]. According to Schirmer et al. (2005)[17], 30% of people over the age of 70 and 20% of those over the age of 40 are prone to biliary calculi form. The proportion increases almost four times more in women than in males throughout the reproductive phase, and as people get older, the gender disparity roughly equalizes. According to Kazi et al[18] study, 34.4% of the patients were between the ages of 21 and 25. As they got older, the proportion rose and showed that women made up 72.2% of the sample (90 patients), making the male to female ratio 1:4. Even though gallbladder stones were prevalent in young adults, they had symptoms that got worse as they got older. Even though gallbladder stones were prevalent in young adults, they had symptoms that got worse as they got older[15,19].

Five (1%) of the study's patients with gallstones were under the age of 30, compared to five (7.2%) who were. The majority of the pregnant women with biliary sludge were older than 30 (100%), on average. In this study, there were one (36.3%) primigravida woman and nine (63.7%) women with gallstones who had two or more pregnancies. This is in line with recent studies showing that having more children increases your risk of acquiring gallstones[10,14]. However, the study by Watemberg et al[20].noted that while some research demonstrate a link between gravidity and the development of gallstones, others have been unable to demonstrate this link.

Two women had biliary sludge as opposed to the eleven women who had stones. The development of biliary sludge has been linked to a number of clinical occurrences and ailments. Biliary sludge, which is thought to be temporary and a precursor to the generation of bile, is a mixture of bile precipitate and bile[21].

In this study, blood group O was present in all 10 (100%) of the pregnant women who had gallstones. Two of the three ladies who had biliary sludge belonged to blood group A, whereas the other belonged to blood group O. Our findings showed that blood group O and group A were the two blood groups that were most frequently observed. This is in contrast to earlier studies conducted, where blood group B was shown to be the second most prevalent. It was also discovered that the population was in Hardy-Weinberg equilibrium[22,23].

In total, 76 (11.6%), 256 (39%) and 317 (48.3%) of the participants were in the first trimester, second trimester, and third trimester, respectively. Of the 11 women who had gallstones, seven (63.6%) were in their third trimester and two (18.2%), their second and third, respectively. In addition, both of the subjects who had biliary sludge were pregnant.

The majority of gallstones have been documented during the second and third trimesters, which is consistent with literature[24]. Additionally, both of the biliary sludge-positive pregnant women were in their third trimester. Various other studies found that at the end of the pregnancies, stones or sludge were found in 30% and 2% of the women, respectively. This result agrees with what was found in that study. [25]. By the third trimester, over 8% of pregnant women develop new gallstones, but only around 1% of them experience symptoms. Less than 10% of those who have symptoms go on to develop problems.

Contrarily, Giangrande et al[24]. stated that an ultrasound revealed gallstones in 5 out of 56 women in the first trimester (one woman had gallstones, four had sludge), and 9 out of 49 women examined in the third trimester (2 women had gallstones, 7 had sludge)[11,26]. According to this study, pregnant women have a higher frequency of gallstones than sludge.

CONCLUSION

It may be said that age was strongly related with gallbladder disease in this study. The gallstones were more numerous than the sludge. As there were more pregnancies, gallstones became more prevalent. The same cannot be stated for those with sludge because there were just two examples discovered. During the third trimester, biliary sludge and gallstones were most common in pregnant women.

This study's cross-sectional design made it impossible to date the exact onset of biliary stones and sludge. However, their findings indicate that an abdominal-pelvic scan must be included in regular obstetric checkups. This is especially important for women who are multigravida and in their thirties, who are more susceptible to acquire biliary stones and sludge.

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