Ministry of Higher Education and
Scientific Research
University of Diyala College of Medicine

Gallbladder Diseases in Diabetic Patients

Submitted to the Council of the College of Medicine, Diyala University, In Partial Fulfillment of Requirements for the Bachelor Degree in Medicine and General Surgery.

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بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

{ هُوَ الَّذِي جَعَلَ الشَّمْسَ ضِيَاءً وَالْقَمَرَ نُورًا وَقَدَّرَهُ مَنَازِلَ لِتَعْلَمُوا عَدَدَ السِّنِينَ وَالْحِسَابَ مَا خَلَقَ اللَّهُ ذَٰلِكَ إِلَّا بِالْحَقِّ يُفَصِّلُ الْآيَاتِ لِقَوْمٍ يَعْلَمُونَ }

سورة يونس- الآية 5.

Abstract

Background: Diabetes has been hypothesized to increase the risk of gallbladder disease based on the observation that obesity and insulin resistance are associated with gallbladder disease. The principal gallbladder pathologic feature in diabetic patients is a functional deficit of uncertain etiologic factors, creating a large, flaccid, poorly emptying organ. Bile acid and lipid composition are usually increased in diabetic patients. Cholecystitis seems to be a more serious disease in diabetic patients, with worse infectious sequelae and more rapid disease progression.

Purpose

1. To find out the prevalence of gallbladder diseases among T1DM and T2DM patients,
2. To determine of type of gallbladder diseases in diabetic patient and it's relation to ,age body weight, gender, residency ,control diabetes, duration of diabetes ,type of medication،type of DM

Patients and Methods : The present retrospective cross sectional study based on the available biochemical data of type 1and 2 diabetic patients This study employed in Diyala province collecting inpatients from Baquaba teaching hospital, outpatients from clinics , college and the nearby places.

Data on socio-demographic characteristics, and clinical factors were collected using a structured questionnaire through face to face interviews. This cross-sectional questionnaire was applied to 125 case , 100with Type 1 or 2 diabetes mellitus and the other 25 are without, gathering data during the period between 15 of February 2023 and 10 of April 2023 . Inclusion Criteria allowed for Type 1 and 2 diabetes mellitus patients exclusion criteria: pediatric age.

Conclusions: Relation between gallbladder diseases and age, residency , socioechnomic state , gender , BMI , blood test(rbs.hba1c), duration of DM, type of DM, type of medication and blood cholesterol level

Acknowledgment

By the name of Allah, I start my project and I am thankful to Allah for helping us to complete this project and giving us the power and determination to do it faithfully and honestly.

I am deeply indebted to my supervisor **Prof. Dr. Ali Mousa J'afar**, for great help and appreciable advice and for close and scientific supervision to our project.

In addition, thanks to all my doctors in the Diyala University College of medicine for the knowledge they provided to me throughout the duration of my studies.

I should express our gratitude and appreciation to my family and friends for their support to me. I want to thank all the people who accept to provide me with information about my subject.

Finally, thanks to everyone who helped this study to be completed

Dedications

تحية طيبة

قال الله تعالى (يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ }

الشكر الاول والاخير الى الله عز وجل الذي وفقني بكل مراحلي الدراسيه واخرها لاكمال هذا البحث.

الى اعز الاشخاص على قلبي ،الى سندي من بعد الله عز وجل، امي الغاليه التي لو لاها لما وصلت الى هذه المرحله المتقدمه من حياتي.

الى من شجعني على المثابره طول عمري،الى الرجل الابرز في حياتي ،الى من افخر بأني ابنته ابي العزيز والغالي

الى سندي ومصدر بهجتي في هذه الحياة ،اخواني سيف واحمد واختي سحر الاعزاء

الى رفيقة المشوار الطبي ،الى التي قاسمتني فرحي وحزني

زهراء سلمان

الى جميع الاساتذه والصديقات والزميلات والزملاء ،الى كل من شجعني ولو بكلمه

كما وأود أن أتقدم بالشكر إلى

أستاذي ومشرفي و موجهي الفاضل /الاستاذ الدكتور علي موسى

الطالبة /ايمان قيس حميد

Contents

Introduction

Diabetes mellitus is a syndrome with disordered metabolism and inappropriate hyperglycemia due to either a deficiency of insulin secretion or to a combination of insulin resistance and inadequate insulin secretion to compensate for the resistance [1].

It has many causes , most commonly type 1 or type 2 diabetes. Type 1 diabetes is generally considered to result from autoimmune destruction of insulin-producing cells (β cells) in the pancreas, leading to marked insulin deficiency, whereas type 2 diabetes is characterised by reduced sensitivity to the action of insulin and an inability to produce sufficient insulin to overcome this 'insulin resistance [2].

Hyperglycaemia causes both acute and long-term problems. Acutely, high glucose and lack of insulin can result in marked symptoms, metabolic decompensation and hospitalisation. Chronic hyperglycaemia is responsible for diabetes-specific 'microvascular ' complications affecting the eyes (retinopathy), kidneys (nephropathy (and feet (neuropathy) [3].

The worldwide prevalece of DM has risen dramatically over the past two decades, from an estimated 30 million cases in 1985 to 382 million in 2013, Based on current trends, the International, Diabetes Federation projects that 592 million individuals will have diabetes by the year 2035 Although the prevalence of both type 1 and type 2 DM is increasing worldwide, the prevalence of type 2 DM is rising much more rapidly, presumably because of increasing obesity, reduced activity levels as countries become more industrialized, and the aging of the population. In 2013, the prevalence of diabetes in individuals from age 20-79 ranged from 23 to 37% in the 10 countries

with the highest prevalence (Tuvalu, Federated States of Micronesia, Marshall Islands, Kiribati, Vanuatu, Cook Islands, Saudi Arabia, Nauru, Kuwait, and Qatar, in descending order of prevalence) [4].

The gallbladder is a hollow, pear-shaped organ located inferior to the right lobe of the liver. It connects to the liver and pancreas through the biliary duct system. The gallbladder plays an essential role in the digestive process by storing and releasing bile produced by the liver. From the liver, bile flows through the hepatic and cystic ducts into the gallbladder for storage. Consumption of food releases cholecystokinin (CCK), a peptide hormone, from duodenal and jejunal cells, which stimulate the gallbladder to contract. Bile drains through the biliary duct system into the duodenum for digestion and absorption of fat [5].

The gallbladder plays a fundamental role in the digestive process of fats by coordinating the storage and release of bile, The wide breadth of gallbladder disease is a reflection of the complex interaction of anatomic, genetic, and environmental factors, the primary care physician may need to work with medical and surgical subspecialty colleagues for treatment of various gallbladder diseases [6].

Gallbladder disease, including gallstones and cholecystitis, is a major cause of morbidity in the US and in the Europe, The prevalence of asymptomatic gallstones is 10–15% in European populations, while symptomatic gallstones are less frequent and affects 2% of the population, Of digestive diseases that require hospitalization gallstones are the most frequent and costly; the economic costs of hospital treatment of gallstones are over 6.5 billion US dollar per year, in the United Kingdom 49,000 cholecystectomies are conducted every year, while in the US the number is N700,000 [7].

There is strong evidence that greater body fatness and low physical activity are associated with increased risk of gallstones. In addition, there is increasing evidence to suggest that components of the metabolic syndrome including insulin resistance, hyperinsulinemia, and elevated triglycerides may be associated with increased risk [8].

Epidemiological studies on the risk of gallbladder disease among diabetes patients have been inconsistent, Some studies have found a positive association between diabetes and risk of gallbladder disease or gallstones [9].

However, other studies found no association , In addition the size of the risk estimates has varied considerably, and this could potentially be due to confounding by other risk factors such as obesity and physical activity or other risk factors. As the prevalence of diabetes is projected to increase from 366 million people in 2011 to 552million by 2030 it will be important to clarify whether there is an association between a diabetes diagnosis and gallbladder disease risk independent of body fatness and other confounding factors [10].

patients and methods

The present retrospective cross sectional study based on the available biochemical data of type 1and 2 diabetic patients.

This study employed in Diyala province collecting inpatients from Baquaba teaching hospital, outpatients from clinics , college and the

nearby places .

Data on socio-demographic characteristics, and clinical factors were collected using a structured questionnaire through face to face interviews.

This cross-sectional questionnaire was applied to 125 case 100 , with Type 1 or 2 diabetes mellitus and the other 25 are without, gathering data during the period between 15 of february 2023 and 10 of April 2023 . Inclusion Criteria allowed for Type 1 and 2 diabetes mellitus patients exclusion criteria: pediatric age

Results

In this study, the total sample of study was (125), (25) from them was controlled, also about (79) with cholecystitis and (117) with gallstones.

Table 1(a.b.c.d) demographic characteristics of the studied groups

Table 1.a: Demographic characteristics of the studied groups (Age)

Age Categories	Groups		Chi P value
	Patient	Control	
Less than 40 years	4	4	6.541 0.16 (Non-significant)
41-50 years	18	5	
51-60 years	30	6	
61-70 years	28	8	
70 years and above	20	2	

*Significant difference between groups (p value < 0.05)

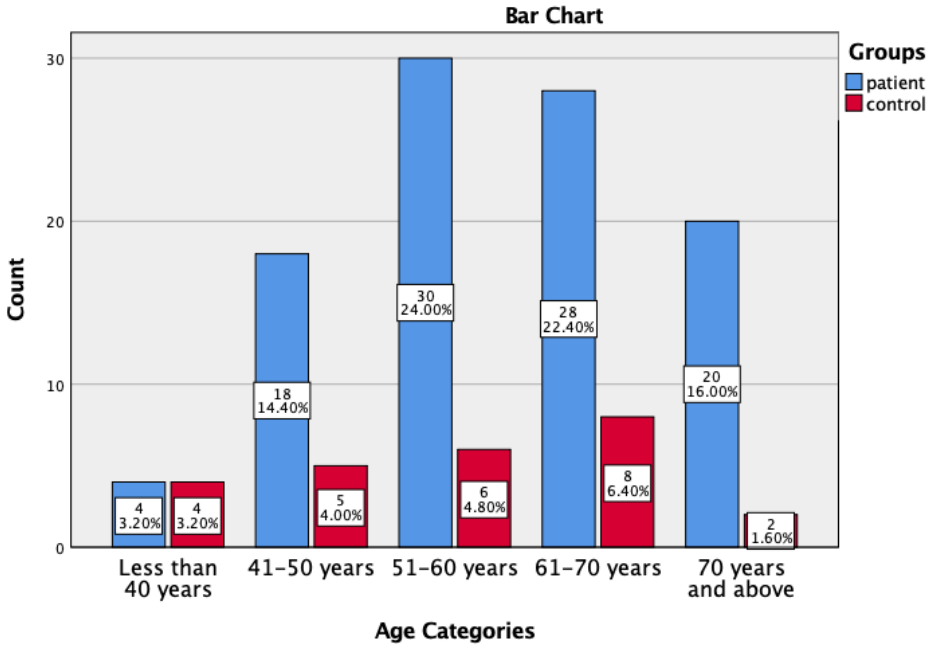


Table 1.b: Demographic characteristics of the studied groups (Gender)

Gender	Groups		Chi P value
	Patient	Control	
Male	47	10	0.395 0.53 (Non-significant)
Female	53	15	

*Significant difference between groups (p value < 0.05)

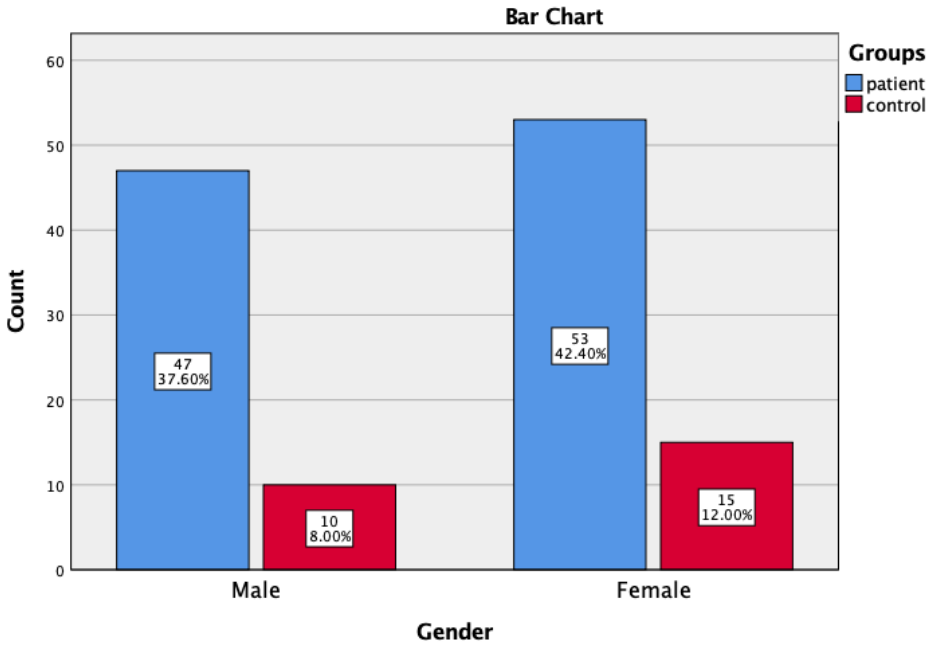


Table1.c: Demographic characteristics of the studied groups (Residency)

Residency	Groups		Chi P value
	Patient	Control	
Rural	27	6	0.093 0.76 (Non-significant)
Urban	73	19	

*Significant difference between groups (p value < 0.05)

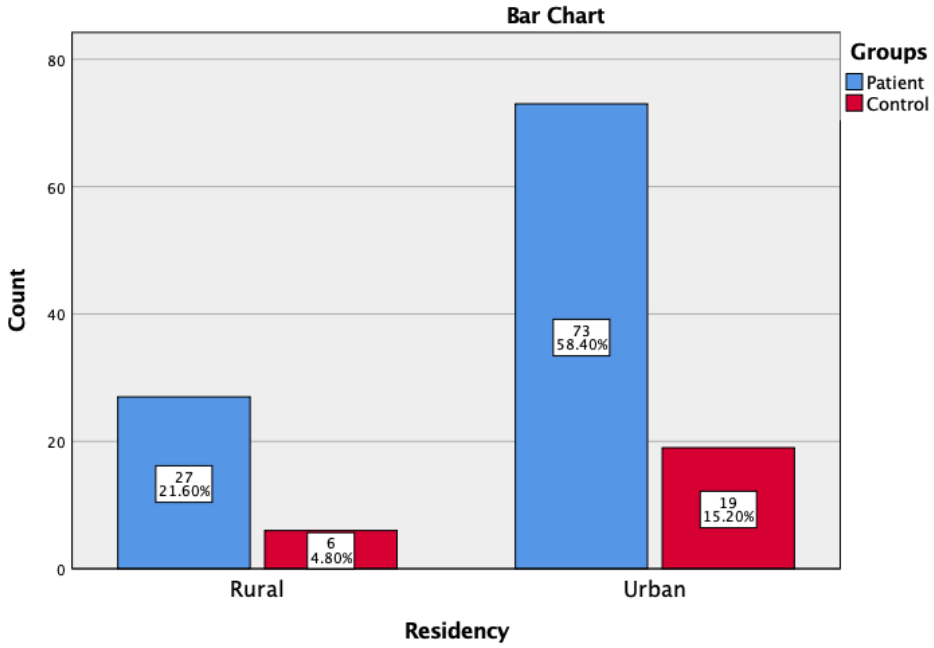


Table 1.d: Demographic characteristics of the studied groups (Socioeconomic State)

Socioeconomic State	Groups		Chi P value
	Patient	Control	
Low	55	15	0.20 0.65 (Non-significant)
High	45	10	

*Significant difference between groups (p value < 0.05)

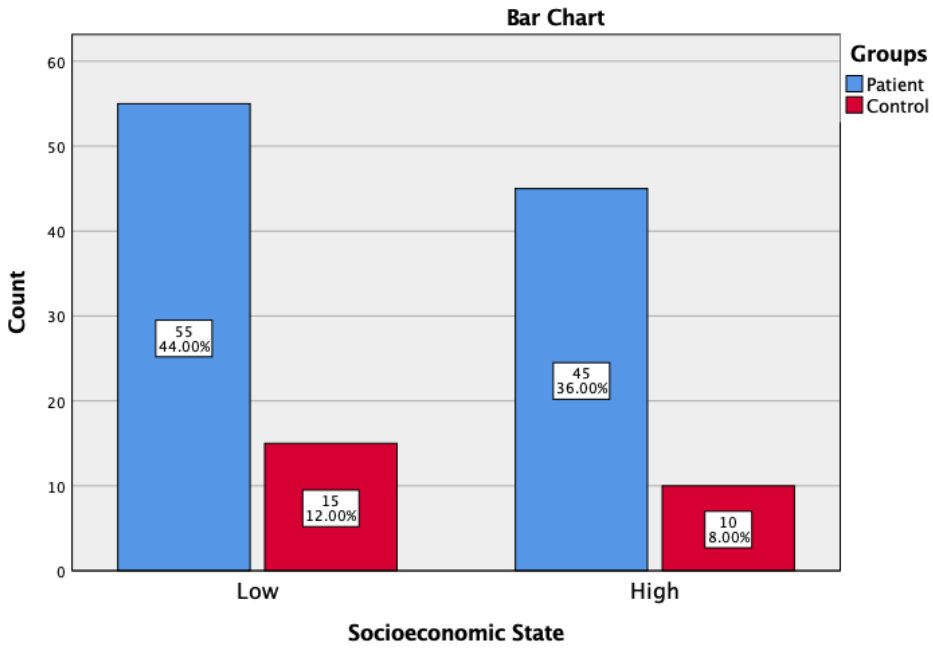


Table 2: Duration of diabetes mellitus and age of onset of diabetes mellitus

Socioeconomic State	Age of onset in (years) Mean □ S.E.	$LSD_{0.05}$ (p value) Sig or Non-Sig
< 5 years	48.68 □ 2.03 **a**	3.136 (0.49*) (Sig.)
5 – 10 years	42.00 □ 1.88 **b**	
> 10 years	49.87 □ 3.58 **a**	

*Significant difference between groups (p value < 0.05)
.groups with different letters are significantly different.

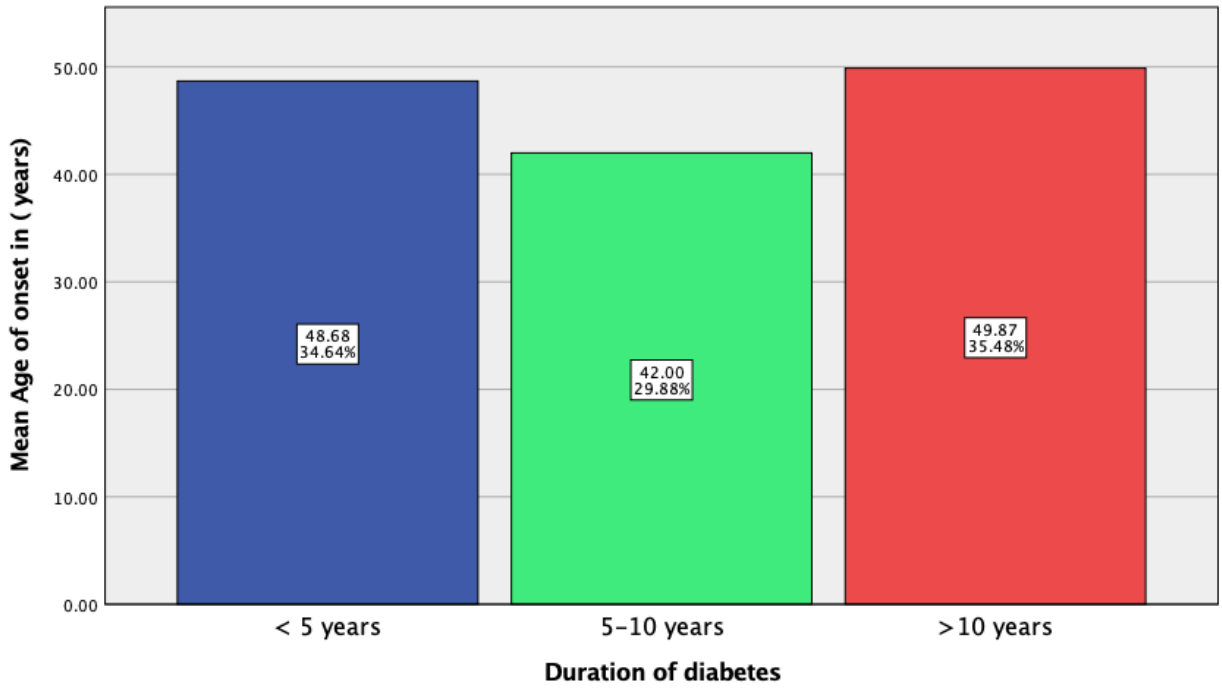


Table 3. Type of diabetes mellitus and type of medication

Type of DM	Type of medications		Chi (p value) Sig or Non-Sig
	Oral	Injection	
Type 1	0	24	12.89 (0.001*) (significant)
Type 2	56	20	

*Significant difference between groups (p value < 0.05)

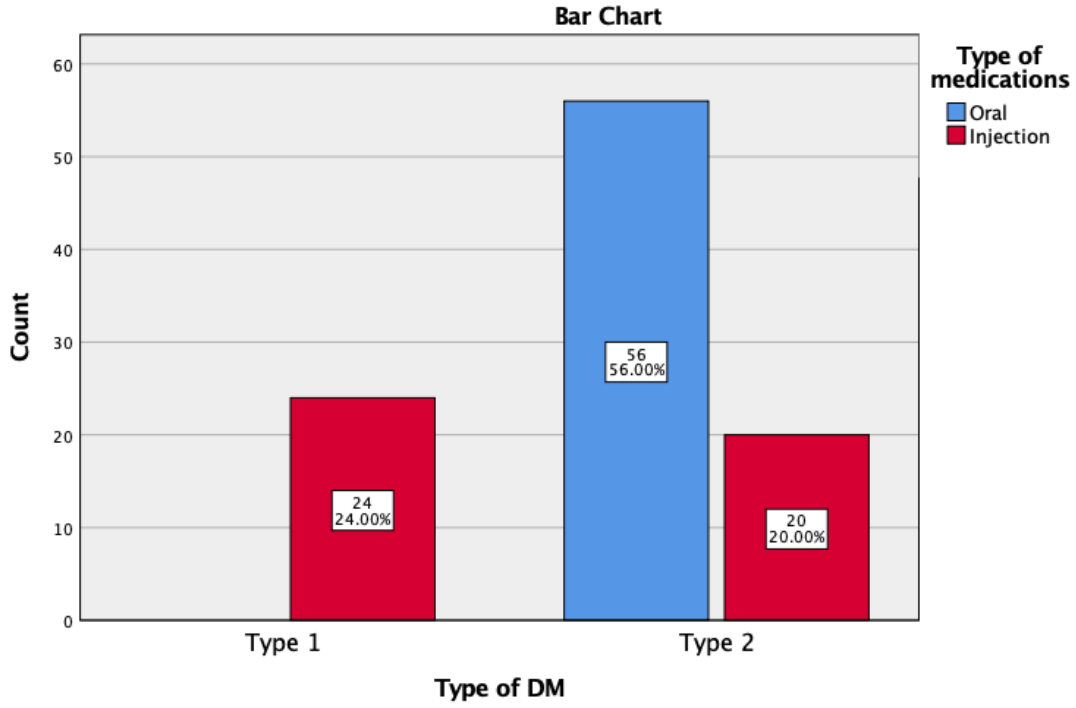


Table 4. Presence of cholecystitis and presence of gallstones

Presence of cholecystitis	Presence of gallstones		Chi (p value) Sig or Non-Sig
	Yes	No	
Yes	71	8	4.977 (0.026*) (significant)
No	46	0	

*Significant difference between groups (p value < 0.05)

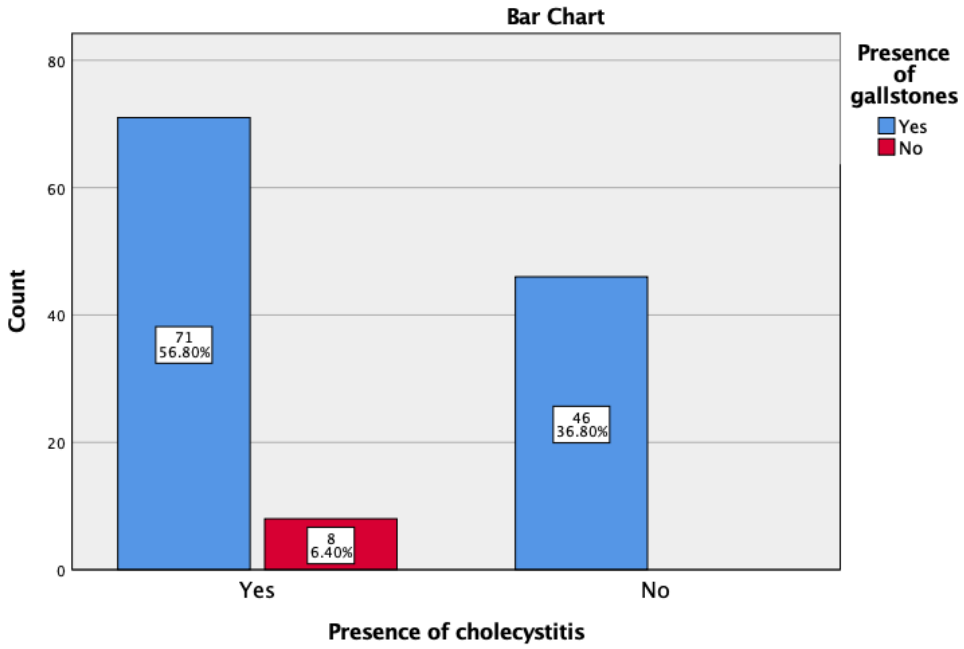


Table 5.a: Relation between cholecystitis and BMI

BMI	Presence of cholecystitis		LSD0.05 (p value) Sig or Non-Sig
	Yes	No	
Under	21	5	9.329 (0.009*) (Sig.)
Normal	33	32	
Over	25	9	

*Significant difference between groups (p value < 0.05)

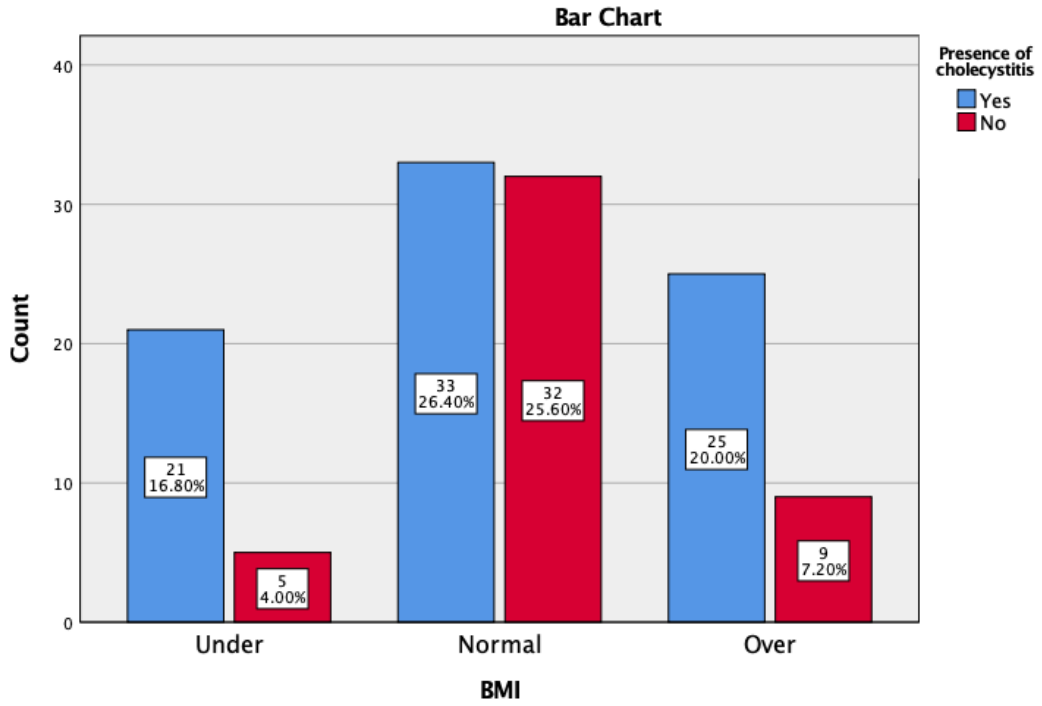


Table 5.b: Relation between gallstones and BMI

BMI	Presence of gallstones		LSD0.05 (p value) Sig or Non-Sig
	Yes	No	
Under	26	0	4.775 (0.018*) (Sig.)
Normal	61	4	
Over	30	4	

*Significant difference between groups (p value < 0.05)

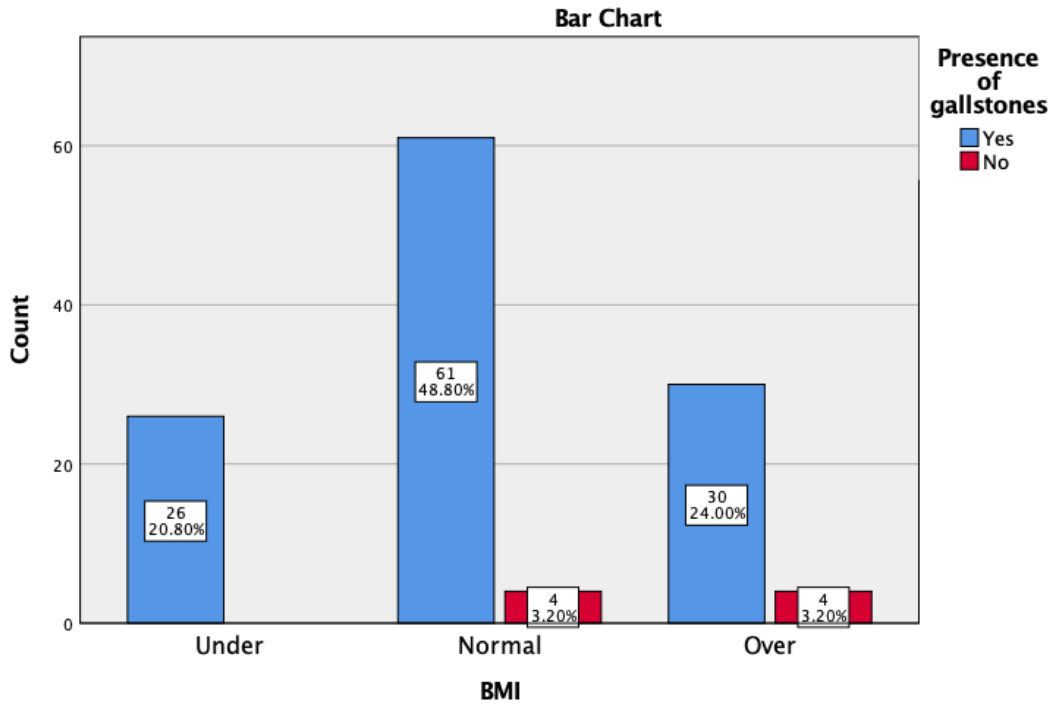


Table 6.a: Relation between cholecystitis and socioeconomic state

Socioeconomic State	Presence of cholecystitis		LSD0.05 (p value) Sig or Non-Sig
	Yes	No	
Low	51	19	6.379 (0.012*) (Sig.)
High	28	27	

*Significant difference between groups (p value < 0.05)

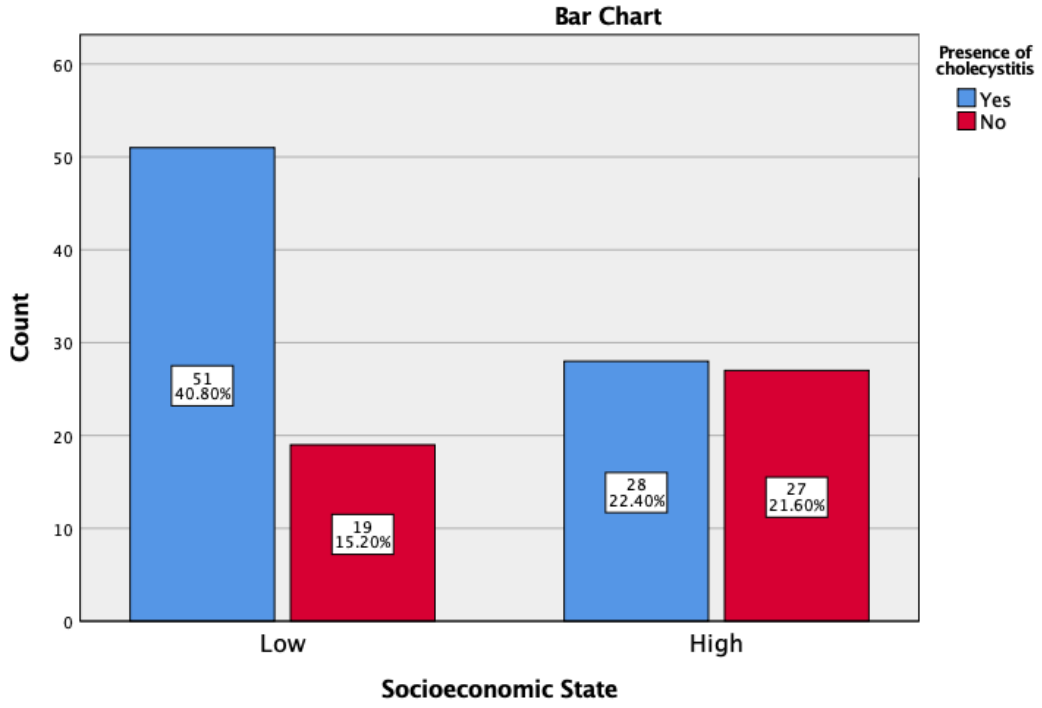


Table 6.b: Relation between gallstones and socioeconomic state

Socioeconomic State	Presence of gallstones		LSD0.05 (p value) Sig or Non-Sig
	Yes	No	
Low	70	0	10.878 (0.001*) (Sig.)
High	47	8	

*Significant difference between groups (p value < 0.05)

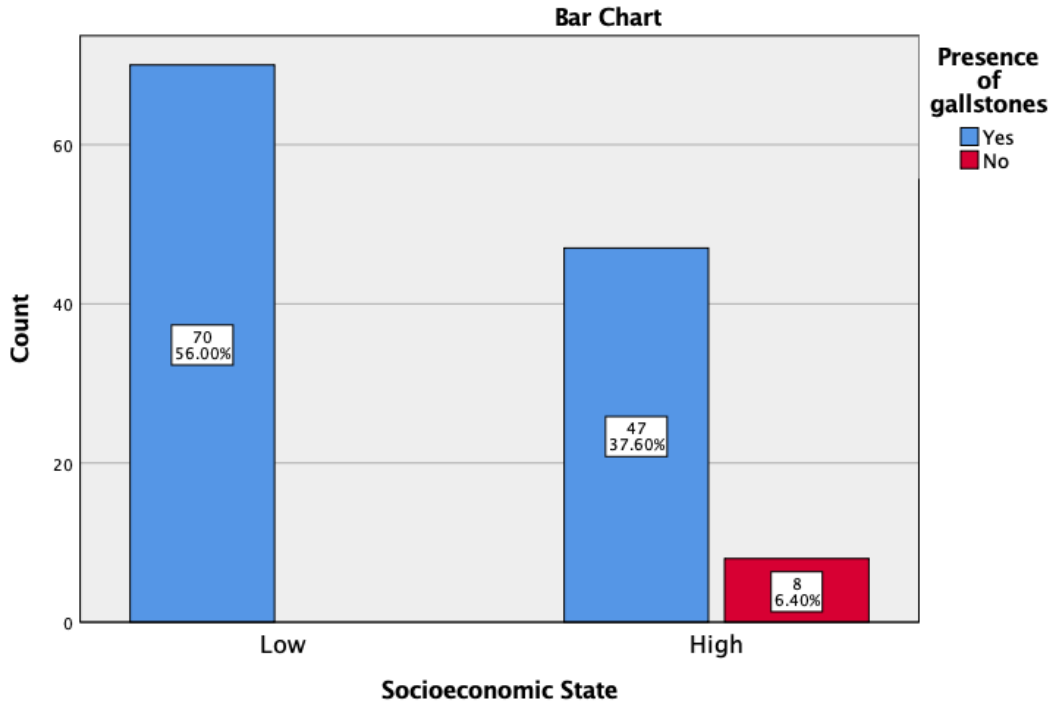


Table 7: Relation between gallbladder diseases and HBA1c

HbA1c %	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
< 7	24	11	35	0
7 - 10	31	27	50	8
> 10	24	8	32	0
Chi squared (p value) Sig. or non-sig	4.772 0.049* (sig)		9.832 0.007 (sig)	

*Significant difference between groups (p value < 0.05)

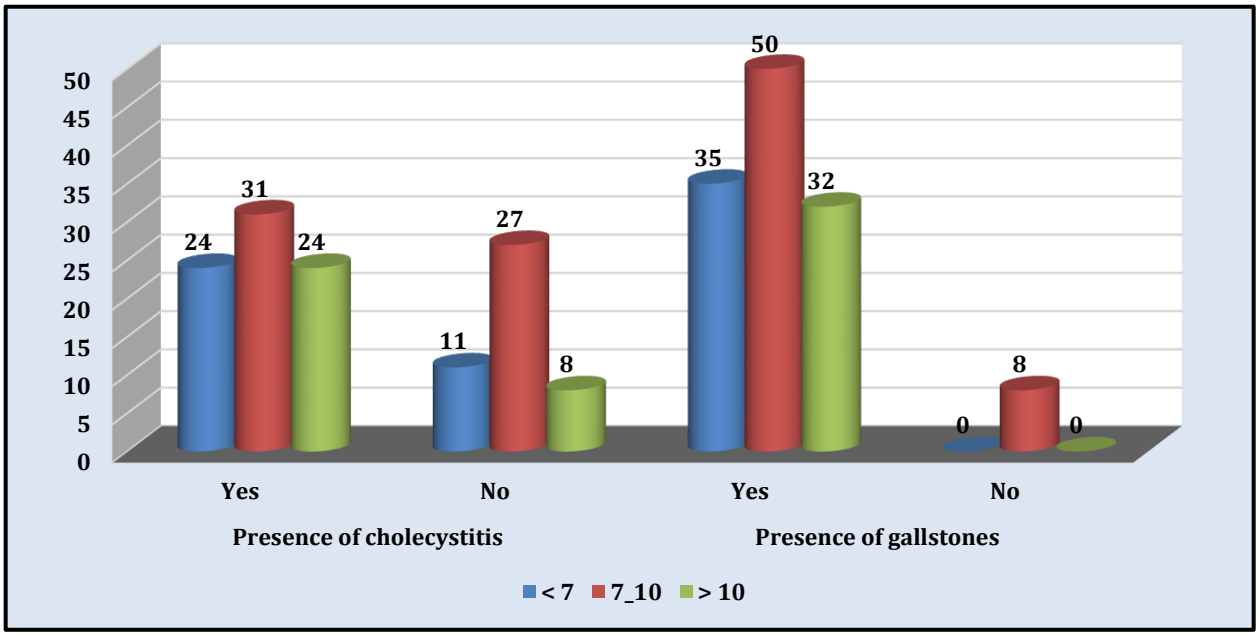


Table 7: Relation between gallbladder diseases and HBA1c

HbA1c %	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Frequency	79	46	117	8
Mean □ S.E.	8.730	8.165	8.492	8.95
T test (p value) Sig. or non-sig	3.071 0.0286* (sig)		0.438 0.662 (non sig)	

*Significant difference between groups (p value < 0.05)

Table 8: Relation between gallbladder diseases and gender

Gender	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Male	36	21	51	6
Female.	43	25	66	2
Chi squared (p value) Sig. or non-sig	0.343 0.993 (non-sig)		2.978 0.081 (non-sig)	

*Significant difference between groups (p value < 0.05)

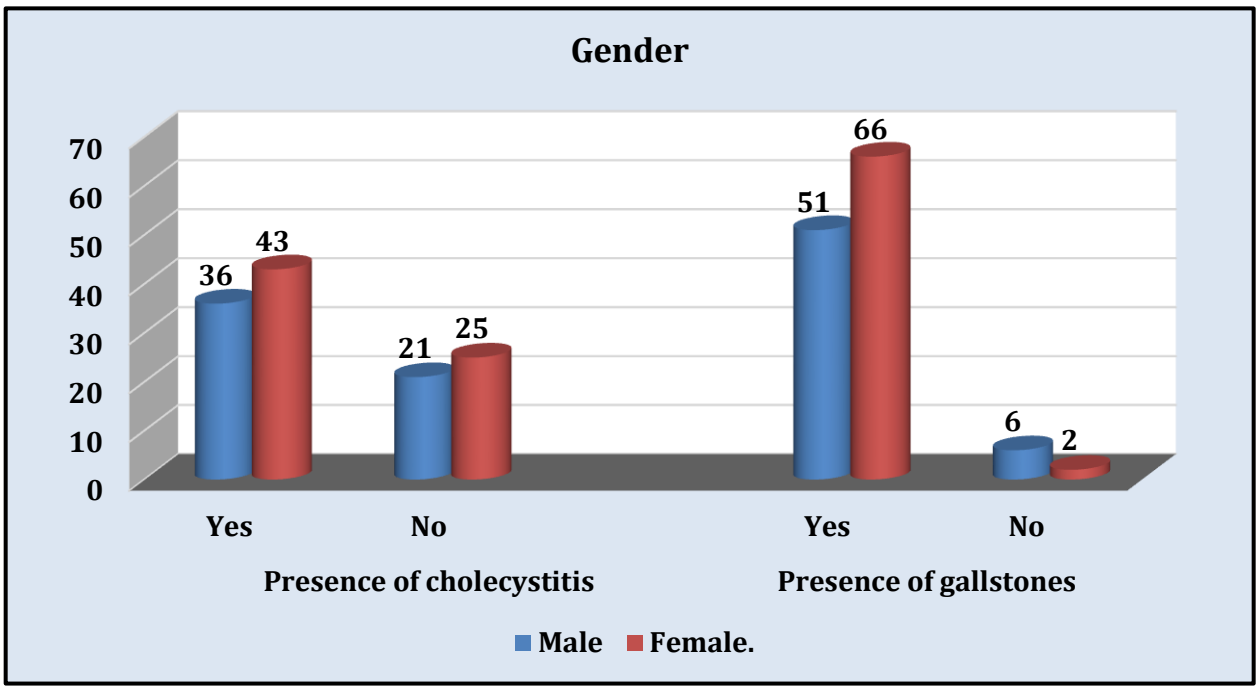


Table 9: Relation between gallbladder diseases and residency

Residency	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Rural	33	0	33	0
Urban	46	46	84	8
Chi squared (p value) Sig. or non-sig	26.108 0.0001* (sig)		3.660 0.008* (sig)	

*Significant difference between groups (p value < 0.05)

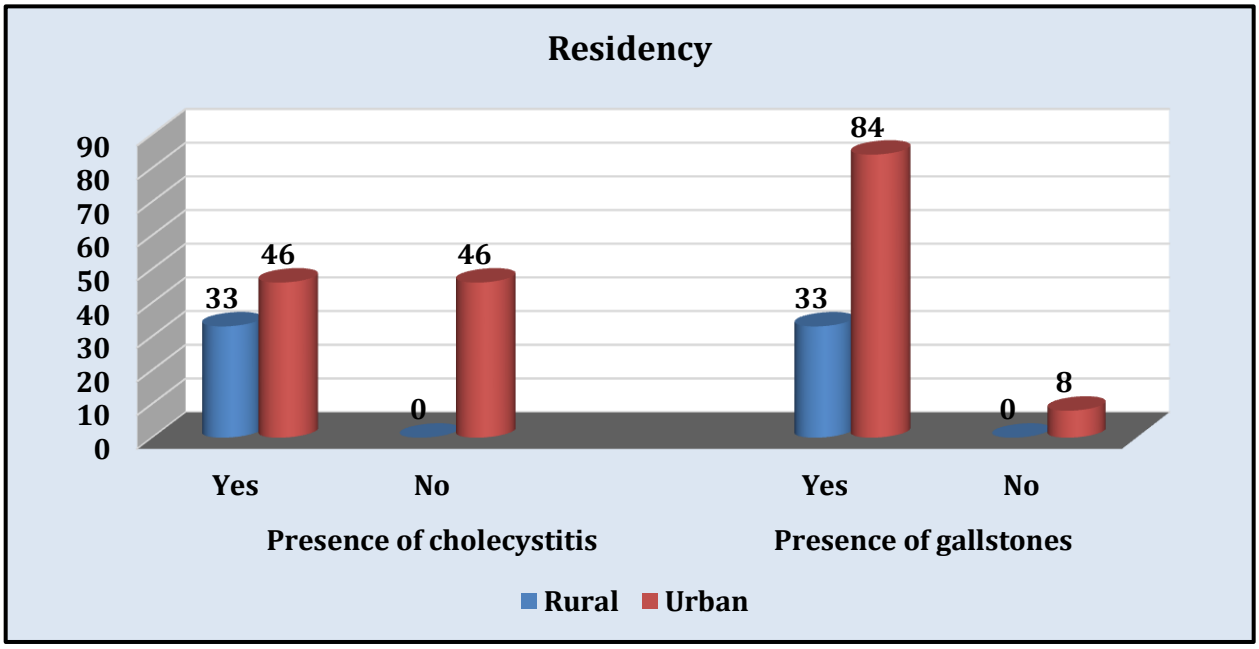
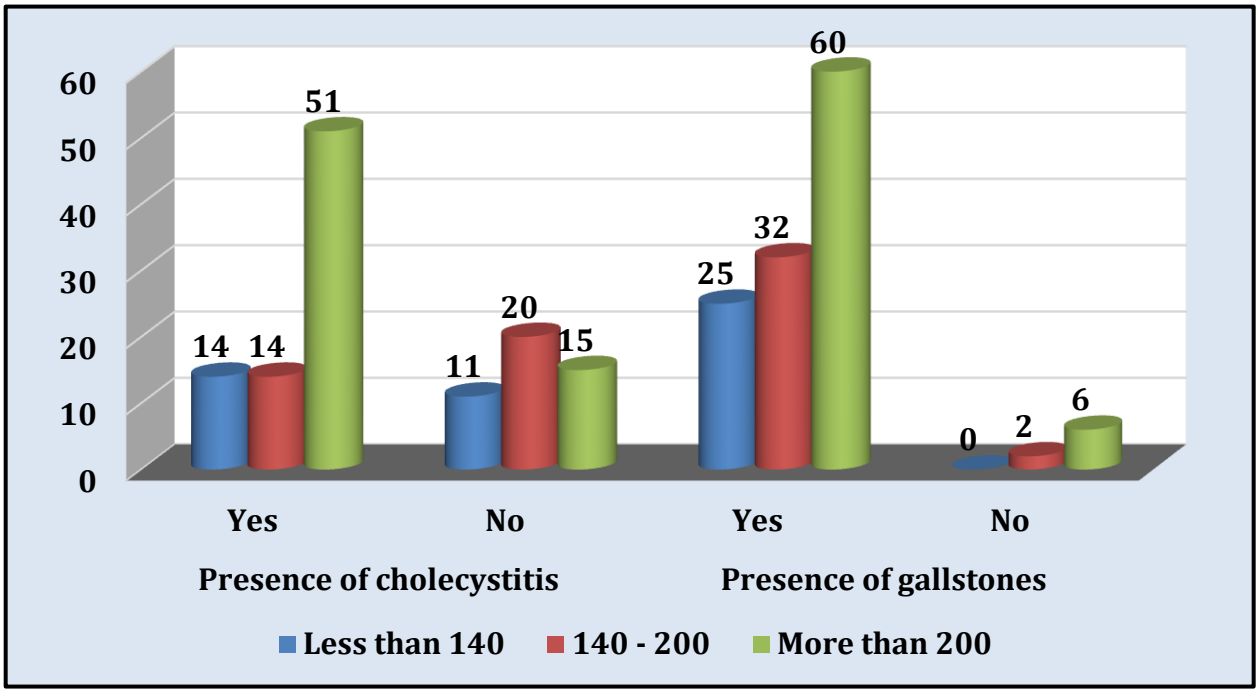


Table 10: Relation between gallbladder diseases and Random blood sugar

RBS	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Less than 140	14	11	25	0
140 - 200	14	20	32	2
More than 200	51	15	60	6
Chi squared (p value) Sig. or non-sig	13.26 0.001* (sig)		2.522 0.283 (non sig)	

*Significant difference between groups (p value < 0.05)



RBS	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Frequency	79	46	117	8
Mean □ S.E.	279.7	79.61	249.66	256.25
T test (p value) Sig. or non-sig	3.905 0.0001* (sig)		0.153 0.879 (non sig)	

*Significant difference between groups (p value < 0.05)

Table 11. Relation between gallbladder diseases and duration of diabetes mellitus.

Duration of DM	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
< 5 years	19	9	28	0
5-10 years	20	22	36	6
>10 years	24	6	28	2
Chi squared (p value) Sig. or non-sig	8.265 0.016* (sig)		4.762 0.029 (sig)	

*Significant difference between groups (p value < 0.05)

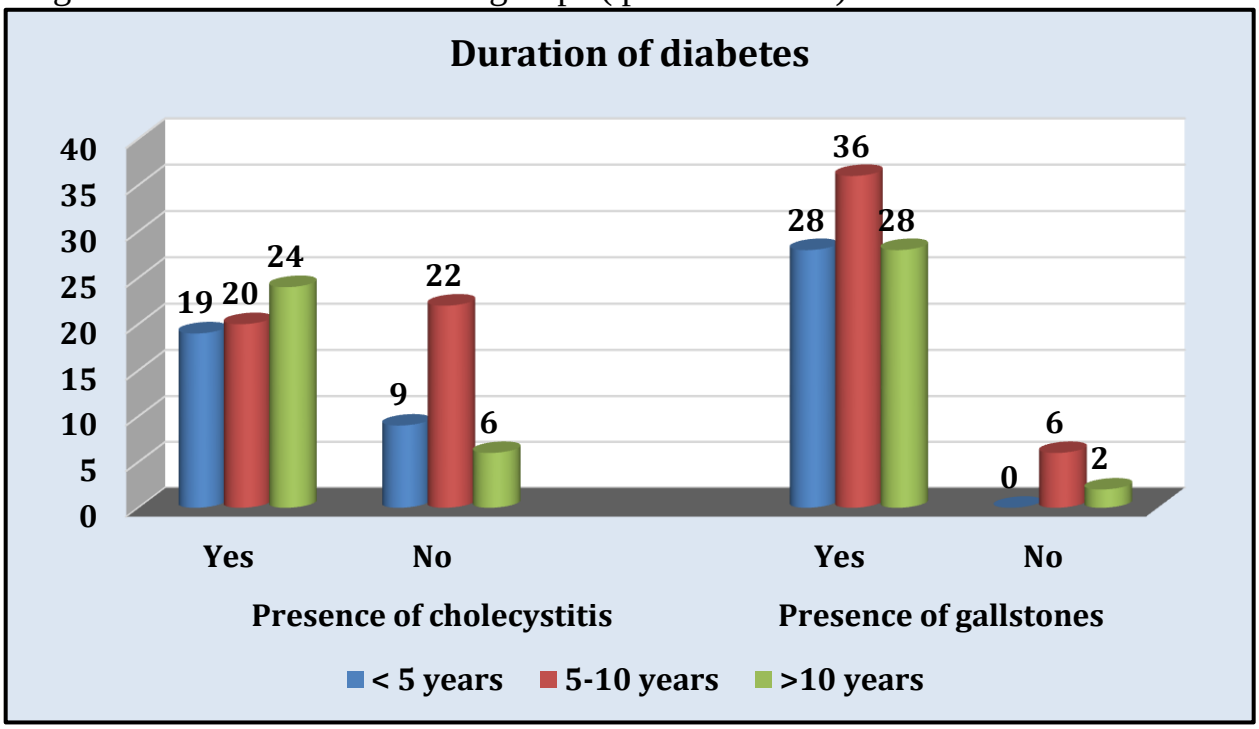


Table 12. Relation between gallbladder diseases and type of diabetes mellitus

Types of DM	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Type 1	18	6	24	0
Type 2	45	31	68	8
Chi squared (p value) Sig. or non-sig	3.951 0.0162* (sig)		4.746 0.019* (sig)	

*Significant difference between groups (p value < 0.05)

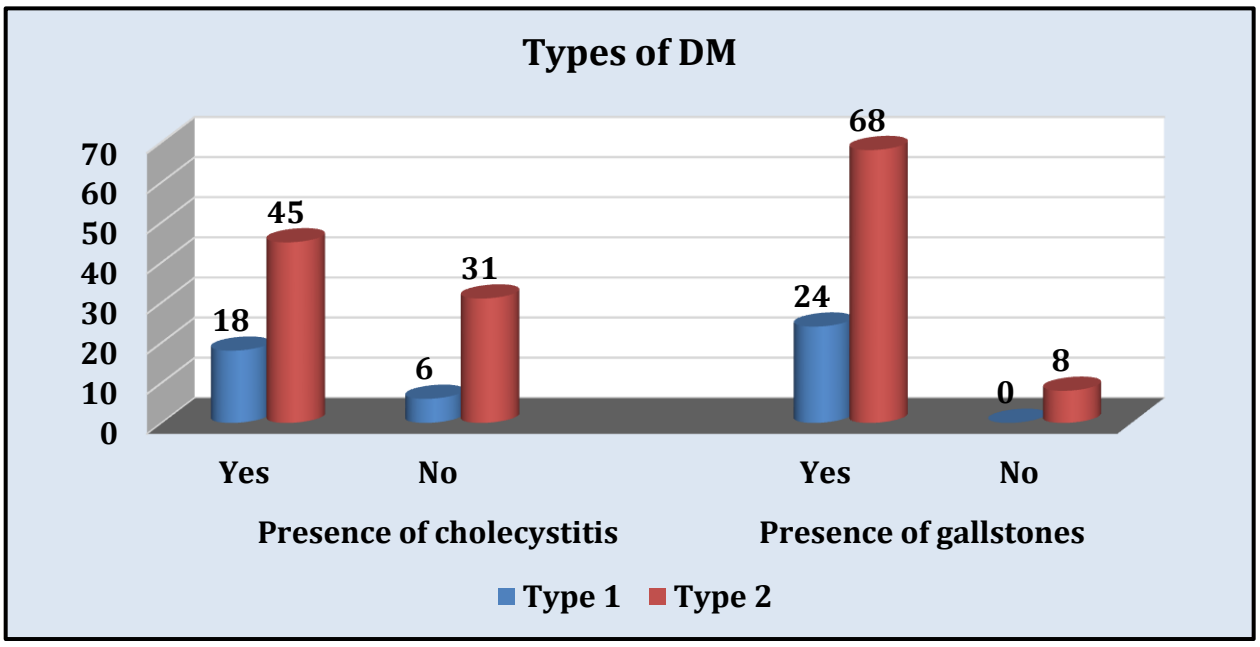


Table 13. Relation between gallbladder diseases and cholesterol level

cholesterol	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Frequency	79	46	117	8
Mean □ S.E.	238.84	193.10	221.65	227.25
T test (p value) Sig. or non-sig	3.347 0.001* (sig)		0.199 0.843 (non sig)	

*Significant difference between groups (p value < 0.05)

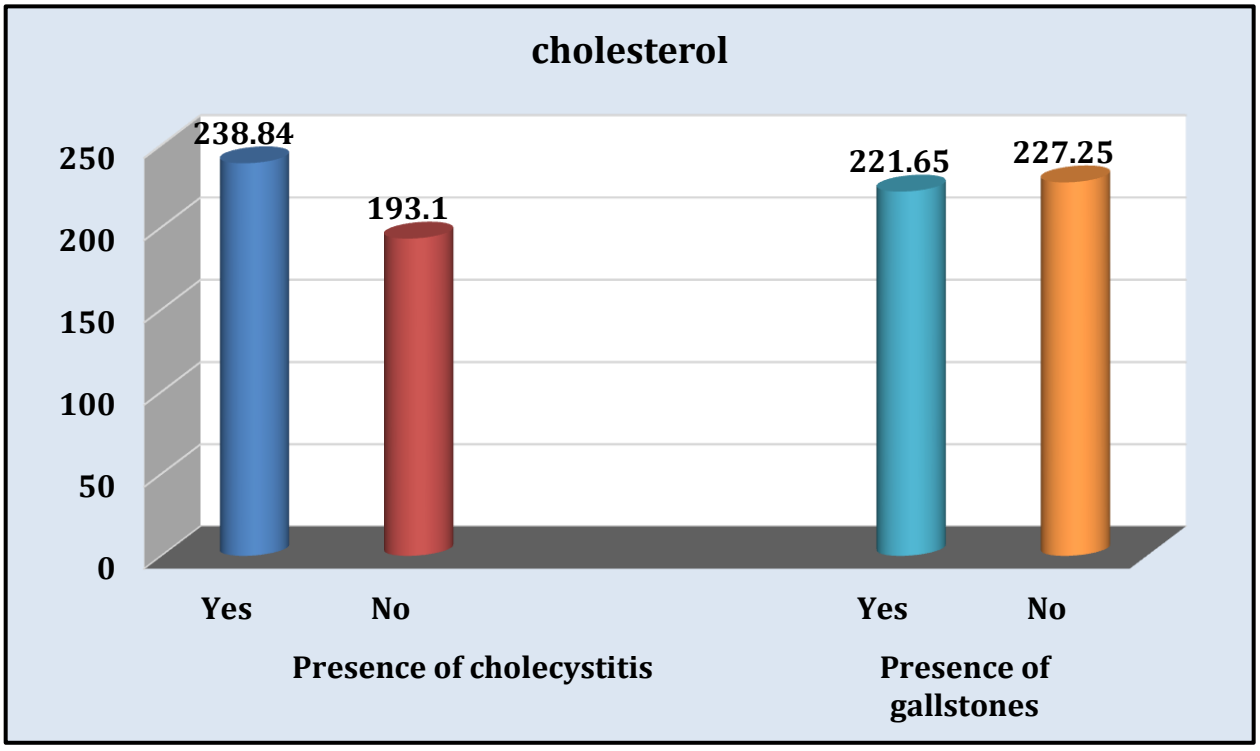
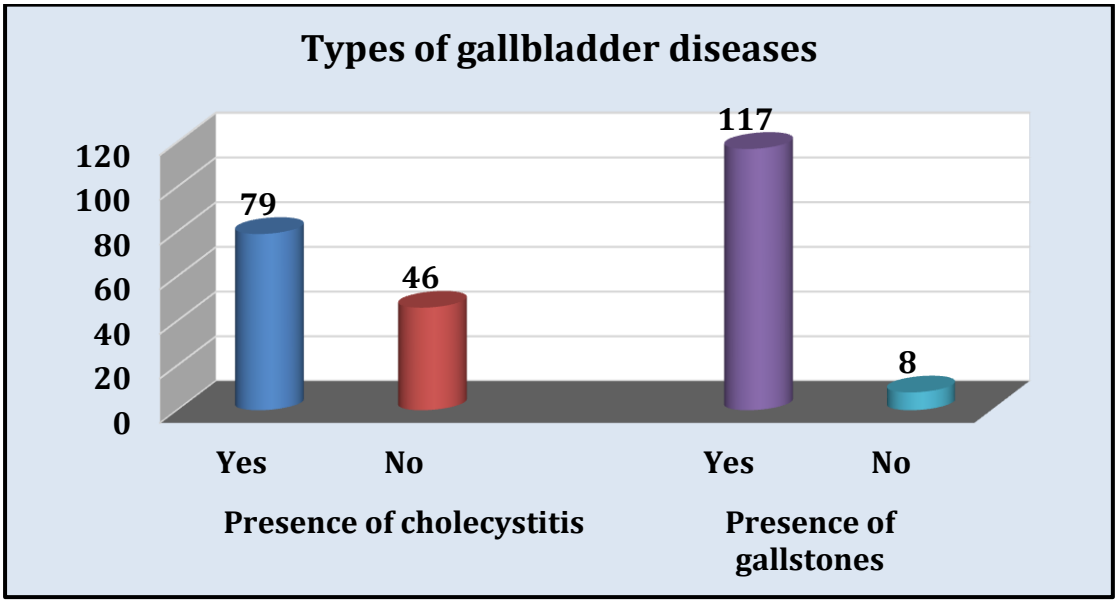


Table 14: Types of gallbladder diseases

Types of gallbladder diseases	Presence of cholecystitis		Presence of gallstones	
	Yes	No	Yes	No
Frequency	79	46	117	8
Chi sauared (p value) Sig. or non-sig	3.467 0.013* (sig)		5.949 0.0023* (sig)	



Discussions

In this study, the sample size was (125), about (25) from them was control.

In the present study, there was no significance correlated between age group when divided for five group in patients and control cases that the p-value was 6.541, also the results of this study founded that there was no significance related of patients cases and controlled samples between male and female that the p-value was 0.395 for male, 0.53 in female and that more than 0.05.

In another study was conducted in Norway [11], the only significance age related to DM with gallbladder disease was age group older than 75 years old that the p value was < 0.05, while according to gender also founded that there was no correlated significance between male and female, that the p value was > 0.05.

In this study, there is no significance between residence and Socioeconomic State with patients and control cases, that founded the p value for urban 0.76 and rural 0.093 for patients and control cases, and for high Socioeconomic state 0.65, and low Socioeconomic state 0.20 in patients and control cases.

Also that's same results founded in other study was conducted in Czech [12], there is no significance between residence and Socioeconomic State with patients and control cases, that founded the p value was >0.05.

In this study, there is significance correlated between cholecystitis with BMI that the p value was 0.009 for this relations, and gallstones with BMI p value was 0.018.

Also that same results founded in study of Norway [11], that there is significance correlated between cholecystitis with BMI, and gallstones with BMI the p value was < 0.05.

According to this study founded that there is a relation significance between cholecystitis and socioeconomic state and gallstones and socioeconomic state that the p value was 0.012, 0.001 respectively.

While in study was conducted in Vanderbilt University, Nashville, Tennessee [13], shows that there is no significance between cholecystitis and socioeconomic state and gallstones and socioeconomic state, the difference in results when compare with this study may be due to low sample size of this study.

According to this study shows that there was a significance relation between HbA1c level and presence of cholecystitis that p value was 0.049, also significance with frequency of of HbA1c p value 0.0286, also there is relation significance between HbA1c level and gallstones the p value was 0.007, while there was no significance with frequency of HbA1c p value was 0.662.

In other studies of Norway [11] and Czech [12], founded there was a significance relation between HbA1c level and presence of cholecystitis and gallstones and significance relation between HbA1c frequency and presence of cholecystitis and gallstones.

In this study founded that there was no significance relation between gallbladder diseases both gallstones and cholecystitis with gender, also that also in study of Vanderbilt University, Nashville, Tennessee [13].

In the present study the relation between gallstones and Random blood sugar level and frequency was non-significance and Presence of

cholecystitis with Random blood sugar level and frequency was significance p value was 0.001.

While in study of Norway [11], founded that was significance relation between gallstones and Random blood sugar level and frequency and Presence of cholecystitis with Random blood sugar level and frequency was significance p value was <0.005, and that disagree with our results may be due to small size of samples with gallstones.

In the present study the relation between gallstones and duration of diabetes mellitus was non-significance and Presence of cholecystitis with duration of diabetes mellitus was significance p value was 0.016.

While in study of Czech [12], there was significance relation between gallstones and duration of diabetes mellitus and Presence of cholecystitis with duration of diabetes mellitus p value was less than 0.05.

In this study there is significance correlations between gallbladder diseases and type of diabetes mellitus (type 1 and type 2) for presence of cholecystitis p value was 0.0162 and for gallstones p value 0.019.

Same results founded in other study conducted in Saudi Arabia [14], that there is significance correlations between gallbladder diseases and type of diabetes mellitus (type 1 and type 2) for presence of cholecystitis.

For the relations between cholesterol and gallstones this study founded that there is no significance p value 0.843, while there was clear significance between cholesterol and Presence of cholecystitis p value was 0.001.

While in study of Saudi Arabia [14], the significance between cholesterol with both cholecystitis and gallstones that was p value 0.001.

The difference may be due to small sample size of this study.

Conclusion

We conclude that there is:

1. Relation between gallbladder diseases and age
2. Relation between gallbladder diseases and residency
3. Rrelation between gallbladder diseases and socioechnomic state
4. Relation between gallbladder diseases and gender
5. Relation between gallbladder diseases and bmi
6. Relation between gallbladder diseases and blood test(rbs.hba1c)
7. Relation between gallbladder diseases and duration of dm
8. Relation between gallbladder diseases and type of dm
9. Relation between gallbladder diseases and type of medication
10. Relation between gallbladder diseases and blood cholesterol level

Recommendations

In our study we faced difficulties in performing the investigation of lipid profile ,ultrasuond examination from inpatient in hospital as they are not routine investigations for DM patient , so we recommended that they should be routinely investigated in order to decrease its associated complications and comborbidities and to facilitate the collection of data in the future .

The findings of this study should be taken into account to conduct appropriate intervention measures on identified risk factor reduction and implement routine screening, treatments, and prevention of Gallbladder diseases associated with DM patients.

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