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A Study on the Effect of Unhealthy Dietary Pattern with Sedentary Lifestyle as a Risk Factor for the Formation of Gallstones

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Abstract: ***Aim: The aim of this study is to know the effect of unhealthy dietary pattern and sedentary lifestyle correlating a risk factor for the formation of gallstones. Objective: To determine the relationship between diet, physical activity in the patients diagnosed with gallstones along with assessing the anthropometric and biochemical parameters. Methodology: An observational, cohort study was carried out on 50 patients diagnosed with cholelithiasis to assess the effect of unhealthy diet and sedentary lifestyle for the formation of gallstones. A pre tested questionnaire was framed, consisted of 11 questions from which anthropometric measurements, biochemical parameters, dietary assessment, social habits specific to smoking/alcohol and physical activity were chief attributes of the study. Results: Based on the results obtained, it is demonstrated that the unhealthy dietary pattern with sedentary life style was found as a risk factor in formation of gallstones. During this survey, patients with high BMI and waist hip ratio shown to have unhealthy eating pattern such as diet rich in high saturated fats, high refined carbohydrates, poor in vegetable fat and fiber with physical inactivity represents the cause of cholelithiasis.***

Keywords: Diabetes, Smoking, Cirrhosis, Dietary pattern, Lifestyle, Genetic, Cholelithiasis, Choledocholithiasis, Cholecystitis. high BMI, high cholesterol levels

1. Introduction

Cholelithiasis has increasingly become major cause of abdominal morbidity. It has been estimated that more than 25 million people in the United States have gallstones and 65% to 70% of them are women who are above 40yrs of age, among males the geriatric age group (<60yrs) was relatively more susceptible (28%). Unfortunately, for most people, gallstones are "silent" –they don't cause major symptoms.

Gall bladder is an organ attached to the right side of the undersurface of the liver.Its main function is to concentrate and store the bile formed in the liver until the body needs to digest fat. [1]

Bile contains water, cholesterol, fats, bile salts, proteins and bilirubin, bile salts break up fat and bilirubin gives bile and stool a yellowish colour and increases in concentration causes gall stones. If the liquid bile contains too much cholesterol, bilesalts or bilirubin under certain conditions can harden into stones [2]

The two types of gall stones are 1) cholesterol stones 2) pigment stones.

Cholesterol Stones are usually yellow green and are made up hardened cholesterol and hypersection of hepatic cholesterol saturates and solubilize the bile which account for 80 percent of gallstones. Cholesterol stones are associated with various conditions like insulin resistance, atherosclerosis, heart disease and cancer. [3] [18]

Cholesterol and pigment stones are formed due to unhealthy diet such as consumption of more lipid, beef fat (tallow), fried items, more refined carbohydrates [4]

Pigment stones are small, dark stones made up of bilirubin,.the common diseases of the biliary tract are cholelithiasis, choledocholithiasis and cholecystitis.

*Cholelithiasis: It is formation of gallstones in the absence of infection of the gallbladder. These may cause no symptoms and the patient might be unaware of their presence.
*Choledocholithiasis: When stones slip into the bile duct producing obstruction, pain and cramps are referred to as choledocholithiasis. [5]
*Cholecystitis: Inflammation of gallbladder. It is usually caused by gallstones obstructing the bile ducts causing a backflow of bile. The walls of the gallbladder become inflamed and disintented and infection can occur. Jaundice can also occur during this disease. [6] [7]

Risk Factors

Unmodifiable Risk Factors

- **Age**: The risk of developing gallstones disease increases with age, mainly after the age of 40 in women and elderly men. [8]
- **Sex**: Women are at more risk than men because estrogen, a female sex hormone is likely to increase the risk of gallstones. Specially high calorie liquid food and also being overweight saturates the cholesterol in the bile [9].

- **Genetic:** A series of gallstones (LITH) genes have been identified, which affect cholesterol homeostasis and promote cholesterol gallstones formation and growth. Also epigenetic mechanisms are investigated which influence gene expression in the absence of an altered DNA sequence, in response to several environmental stimuli.

Modifiable Risk Factors

- **Diabetes**: Both metabolic syndrome and diabetes mellitus are associated with stone complications because insulin resistance predisposes to cholesterol gallstones formation. [9]
- **Cirrhosis**: Is a metabolic disorder which causes severe liver disease or due to an excessive consumption of alcohol or NAFLD or obesity [10].
- **Smoking**: Is found to increase the risk of gallstones as it lowers the plasma HDL cholesterol [11].

Dietary Pattern and Lifestyle: [15]
Gallstones are associated with high fat, refined sugar and low fiber in the diet increases risk of cholelithiasis. Also sedentary habits, recent stress and hypertension with high body mass index and waist hip ratio represents unhealthy lifestyle. However only three of these physical inactivity, high saturated fats and high waist hip ratio emerged as significant predictor in cholelithiasis [15].

Physical Inactivity: Due to less physical activity there is an increased risk of weight gain which ultimately increases cholesterol levels in the bile.

Complications
Obstruction of the common bile duct. Inflammation or infection of the gall bladder (acute cholecystitis) or cholangitis if gallstones get stuck in the common bile duct. Inflammation of the pancreas (pancreatitis). [12]

Symptoms
The gallstones can be diagnosed easily with continuation from asymptomatic to symptomatic disease. Gallstones signs and symptoms occur with intensifying pain in your upper right abdomen, bloating, nausea, vomiting and pain in your abdomen, shoulder, back or pain in the chest and hence a surgery is advised to remove the gallbladder called cholecystectomy. Since the gallstones frequently reoccur and once gall bladder is removed, then bile flows directly from liver into small intestine rather than being stored in gallbladder [13].there are two different kinds of operations.

1) Laproscopic cholecystectomy
2) Open Cholecystectomy

a) Laparoscopic cholecystectomy: This is the surgery which removes gallbladder. This procedure uses several small cut instead of one large one. A laparoscope is a narrow tube with a camera inserted through one incision which allows to see gallbladder, then it is removed through another small incision and the complications due to this surgery are less significant compare to open cholecystectomy. [14]
b) Open cholecystectomy: It is the removal of gallbladder through a cut in the upper abdomen. This surgery makes a incision in abdomen below ribs on right side. The muscle and tissue are pulled back to reveal gallbladder and then it is removed. [14]

2. Prevention

Primary prevention is defined as the prevention of gallstone formation; Secondary prevention is defined as the prevention of clinical manifestation of gallstones such as symptoms or severe complications.

For primary prevention general wellness measures can be recommended such as elimination of obesity to decrease excessive cholesterol biosynthesis during rapid weight loss; a high fiber, high calcium diet (to diminish input of deoxycholic acid). Ingestion of regular meals without excessive calorie intake and intake of low saturated fatty acids from animal food. [16]

Secondary prevention is recommended only when gallstones become symptomatic because of benign natural history of asymptomatic gallstones. It involves non surgical approaches like treatment with hydrophilic bile salts ursodeoxycholic acid (UDCA) has shown to reduce the risk of biliary colic acid and gallstone complications [17] [18].

3. Review of Literature

The study of Harvard women's health watch, March 2011 has stated that gallstones are more prevalent in women than men and physiology of gallbladder shows the saturation of cholesterol and bilirubin increases risk for gallstones formation and mostly seen in obese, diabetic and persons consuming high calorie, high saturated food [1]
Https://www.health.harvard.edu/womens-health.

A study on Bile metabolism and lithogenesis by Dosh AR', Imagawa DK', Jutric Z2 in 2019.shows that bile is composed of cholesterol phospholipids, bilirubin and inorganic ions which aids in digestion and nutrient absorption, thus the risk of gallstones increases due to physiologic conditions and diseases which alter the bile composition and metabolism [2].
https://www.ncbi.nlm.nih.gov/pubmed/30846031

A study on from lipid secretion to cholesterol crystallization in bile by portincasa p1 et al. states, the formation of gallstones is due to disturbed cholesterol homeostasis in the body and hyper secretion of hepatic cholesterol precipitates cholesterol crystals in the gallbladder, which can be seen in the persons with insulin resistant, atherosclerosis and heart diseases
[3].https://www.ncbi.nlm.nih.gov/pubmed/15280810
The present study on Association between diet and gallstones of cholesterol and pigment stones among patients with cholecystectomy shows that patients who underwent choleystectomy are related with the unhealthy diet such as cholesterol stones are due to consumption of more lipid, animal lipid beef, fried foods and pigment stones are due to high refined carbohydrate foods [4].
https://www.ncbi.nlm.nih.gov/pubmed/29169372

A study on Choledocholithiasis: Evaluation, Treatment, and Outcomes by Molvar C, et al. presents where Choledocholithiasis is usually seen when there is an biliary obstruction and they generate symptoms and the treatment includes ERCP with spincterotomy [5]. https://www.ncbi.nlm.nih.gov/pubmed/27904245

Gallbladder Dysfunction: Cholecystitis, Choledocholithiasis, Cholangitis, and Biliary Dyskinesia – by wilkins T', Agabin E2 et al. states as these are the serious complication including cholangitis and gall stones pancreatitis and treatment includes clearing common bile duct stones [6].https://www.ncbi.nlm.nih.gov/pubmed/29132521

A study on, Timing of cholecystectomy in Acute cholecystitis-by Thangavelu A'et al.has shown that inflammation of the gallbladder due to obstruction of cystic duct is known as cholecystitis and treatment of acute cholecystitis is cholecystectomy [7].
https://www.ncbi.nlm.nih.gov/pubmed/29752150

Diagnosis and treatment of gallstones disease by Lee JY, It shows that gallstones disease increases with age which is associated with obesity and a diet that is high in refined carbohydrates, high saturated fat, low calorie diet and rapid weight loss are the causes of cholesterol gallstones [8].https://www.ncbi.nlm.nih.gov/pubmed/26455113

The study on Association of obesity and type II diabetes mellitus as a risk factor for gallstones by Pacchioni M et al., evaluates that person with type 2 diabetes are at more risk of gallstone formation with their age, female sex and obesity [9]
https://www.ncbi.nlm.nih.gov/pubmed/11117574

The data on Chemical Characterization of Gallstones: fracanzani AL1, valenti, et al.

In 2012 shows, Gallstone disease is highly prevalent in Non Alcoholic Fatty Liver Disease, obese people with diabetes and more severe liver diseases [10].
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4390354/

Many studies on Prevalence of Gall Stones in Liver Cirrhosis by K C S', Sharma D2, et al. in 2015 shown the association of liver cirrhosis and portal vein diameter to gallstone disease [11].
https://www.jnma.com.np/jnma/index.php/jnma/article/view/2745

The Impact of Obesity on Gallstone Disease, Acute Pancreatitis, and Pancreatic Cancer.by Cruz-Monserrate Z'in 2016 has estimated that Complications due to gallstones are directly proportional to pancreatic diseases in obesity such as weight loss surgery like bariatric surgery increases the risk of acute pancreatitis and pancreatic cancer [12].
https://www.ncbi.nlm.nih.gov/pubmed/27837777

General surgery department by Ghazal AH, et al.in 2009. gives information on the technique used to treat gallstones through surgery called laproscopic cholecystectomy which is an effective technique for the treatment of gallstones in quality of life [13].
https://www.ncbi.nlm.nih.gov/pubmed/19481184

Treatment in removal of gallbladder shows effective surgery called lap cholecystectomy alternative to open cholecystectomy which reduces the incidence of pneumonia and wound infection after the surgery, where as open surgery is performed in cases of cirrohsis, gall bladder cancer, extensive upper abdominal pain an it include more complications and longer stay in hospital [14].
https://www.ncbi.nlm.nih.gov/pubmed/25958296

The evidence in Open versus laproscopic cholecystectomy in acute cholecystitis in 2015 has stated that formation of gallstones is seen mostly among females and elderly males and causative factors is mainly due to inadequate physical activity, abdominal adiposity and high intake of saturated fat shows high risk of cholelithiasis which can be a primary prevention
[15].https://www.ncbi.nlm.nih.gov/pmc/.../PMC1741996/

The study in Cholesterol gallstones: from epidemiology to prevention by Acalovschi M. in 2001 estimated Gallstones disease is highly prevalent and can be prevented through non surgical treatment such as primary prevention by the inhibition of formation of stones specially in obese women, with many pregnancies and positive family history by healthy life style [16]
https://www.ncbi.nlm.nih.gov/pubmed/8386910

In cholesterol cholelithiasis: part of a systemic metabolic disease, prone to primary prevention by Di Ciaula A1, et al. in 2019 shown Primary and secondary prevention of cholelithiasis include elimination of obesity, a high fiber and high calcium diet and ingestion of meals at regular intervals with low saturated fat and secondary prevention involves non surgical treatment, dissolution with ursodiol etc [17]
https://www.ncbi.nlm.nih.gov/pubmed/30791781

The study on Lifestyle and gallstone disease; Scope for primary prevention by Sandeep sachdeva, zulfia khan in 2011 proved the association between formation of cholesterol gallstones disease is linked with insulin resistance, heart disease, atherosclerosis, cancer and therapy includes oral litholysis by the bile acid ursodeoxycholic acid (UDCA) and lap cholecystectomy [18].
www.ijcm.org.in/article.asp?...2011;...Sachdeva

4. Methodology

Description
A pooled study at individual – level was conducted in 50 subjects who were diagnosed with 3types of gallstones and were analysed as part of this study.

Participants:
The study was taken up by 2 students pursuing Post graduate diploma, each one followed 25 diagnosed cases of cholelithiasis from one of the multispecialty hospitals of Hyderabad. Overall 50 subjects were studied &analyzed.

Method:
A questionnaire was designed to know the effect of unhealthy dietary pattern and sedentary lifestyle as a risk

factor for gallstone formation.The questionnaire was framed Consisted of 11 questions and included both open and closed ended questions. From this questionnaire, the data on anthropometric measurements, biochemical parameters, diet type and physical activity were taken.

The collected data was later classified in to the BMI, dietary pattern, frequency of physical activity on the information obtained from the patient's medical profile such as (patients weight in kgs/height in m2), 24 hr dietary recall and their daily activity.

5. Results & Discussion

The survey was done on patients suffering with cholelithasis, Following factors were considered:

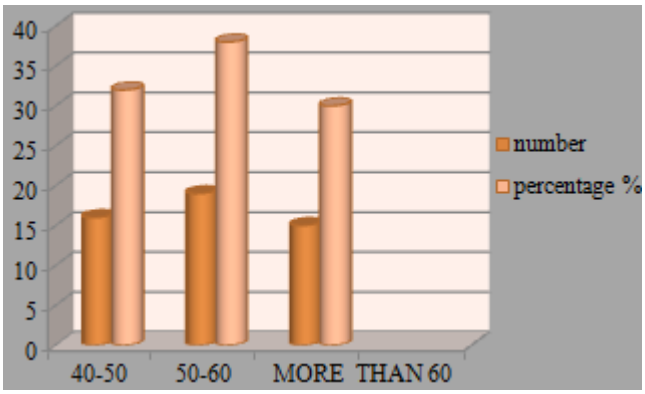
1) Age
2) Co Morbidities
3) Anthrometeric Measurements
4) Biochemical Parameters
5) Type Of Diet Followed
6) Life Style And Physical Activity

5.1 General Classification

a) Age Classification
The age distribution of the patients is shown in table (I)

Table I: Age Classification

Age	Number(n= 50)	Percentage %
40-50	16	32%
50-60	19	38%
> 60	15	30%

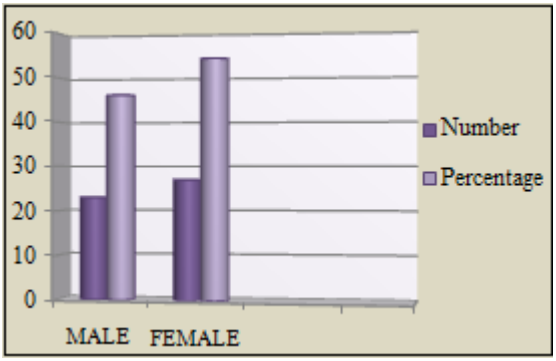


From the above diagram it is clear that most of the patients who were diagnosed with cholelithiasis were in the age group of 50-60 years. i.e. 38 % and about 30% were between more than 60 years of age and 32% were between 40 -50 years age. Gallstones increases with age in the Asian country as the persons with co morbidities and unhealthy diet are usually at higher risk [8]

b) Gender
The patients were classified as per their sex.

Table II: Gender

Sex	Number (n=50)	Percentage (%)
Male	23	46%
Female	27	54%

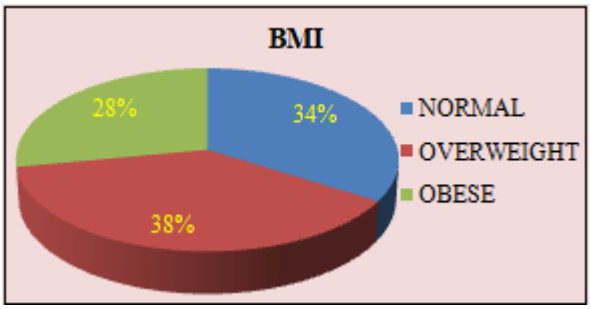


Above diagram states that, most of the patients who was diagnosed with cholelithiasis were women with 54% and the percentage observed in elderly men is 46%. Cholelithiasis is more prevalent in women over 40yrs of age and in men the geriatric group is more succeptible. [1].

c) BMI
The patients were classified as per BMI and variation shown in table (iii)

Table III: BMI

BMI	Number (n=50)	Percentage %
Normal (20-24)	17	34%
Overweight (25-28)	19	38%
Obese (>30)	14	28%

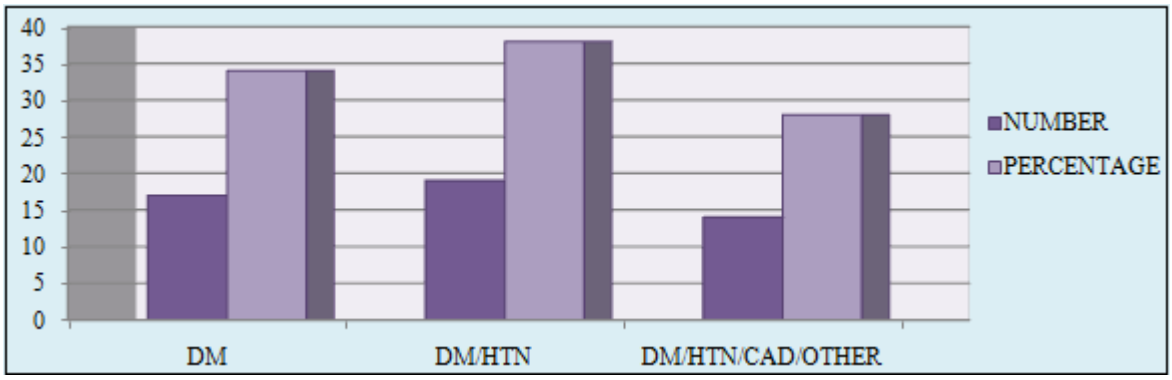


Most of the patients who were diagnosed with cholelithiasis had a BMI more than normal range. It was found about 38% of the patients fell under the category of overweight and 34% of them normal and 28% of them were obese. Association of high BMI with diabetes and other co morbidities has a greater impact in gallstone formation [9]

d) Comorbidities
The data is collected and details are shown in table (IV):

Table IV: Comorbidities

Comorbidities	Number (n=50)	Percentage %
Diabetes Mellitus	17	34%
Diabetes /Hypertension	19	38%
Diabetes/Hypertension/Coronary Artery Disease/Other	14	28%



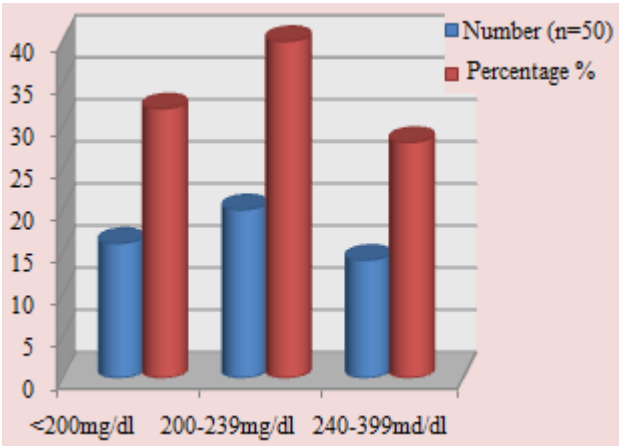
Above diagram states that most of the patients with cholelithiasis has co morbidities and 38% of them suffer from DIABETES/HYPERTENSION, 28% are of with DIABETES/HYPERTESION/CORANARY ARTERY DISEASE/OTHER and 34% are only with DIABETES. The study estimated that people with genetic obesity, insulin resistance and heart diseases are associated with more risk [9]

e) Biochemical Parameters

Total cholesterol levels of the patients were analyzed and data is shown.

Table V: Biochemcial Parameters

Total Cholesterol Levels	Number (n=50)	Percentage%
<200mg/dl	16	32%
200-239mg/dl	20	40%
240-399mg/dl	14	28%



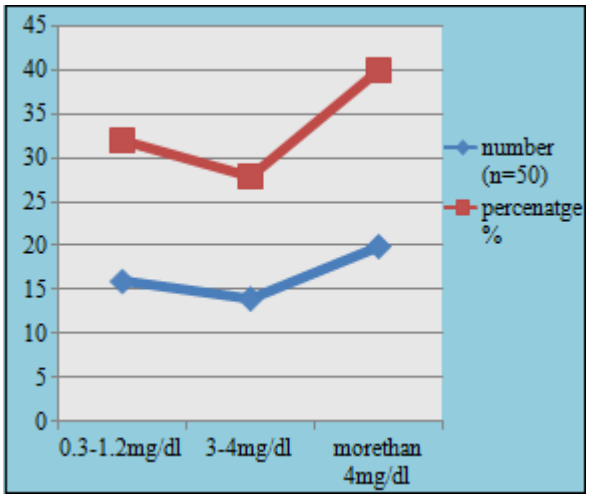
During this survey it was concluded that most of the patients have abnormal lipid profile and 40% of them were having high cholesterol levels i.e. 200-239mg/dl and 32% of them has less than 200mg/dl which is normal and remaining 28% of them has very high levels of cholesterol i.e 240-399 mg/dl.

f) Bilirubin Levels

The levels of patients were observed and data is shown in table (VI)

Table VI: Bilirubin Levels

Bilirubin Levels	Number (n=50)	Percentage%
0.3-1.2 mg/dl	16	32%
3-4mg/dl	14	28%
More than 4 mg/dl	20	40%



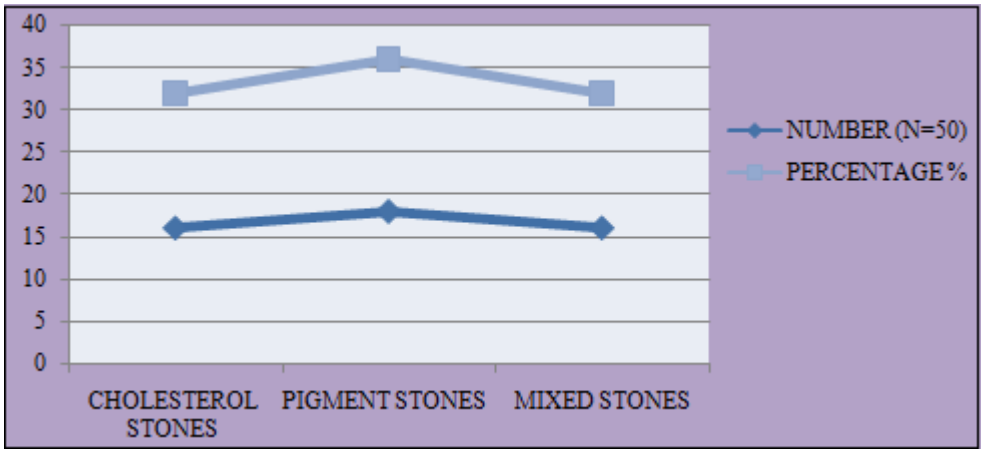
The above graph illustrates the bilirubin levels of the patients suffering with gallstones. The highest level of bilirubin that is more than 4.0mg/dl is seen in 40% of the patients followed by 32% holding the normal levels (i.e 0.3-1.2mg/dl). 28% of patients fall under less than 4mg/dl.

g) Types of Stones

Different types of stones were diagnosed in the patients and study has shown the data:

Table VII: Types of Stones

Types of Stones	Number (N=50)	Percentage %
Cholesterol stones	16	32%
Pigment stones	18	36%
Mixed stones	16	32%



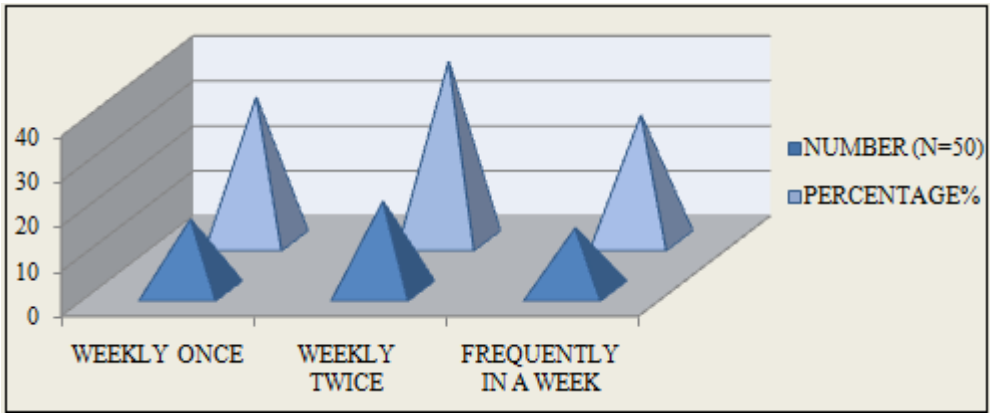
Cholesterol stones are linked with saturation in the bile due to unhealthy diet such as high saturated fats, low fiber, animal lipids, fried foods and pigment stones are due to more consumption of refined carbohydrates [4].The above graph depicts the 3 different types of stones in which 32% constitutes of cholesterol stones, 36% of pigment stones and rest 32% are of mixed stones.

h) Diet History

Frequency of non vegetarian per week is illustrated from the 24 hour recall of the patients:

Table VIII: Diet History

Frequency of Consumption of Non Veg/Week	Number (N=50)	Percentage %
Weekly once	16	32%
Weekly twice	20	40%
Frequently in a week	14	28%

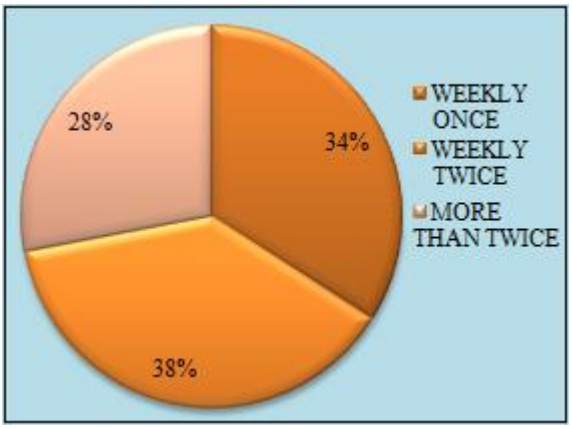


The patients who consume non-veg frequently are at more risk of developing gallstones from the conducted study it was clear that 20% of people consumes frequently in a week followed by 30% consuming weekly once whereas the highest percentage i.e., 50% consume weekly twice**.**

B) Frequency of consuming outside food in a week:

Table (IX)

Frequency	Number(n=50)	Percentage%
Daily	17	34%
Weekly once	19	38%
Weekly twice	14	28%

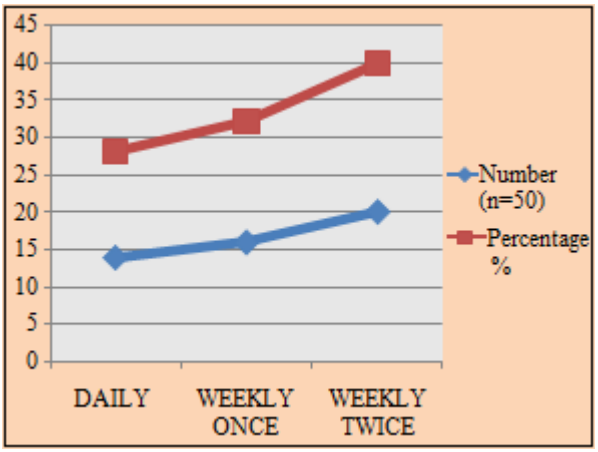


Outside foods containing animal fat which are rich in saturated and trans fats contains less amount of fiber which is correlated with the development of gall stones [4].The above graph illustrates the frequency of people eating junk food, in which 34% eat daily followed by 38% consuming weekly once and 28% weekly twice.

C) Consumption/ frequency of milk and milk products

Table X

Frequency Of Consumption	Number (n=50)	Percentage %
Daily	14	28%
Weekly Once	16	32%
Weekly Twice	20	40%



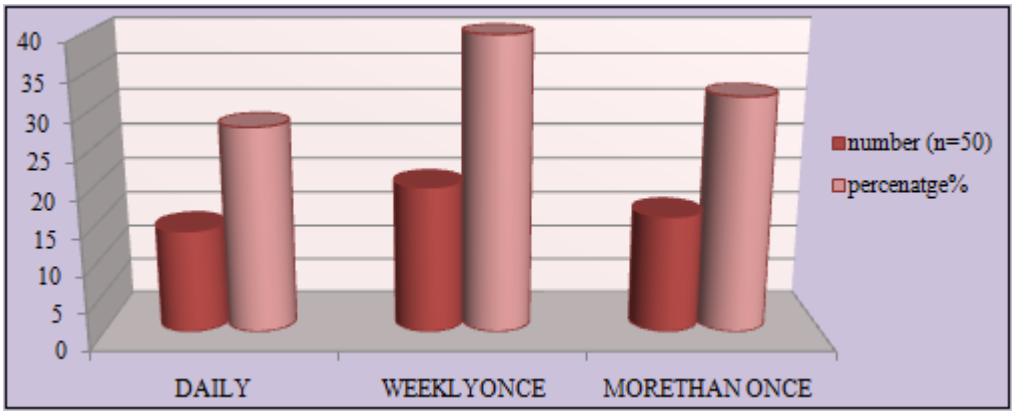
It is found that the gallstones developed were due to different types of components in the diet. The above data states that the frequency of consumption of milk products daily is 28% followed by 34% weekly once and 40% twice a week.

I. Life Style and Physical Activity

A).Physical Activity

Table (XI)

Frequency of Physical Activity	*Number (N=50)*	*Percentage %*
Daily	14	28%
Weakly Once	20	40%
More Than Once	16	32%

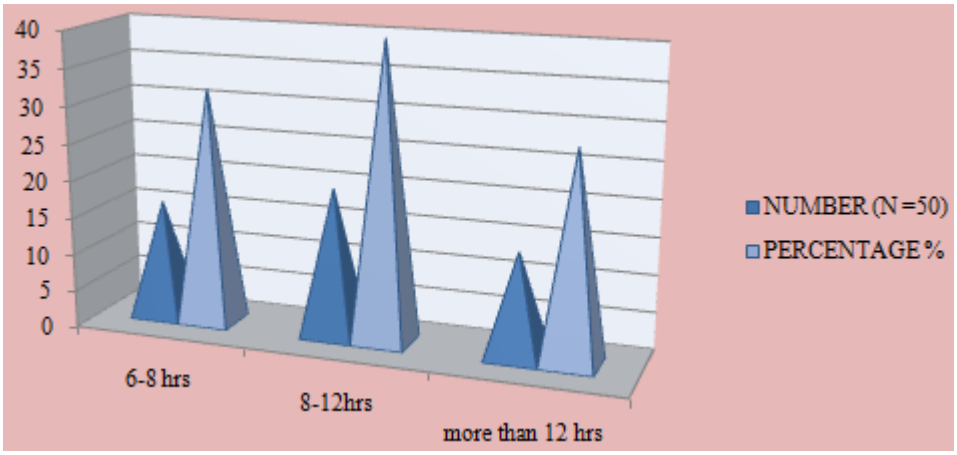


The patients under the category of overweight and obese leading a sedentary life have caused a risk for gallstones formation. The above illustration shows that 40%of the patients does physical activity once in week whereas 28% prefers daily and 32% more than once in week. Sedentary life, high BMI with co morbidities in people are linked to gallstone problems [15]

B) Working hours of the patients

Table XII

Working Hours	Number (n=50)	Percentage %
6-8hrs	16	32%
8-12hrs	20	40%
More than 12hrs	14	28%

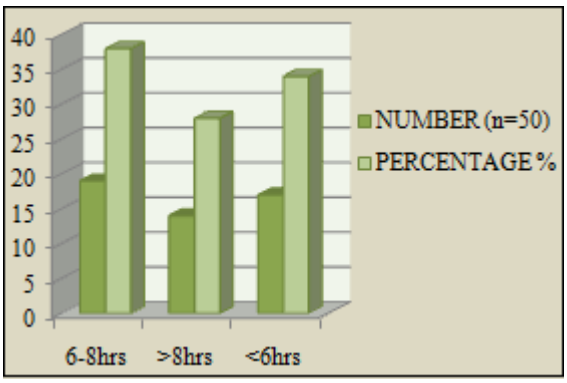


The above subjective data provides the information on the number of working hours in a day, in which majority of 40% works for 8-12 hours a day followed by 32% working for 6-8 hours and the rest 28% working for more than 12hours from which we can interpret the health status of an individual.

C) Sleeping hours of patients

Table XIII

Sleeping Hours	Number (n=50)	Percentage %
6-8hrs	19	38%
>8hrs	14	28%
<6hrs	17	34%

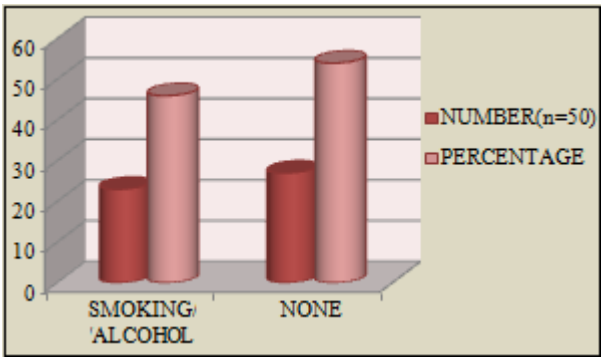


The sleeping patterns often effects the mental and physical health status of an individual, provided data states that the people sleeping for 6-8 hours hold less proximity of developing gallstone in their later life which comprises of 38% followed by 34% who sleeps less than 6 hours a day and rest 28% sleeps more than 8 hours increasing the risk of gallstones.

D) Social Habits

Table XIV

Social Habits	Number (n=50)	Percentage %
Smoking/Alcohol	23	46%
none	27	54%



The above graph depicts the information about the social habits of people like smoking and alcohol which constitutes 46% of this category and 54% constitutes the people who don't consume alcohol nor smoke.

6. Summary& Conclusion

It has been found in many studies that people who follow unhealthy diet and leading sedentary life are at higher risk of cholelithiasis, who were falling under the category of overweight and obese. In the view of this statement the survey was carried out with 50 patients diagnosed with cholelithiasis and their medical profile data was collected and analyzed by using a pretested questionnaire method, which concluded that out of 50 patients, 19 patients has a habit of eating outside food twice a week, 17 of them eat weekly once. whereas 14 patients found to eat outside food more than twice a week and also they has less physical activity in a week. Hence, the association between unhealthy diet and sedentary life style was primarily attributed to the risk of cholelithiasis.

7. Recommendations

1) As the patients with high BMI are prone to cholelithiasis, so early diagnosis and prevention is suggested to prevent complications due to cholecystectomy.
2) Reduce the BMI in the obese by gradual weight loss.
3) Lower the serum triglyceride concentration, by reducing the foods which are high in trans fat, hydrogenated oils, fried foods and excessive saturated animal fat can overwork the gallstones.
4) Reduce refined carbohydrates such as sugars, sweetners, flour, refined grains and starches which has higher glycemic index as this increases the risk of gallbladder disorder.
5) The lifestyle measures such as controlling obesity, avoiding rapid weight loss, avoiding allergens, quitting smoking and trying a vegetarian diet.
6) Eating healthy fats like fish oil, olive oil and polyunsaturated fats to help gallbladder contract and empty on a regular basis.
7) Consume a balance diet by maintaining meal timings.
8) Fiber in the diet plays an important role in a healthy digestive system and calcium in the diet can also support a healthy gallbladder.
9) Including more of vitamin C foods in the diet appear to experience fewer gallbladder problems.
10) Heavy alcohol drinking can cause problems for liver, but moderate drinking i.e around one drink per day can help to protect the gall baldder.
11) Avoiding feasting and fasting.
12) Practice regular physical activity to help you reach and maintain a healthy weight.

8. Acknowledgement

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Annexure-I

Case Study Format

Date:

1) **Patient Details:** Mrs.ABC

2) **Anthropometry**
- Age:
- Gender:
- Height:
- Weight:
- Bmi:
- Lifestyle:
- Diet Type:
- Food Allergies:

3) **Medical History**
4) **Co-Morbidities**
5) **Diagnosis**
6) **Biochemical Parameters**

Sno.	Parameters	Patient values	Normal values	Inference

Medications

Medication	Mechanism of action	Side effects	Food & drug interaction

3) 24 Hour Recall Diet:

1	Energy	Kcal
2	Protein	G
3	Fats	G

4) Interpretation of the Case Study

5) Nutritional Management
Nutrients Requirement Per Day
Energy-
Protein-
Fat-
CHO-
FIBRE-

Nutritional Principle

Nutritional Guidelines:

5) Discharge Diet with Calculations:

SNo	Meal Time	Food Item	S.S	Ingredients	Qty (gm)	Energy (kcal)	Protein (g)	Fat (g)
					Total			
					R.D.A			

Annexure-II

Questionnaire- A study on the effect of unhealthy dietary pattern with sedentary lifestyle as a risk factor for the formation of gallstones

Name:
Age/sex:
Height: Weight: BMI:
Educational qualification:
Occupation:

Medical History:

1. Do you have any co morbidities?
a) Heart disease b) diabetes c) thyroid disorder d) high blood pressure e) high cholesterol levels f) kidney disorders.

Parameters:

2. What are your total cholesterol levels?
a) High b) low c) normal d) very high

3. What are your bilirubin levels?
a) 0.3- 1.2 mg/dl b) 3.0-4.0mg/dl c) more than 4.0mg/dl

4. Types Of Stones Diagnosed In Cholelithiasis?
a)Cholesterol Stones b) Pigment Stones c) Mixed Stones

5. How often do you take non vegetarian?
a) Never b)once in a week c) twice in a week d)more than twice in a week.

6. How often do you take milk and milk products? If yes
a) Daily once b) weekly 2-3times c) monthly 1or 2 times d) weekly once

7. How often do you prefer outside food /fried foods/feasting outside /ready to eat foods or processed food?
a) Daily once b) weakly once c) once in a month d) often.

Life Style and Exercise

8. Do you smoke or drink alcohol? Yes/No

9. Physical Activity Done Per A Week
a) Daily b) Weekly once c) More Than Once

10. What is the duration of time spent in working place daily ?
a) 6-8 hours b) more than 8 hours c) less than 6hours

11. What is your sleeping hours?
a) 6-8 hours b) less than 6hours c) more than 8 hours