International Research Journal of Multidisciplinary Scope (IRJMS), 2025; 6(2): 652-661 IRJMS

Original Article | ISSN (O): 2582-631X DOI: 10.47857/irjms.2025.v06i02.03271

Nutritional Status and Dietary Pattern among Cholelithiasis Patients

Reshma Banu S, TH Hema*, AJ Hemamalini

Department of Clinical Nutrition, Faculty of Allied Health Sciences, Sri Ramachandra Institute of Higher Education and Research, (Deemed to be University), Chennai, Tamil Nadu, India. *Corresponding Author's Email: hema@sriramachandra.edu.in

Abstract

To determine the association of abdominal obesity and dietary pattern with female cholelithiasis patients. A prospective observational study was conducted out on 30 female patients with recently diagnosed cholelithiasis. Anthropometric Measurements, Dietary Assessment and Socio- Economic Status were key characteristics of the study. In accordance with the Asia-Pacific guidelines established by the World Health Organization (2000), patients with normal BMI (23.3%) have a high WHtR (≥0.5), whereas those with overweight (20%) and obese (56.7%) BMIs consistently showed higher WHtR (≥0.5). The central adiposity, evaluated through the Waist-to-Height Ratio (WHtR), tends to be consistent from early to late adulthood (i.e. ≥0.5). The Waist-to-Height Ratio (WHtR) which is the marker of central adiposity, remains stable from early to late adulthood (i.e., ≥0.5). The analysis of energy adequacy, based on the updated ICMR RDA (2024), indicated that, all age groups exhibited energy intake below the recommended levels, with early adulthood showing the most pronounced shortfall. The average consumption of TSFA and TPUFA was marginally above the recommended thresholds for middle adulthood, though not to a significant extent. Similarly, the average intake of TMUFA and total trans-fatty acids fell within the recommended guidelines for all age categories. According to our study, WHtR plays a more significant role in mediating the correlation between dietary patterns and cholelithiasis compared to BMI.

Keywords: Body Mass Index (BMI), Recommended Dietary Allowances (RDA), Waist Circumference (WC), Waist -to -Height Ratio (WHtR), World Health Organisation (WHO).

Introduction

Cholelithiasis, commonly referred to as gallstones, constitutes solidified accumulations of digestive fluid that form within the gallbladder (1). The gallbladder is an organ with a pear shape that typically measures between 7 to 10 centimeters in length and has a diameter of about 4 centimetres when fully distended, with a total capacity of 50 milliliters. It consists of three main parts: the neck, fundus, and body, and is situated against the abdominal wall beneath the liver's IV B and V segments. The cystic duct narrows to create the common bile duct, which has an approximate diameter of six millimetres. Gallstones often become lodged in the bile duct and the mucosal folds of the neck, resulting in distension. The contractions of the gallbladder are mainly controlled by parasympathetic in nervation and the secretion of cholecystokinin, which is triggered by nutrients in the duodenum. When gallstones move toward the bile duct during the gallbladder's emptying process, they can induce biliary colic, leading to smooth muscle contractions and dilation of the duct (2). One of the most common gastrointestinal conditions affecting the adults is cholelithiasis. The 5Fs "Fat, Fair, Female, Fertile and Forty"are risk factors for cholelithiasis (3). Asymptomatic gallstones, often found incidentally, carry an annual risk of 1% to 2% for developing symptoms or complications. Generally, treatment is not necessary unless symptoms arise. However, during a 15-year follow-up, approximately 20% of asymptomatic individuals may experience symptom development. Possible complications include gallstone pancreatitis, choledocholithiasis, cholangitis, cholecystitis, and, in rare cases, cholangiocarcinoma. The formation of gallstones occurs through three primary mechanisms: cholesterol supersaturation, where excess cholesterol crystallizes; increased bilirubin production, resulting in pigment stones; and reduced gallbladder contractility, which allows bile to concentrate and form stones (4). These

(Received 21st November 2024; Accepted 14th April 2025; Published 30th April 2025)

processes highlight the intricate nature and potential dangers associated with gallstone disease. The crystallization of cholesterol in bile, along with diminished gallbladder contractility, is associated with the emergence of cholesterol gallstones. Factors such as excessive caloric intake, high animal fat consumption, hyperlipidemia, the use of oral contraceptives, prolonged fasting; dieting, obesity, and reduced intestinal motility may contribute to these conditions. Biliary infections are the leading cause of calcium bilirubinate stones, with increased bilirubin in the bile, black stones are thought to form more easily, by increasing unconjugated bilirubin levels. Hemolytic disorders, including Crohn's disease, ileal resection, hereditary spherocytosis, and thalassemia, can also play a role in this condition, which is also seen in cases of liver cirrhosis (5). Gallstone disease (GD) affects between 10% and 20% of the global population, with varying prevalence among different ethnic groups. The highest prevalence is observed in the United States, affecting about 25% of the population. In Chile, Machupes, Hispanics, and Maoris show higher rates, with prevalence ranging from 21% to 35%. Europe reports a prevalence of around 20% among adults, while Asian nations range from 3% to 10%, with China at 6.9%. Africans generally have the lowest prevalence. Ethnicity emerges as a significant risk factor, with higher rates observed among Mexicans and Mexican-Americans when compared to non-Hispanic whites, even at younger ages (6). A study was conducted to compare and identify the main variations among gallstones from seven distinct Indian locations. Based on the study they found that cholesterolwas the significant component of the stones from Chandigarh, Delhi, Kangra, Lucknow, and West Bengal—all of which were classified as North India. In contrast, the South Indian group's stones from Hyderabad and Thiruvananthapuram had mostly pigment stones and only trace amounts of cholesterol (7). The role of diet as a significant environmental factor is gaining recognition, with an expanding array of evidence in nutritional epidemiology indicating that the examination of dietary patterns is the most valid approach for assessing the connections between overall dietary intake and health or disease, as opposed to focusing on individual dietary components. The relationship between dietary habits and the risk of Gall Bladder Disease (GBD) inrelation to abdominal obesity has not received much attention.Moreover, there is a dearth of published research on this topic within developing countries.Conducting epidemiological research in these settings could not only confirm existing evidence but also yield significant new insights. Therefore, the current study's goal is to ascertain the relationship between abdominal obesity and dietary pattern with female cholelithiasis patients. The specific objective of this research is to assess and correlate the waist-to-height ratio in newly diagnosed female patients with cholelithiasis and to evaluate their socio-demographic status and dietary practices.

Methodology

A prospective observational research study was conducted out to analyze the correlation between the prevalence of cholelithiasis and central obesity in female adults aged 20 to 75 years. The Institute of Ethics committee accepted the study protocol (Ref: CSP/23/JUL/132/674), and the letter of authorisation was acquired from the Professor and Head of the Department of Surgery at Sri Ramachandra Hospital.

Sample Size and Sampling Technique

The study employed convenience sampling to recruit subjects from the G-block of Sri Ramachandra Hospital in Porur, Chennai. Female patients who were newly diagnosed with cholelithiasis and fell within a specified age range were selected for participation. Participants with ultrasonographically confirmed symptomatic gallstones were included in the study. Asymptomatic patients were not included in the study.The sample size was established based on the average number of cholelithiasis cases recorded in the female surgery ward over the last three months.Data collection was conducted among patients admitted to the surgery ward of the in-patient department (IPD) at Sri Ramachandra Hospital - G block, located on the second floor of the female surgery ward, from November to December 2023.A standardized proforma was used to collect data on Age, Gender, Height (Cm), Waist Circumference (Cm), and the Waist-to-Height Ratio (WHtR)werecomputed and documented.

Methods of Data Collection

A letter of authorisation was obtained before the anthropometric measurements. Height (Cm) of the

patients was taken using stadiometer. Before taking a measurement, the subject was instructed to take off any shoes or headdresses and was designed to stand with the back of the head, the shoulder blades, and the buttocks against the wall and the head positioned on the horizontal Frankfurt plane (FH plane). The reading was then recorded to the hundredth of a centimetre in Figure 1 (8). An inelastic measuring tape was used to determine the WC in centimetres. At the umbilicus, WC was determined using a calibrated anthropometric tape measure to the nearest 1 mm Figure 2 (9). Waist-to-Height Ratio which is regarded as an anthropometric indicator of central adiposity was computed by dividing WC by height. According to the classification for waist-height ratio developed by Ashwell, the WHtR is ≥ 0.5 it indicates abdominal obesity and is an indicator of early health risk and if the WHtR is < 0.5 it indicates low health risk (10). A three day dietary record was employed to enhance accuracy of dietary intake estimation. Nutrient intake was analysed using dietcal software which is based on the Indian food composition table. Socio-Economic Status was determined using modified Kuppuswamy Socioecomic Status scale (11).

Statistical Analysis

Data collected on the proforma was entered in Microsoft Excel 2017. Data analysis was done using the Statistical Package for the Social Sciences (SPSS) version 21. The data was expressed in mean with standard deviation and frequency with percentage where applicable. Statistical test was done using one way ANOVA**.**

Results

The research encompassed a total of 30 participants, categorized into three age groups: 33.33% were classified as Early adults (n=10), 40% as Middle adults (n=12), and 26.7% as Late adults (n=8). With a median age of 51 years and a range of at least 30 to 73 years, the average age of the entire cohort was determined to be 50.300 ± 14.0643 years. In accordance with the Asia-Pacific guidelines established by the World Health Organization (2000), the research findings highlight a substantial rate of obesity, indicating that 20% (n=6) of the participants are deemed overweight, whereas 56.7% (n=17) are classified as obese. In addition, it was ascertained that 23.3% (n=7) of the individuals were recognized as having a normal body mass index (12). According to the revised Kuppuswamy socioeconomic status classification, around 16.7% of participants belong to low-income households (V), while 10% are categorized within lower middle-income households (III). In contrast, a significant majority, comprising 73.3% of participants, are classified as residing in high-income households (IV) is presented in Table 1.

Table 1: Descriptive Characteristics of Female Cholelithiasis Subjects Enrolled in this Study (N-30)

Variables	Frequency(n=30)	Percent (%)
Stages of Adulthood With Range (Age)		
Early Adulthood (20 – 39 Years)	10	33.3
Middle Adulthood (40 – 59 Years)	12	40.0
Late Adulthood (60 Years and above)	8	26.6
BMI cut points for Asian-Specific Populations		
Normal (18.5 – 22.9kg/m^2)	7	23.3
Overweight (23 – 24.9 kg/m^2)	6	20
Obese (≥25 kg/m^2)	17	56.7
Modified Socioeconomic Status Scale of Kuppuswamy		
Lower Class (V)	5	16.7
Lower Middle Class (III)	3	10
Upper Lower Class (IV)	22	73.3

Table 2: Distribution of Female Cholelithiasis Subjects Waist –to-Height Ratio (WHtR) by Stages of Adulthood (N -30)

Anthropometric Variables	Age Group	N=30	MEAN ± SD	Minimum	Maximum	P- value
WHtR ≥ 0.500	Early Adulthood (20 – 39 Years)	10	0.6540 ± 0.12756	0.52	0.99	0.160^{NS}
	Middle Adulthood (40 – 59 Years)	12	0.6508 ± 0.06288	0.52	0.76	
	Late Adulthood (60 Years and above)	8	0.6625 ± 0.07421	0.52	0.75	

Notes: - t-statistics parentheses p > 0.05

Table 2 illustrates the distribution of female subjects with cholelithiasis across various stages of adulthood, categorized by age. There were no discernible differences between the groups according to the analysis (P > 0.05). This finding suggests that central adiposity, evaluated through the waist-to-Height Ratio (WHtR), tends to be consistent from early to late adulthood in this sample population. Table 3 summarizes the comparison of daily macronutrient intake for female cholelithiasis patients with the RDA set by the ICMR for 2024. The typical amount of energy consumed per day across different adult life stages was calculated as 959.1 ± 129.7 Kcal for early adulthood, 1071.0 ± 199.8 Kcal for middle adulthood, and 1048.2 ± 230.2 Kcal for late adulthood. The analysis of energy adequacy, based on the updated ICMR RDA (2024), indicated that early adulthood met only 57.8% of the energy requirements, while middle adulthood achieved 64.5% and late adulthood 61.7% (13). All age groups exhibited energy intake below the recommended levels, with early adulthood showing the most pronounced shortfall. Furthermore, a similar investigation into the nutritional status of adults with cholelithiasis found that those who were more susceptible to cholelithiasis when following low-calorie diets (1200 - 1500 kcal/day) and extremely low-calorie diets (500 kcal/day) (14). The mean daily protein intake across different phases of adulthood was calculated as 35.3 ± 6.5 g for early adulthood, 41.6 ± 8.4 g for middle adulthood, and 40.1 ± 8.2 g for late adulthood. When compared to the updated RDA from the ICMR in 2024, the protein adequacy was determined to be 76.8% for early adulthood, 90.5% for middle adulthood, and 95.6% for late adulthood. Although the intake levels are nearing the RDA, early adulthood still exhibits a significant deficiency. A prospective study investigating the correlation between various dietary factors and the necessity for cholecystectomy due to gallstone disease found that consuming protein intake was linked to a lower risk of requiring this surgical intervention (15). The average daily carbohydrate consumption observed at various stages of adulthood was recorded as 135.8 ± 17.0 g, 144.5 ± 32.2 g, and 145.6 ± 37.1 g. When assessed against the updated RDA from the ICMR for 2024, the nutritional adequacy of carbohydrate intake was found to be 56.7% in early adulthood, 54.0% in middle adulthood, and 55.6% in late adulthood. This intake aligns with the recommended levels, assuming carbohydrates contribute 50% of total energy. Additionally, a study examining the relationship between glycemic load, glycemic index, and carbohydrate consumption indicated that higher levels of carbohydrate intake, along with increased dietary glycemic load and glycemic index may elevate the risk of cholecystectomy in women (16). The average daily total fat intake observed at various stages of adulthood was calculated as 28.8 ± 7.7 g, 34.5 ± 6.7 g, and 32.1 ± 10.5 g, respectively. When assessed against the updated RDA established by the ICMR in 2024, the nutritional adequacy of total fat intake was found to be 27.1% in early adulthood, 29.1% in middle adulthood, and 27.6% in late adulthood. Notably, total fat consumption remained within the advised range of 15-35% of total energy intake. According to a cross-sectional, consuming foods high in fat is a significant risk factor for the development of cholelithiasis (17). Although there were minor fluctuations in mean energy, protein, carbohydrate, and total fat intake across the different age groups, these differences were not

statistically significant (p > 0.05). These results indicate that, despite some differences in macronutrient consumption among the various stages of adulthood, the overall dietary patterns of the participants were largely consistent with the recommended dietary allowances.

Table 3: Comparing the Daily Macronutrients Intake of Female Cholelithiasis Subjects with the RDA (N - 30)

Macronutrients in Units	Age group	n =30	MEAN ± SD	RDA	P -VALUE
Energy (Kcal)	Early Adulthood (20 – 39 Years.)	10	959.1296 ± 129.78922	1660 kcal	0.564^{NS}
	Middle Adulthood (40 – 59 Years.)	12	1071.0169 ± 199.87901		
	Late Adulthood (60 Years andAbove)	8	1048.2697 ± 230.20496	1700 kcal	
	Total	30	1027.6552 ± 188.91297		
Protein [gms]	Early Adulthood (20 – 39 Years.)	10	35.3269 ± 6.52704	46 g	0.257^{NS}
	Middle Adulthood (40 – 59 Years.)	12	41.6267 ± 8.41624		
	Late Adulthood (60 Years andAbove)	8	40.1589 ± 8.25817	42 g	
	Total	30	39.1354 ± 8.02556		
Carbohydrate [gms]	Early Adulthood (20 – 39 Years)	10	135.8675 ±17.02459	45 - 65% E	0.833^{NS}
	Middle Adulthood (40 – 59 Years)	12	144.5550 ± 32.29021		
	Late Adulthood (60 Years andAbove)	8	145.6737 ± 37.11318		
	Total	30	141.9575 ± 28.93620		
Total Fat (gms)	Early Adulthood (20 – 39 Years)	10	28.8673 ± 7.75554	15 – 35% E	0.518^{NS}
	Middle Adulthood (40 – 59 Years)	12	34.5909 ± 6.73240		
	Late Adulthood (60 Years andAbove)	8	32.1930 ± 10.51602		
	Total	30	32.0436 ± 8.28991		

Notes: - t-statistics parentheses p > 0.05, E - Energy

Table 4 shows the comparison of fat intakes of female cholelithiasis subjects with the RDA revealed interesting findings. The observed average daily Total Saturated Fatty acid (TSFA) intake across different stages of adulthood was 14174.2 ± 2650.2; 16782.3 ± 2825.0; 14563.6 ± 4290.0 mg. The nutritional adequacy of TSFA calculated against updated RDA of ICMR (2024), showed early adulthood meeting 44.2%, middle adulthood48.5%, and late adulthood 45.2%. The

saturated fatty acid consumption is far greater than is significantly higher than the advised threshold ≤10% of total fat intake, given their association with increased risk of gallstone formation. A similar study concluded that, men were 1.14 times more likely to develop cholelithiasis as they consumed above 10.8% of their calories from saturated fat and in females by 1.2 times (18). The observed average daily Total Mono Unsaturated Fatty acid (TMUFA) intake across different stages of adulthood was 4809.7 ± 1556.0; 6007.8 ± 1614.1; 5554.2 ± 2580.4 mg. The nutritional adequacy of TMUFA calculated against updated RDA of ICMR (2024), showed early adulthood meeting15.0%, middle adulthood 17.4%, and late adulthood 17.3%. The consumption of MUFA is around the recommended ≤15% limit of total fat. The observed average daily Total Poly Unsaturated Fatty acid (TPUFA) intake across different stages of adulthood was 4444.7 ± 2899.0; 4788.6 ± 2027.9; 5191.5 ± 2357.4 mg. The nutritional adequacy of TPUFA calculated against RDA of ICMR (2024), showed early adulthood meeting 13.9%, middle adulthood 13.8%, and late adulthood 16.1%. PUFA exceeds the recommended≤10% limit of total fat intake. The average TSFA and TPUFA intake amounts were slightly above the recommended limits for middle adulthood, but not significantly so. Similarly, mean intake levels of TMUFA and total trans-fatty acids were within the recommended limits across all age groups. A prospective cohort study, concluded that, a diet rich in fruit, vegetables, nuts, fish, MUFA/SFA, and n-3 FA/omega-3 fatty acids was found to be significantly protective against cholelithiasis (19). The observed average daily Total Trans Fatty acid intake across different stages of adulthood was .0096 ± .01003; .0096 ± .01005; .01076 ± .0147 mg. The nutritional adequacy of Total Trans Fatty acid calculated against RDA of ICMR (2024), showed early adulthood meeting 3.0%, middle adulthood 2.8%, and late adulthood 3.3%. Trans-fatty acid intake is significantly below the recommended ≤1% limit of total fat intake across all age groups. Consuming fat from meat and fried foods raised the risk of cholesterol gallstone, while consuming carbohydrate from noodles increased the risk of pigment gallstone, according to a case control study on the relationship between diet and gallstones of cholesterol and pigment among patients who had cholecystectomy (20). While there were slight variations in mean intake levels of TSFA, TMUFA, TPUFA, and total trans fatty acids among different age categories, none of these differences reached statistical significance ($p > 0.05$). Overall, the mean intake levels of these fats generally fell within or close to the recommended limits specified for each type of fat.

Table 4: Comparison of Fat Intakes of Female Cholelithiasis Subjects with the RDA (N-30)

	Age group	**n-30**	**MEAN ± SD**	**RDA**	**P VALUE**
Total Saturated Fatty Acids (TSFA)	Early Adulthood (20 – 39 Years)	10	14174.2801 ± 2650.27367	≤10% F	0.613^{NS}
	Middle Adulthood (40 – 59 Years)	12	16782.3921 ± 2825.09827		
	Late Adulthood (60YearsandAbove)	8	14563.6123 ± 4290.03318		
	Total	30	15321.3468 ± 3338.41788		
Total Monounsaturated Fatty Acids (TMUFA)	Early Adulthood (20 – 39 Years)	10	4809.7482 ± 1556.00082	≤15% F	0.031^{NS}
	Middle Adulthood (40 – 59 Years)	12	6007.8938 ± 1614.18940		
	Late Adulthood (60 Years and Above)	8	5554.2347 ± 2580.47334		
	Total	30	5487.5362 ± 1902.29124		

Total Polyunsaturated Fatty Acids (TPUFA)	Early Adulthood (20 – 39 Years)	10	4444.7646 ± 2899.02438		
	Middle Adulthood (40 – 59 Years)	12	4788.6380 ± 2027.94078		
	Late Adulthood (60 Years and Above)	8	5191.5560 ± 2357.44668	≤10% F	0.594^{NS}
	Total	30	4781.4583 ± 2365.40901		
Total Trans Fatty Acids	Early Adulthood (20 – 39 Years)	10	.009606 ± .0100383		
	Middle Adulthood (40 – 59 Years)	12	.009664 ± .0100509	≤1% F	0.910^{NS}
	Late Adulthood (60 Years and Above)	8	.010765 ± .0147778		
	Total	30	0.009938 ± .0110708		

Notes: - t-statistics parentheses p > 0.05, F – Fat

Figure 1: Height Measurement

Figure 2: Waist Circumference Measurement

In Figure 1, Height being measured by the principle investigator on a female participant using a wall-mounted stadiometer, with the participant standing upright without foot wear, heels together and the head positioned in the Frankfort horizontal plane, following standard anthropometric procedures. In Figure 2 Waist circumference being measured by the principle investigator on a female participant using non-stretchable measuring tape at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest following, WHO protocol.

Discussion

This study identified significant association between specific dietary pattern and the prevalence of symptomatic gallstones. Diets high in saturated fatsand low in dietaryfibre were more frequently observed in individuals with gall stones, aligning with existing literature that implicates high fat, low fibre diets in gallstone pathogenesis. These findings emphasize the importance of dietary composition, particularly fat and fibre content, in influencing bile composition and gall bladder motility. The practical applicability of these results lies in dietary recommendations aimed at preventing gallstone formation, especially among high risk groups such as obese individuals and women with hormonal abnormalities. Nutritional counselling for such populations should prioritize macronutrient specific strategies namely, reducing saturated fat intake and increasing consumption of fibre rich foods such as fruits, vegetables and whole grains. The study's findings also offer potential for tailoring preventive dietary interventions such as increasing the intake of plant based foods and reducing the intake of animal fats. Incorporating these strategies in to public health recommendations may aid in reducing the burden of gallstone disease. Beyond dietary influences, this study also highlighted the role of waist height ratio (WHtR) as a significant anthropometric indicator. Individuals with elevated WHtR values which is a marker of central obesity showed a greater prevalence of gallstone disease. Socioeconomic status (SES) was another important factor examined in the study. Participants from lower SES background were more likely to consume high calorie, low fibre diets, often due to limited access to healthier food choices and reduced nutritional awareness. This patter may contribute to both poor diet quality and increased susceptibility to metabolic disorders that elevate gall stone risk.

Conclusion

The research highlights a significant correlation between Cholelithiasis and an increased WHtR. Participants were found to have elevated levels of abdominal obesity, largely due to poor eating habits, such as consuming large amounts of saturated fats and processed carbs, which led to higher waist-to-height ratios and the development of gallstones. Notably, all age categories—Early, Middle, and Late adulthood—exhibited a higher WHtR, suggesting the presence of central obesity. Additionally, Cholelithiasis was found to be independently correlated with abdominal obesity, with waist-to-Height Ratio identified as a precise indicator. In conclusion, the study accentuates the importance of dietary intake and nutritional habits, especially among those with central obesity across different age groups. The strengths of this study is

- This study marks the first examination of the relationship between nutritional status and dietary patterns among patients newly diagnosed with cholelithiasis.
- The analysis shows that there is a correlation between low socioeconomic status and an elevated risk of cholelithiasis, which may lead to a detrimental cycle. Unhealthy eating habits typical in lower socioeconomic demographics often involve diets high in saturated fats and refined carbohydrates. The current research emphasizes the nuanced interactions between socioeconomic factors and health outcomes.

The Limitations and Future Research of this Study

- The current research had a short duration and the statistical power to identify differences is limited by the small sample size.
- A three-day dietary intake was used for assessing the dietary intake, which may not fully capture habitual intake and there is a possibility of misreporting due to recall or social desirability bias.
- Physical activity and biochemical parameters such as lipid profiles were not included in the current research.

- Future research should focus on longitudinal studies to establish casual relationships between dietary intake and gallstone development. Additionally, investigating the roles of micronutrients, hormonal influences, and gut microbiota may provide deeper insight in to gallstone etiology. The findings lay the foundation for further dietary intervention trials that can evaluate the effectiveness of targeted nutrition strategies in preventing gallstone disease.

Recommendations Include

- For optimal gallbladder health, it is important to establish regular meal times and to ensure a balanced intake of nutrients.
- Prompt diagnosis and proactive prevention strategies are vital for minimizing complications related to cholecystectomy, particularly among patients with a high BMI, who are at an increased risk for cholelithiasis.
- Adopting healthy lifestyle practices, such as reducing body fat, avoiding drastic weight loss, quitting smoking, and considering a vegetarian diet, may contribute to the prevention of gallbladder complications.
- Increasing intake of plant based foods may contribute to improved lipid metabolism.
- Reducing animal fat intake help prevent cholesterol supersaturation in bile a key factor in gallstone formation
- Consuming polyunsaturated fats, fish oil, and olive oil, as healthy fats can facilitate consistent gallbladder emptying. At the same time, minimizing the consumption of trans-fat-rich foods can help avert gallstone formation and reduce serum triglyceride levels.
- Limiting refined carbohydrates, including sugars, sweeteners, flour, and high-glycemic index starches, can decrease the risk of gallbladder disorders.
- Antioxidant rich foods such as vitamin C and E may help prevent gallbladder problems.
- Consuming alcohol in moderation, approximately one drink daily, may provide protective benefits for the gallbladder; however, excessive drinking can result in liver complications.
- Avoiding excessive feasting and fasting can maintain a healthy weight, reducing the risk of gallbladder issues.

Abbreviations

BMI: Body Mass Index, ICMR: Indian Council of Medical Research, RDA: Recommended Daily Allowances, TSFA: Total Saturated Fatty Acid, TMUFA: Total Monounsaturated Fatty Acid, TPUFA: Total Polyunsaturated Fatty Acid, WC: Waist Circumference, WHtR: Waist to Height ratio.

Acknowledgement

All praise and thanks to Almighty Allah. I am deeply grateful to my parents for their unconditional love, prayers, and unwavering support. My heartful thanks for my guide Dr.T.H.Hema, M.Sc., M.Phil, PGDSN., Ph.D, I want to convey my sincere thanks to Dr. C. D. Narayanan, MS, FRCS (G)., Professor and Head, The Head of the Department, Department of Surgery, Sri Ramachandra Institute of Higher Education and Research (DU) for extending their support by letting me carry out my data collection in Female surgery ward.

Author Contributions

Reshma Banu S: Taking Measurements, Experime ntal Data, Manuscript drafting, Figure design, T. H. Hema: Planning, Supervision, P. Nivedhitha: Statistical data analysis.

Conflict of Interest

The authors declare that there is no conflict of interest associated with this manuscript.

Ethics Approval

The study protocol was approved by the Institute of Ethics committee (Ref: CSP/23/JUL/132/674), and a permission letter was obtained from the Professor and Head of the Department of Surgery at Sri Ramachandra Hospital.

Funding

No Funds has been Obtained.

References

1. Al Atsariyah F, Budiono BP, Mahati E, Partiningrum DL. Correlation between Body Mass Index, Gender, and Age With Cholelithiasis: Correlation Between Body Mass Index, Gender, and Age With Cholelithiasis. MedicaHospitalia: Journal of Clinical Medicine. 2022 Nov 30;9(3):280-5.
2. Lazarchuk I, Barzak B, Wozniak S, Mielczarek A, Lazarchuk V. Cholelithiasis–a particular threat to women. A review of risk factors. Medical Journal of Cell Biology. 2023;11(1):20-7.
3. Bass G, Gilani SN, Walsh TN, Leader F. Validating the 5Fs mnemonic for cholelithiasis: time to include family history. Postgraduate medical journal. 2013 Nov;89(1057):638-41.

4. Tanaja J, Lopez RA, Meer JM. Cholelithiasis. In: StatPearls. Treasure Island (FL): StatPearls Publishing.2024.https://pubmed.ncbi.nlm.nih.gov/29262107/
5. Fujita N, Yasuda I, Endo I, Isayama H, Iwashita T, Ueki T, Uemura K, Umezawa A, Katanuma A, Katayose Y, Suzuki Y. Evidence-based clinical practice guidelines for cholelithiasis 2021. Journal of gastroenterology. 2023 Sep;58(9):801-33.
6. Parra-Landazury NM, Cordova-Gallardo J, Méndez-Sánchez N. Obesity and gallstones. Visceral medicine. 2021 Oct 7;37(5):394-402.
7. Siddiqui MA, Dwivedi N, Siddiqui MH, Rana SV, Sharma A, Dash NR, Pradeep R, Vijayahari R, Behari A, Kapoor VK, Sinha N. NMR spectroscopy-based analysis of gallstones of cancerous and benign gallbladders from different geographical regions of the Indian subcontinent. Plos one. 2023 Jun 23;18(6):e0286979.
8. Warrier V, Krishan K, Shedge R, Kanchan T. Height assessment.In: StatPearls. Treasure Island (FL): StatPearls Publishing.2023.https://www.ncbi.nlm.nih.gov/books/NBK551524/
9. Ross R, Neeland IJ, Yamashita S, Shai I, Seidell J, Magni P, Santos RD, Arsenault B, Cuevas A, Hu FB, Griffin BA. Waist circumference as a vital sign in clinical practice: a Consensus Statement from the IAS and ICCR Working Group on Visceral Obesity. Nature Reviews Endocrinology. 2020 Mar; 16(3):177-89.
10. Obe MA. Waist to height ratio and the Ashwell® shape chart could predict the health risks of obesity in adults and children in all ethnic groups. Nutrition & Food Science. 2005 Oct 1;35(5):359-64.
11. Radhakrishnan M, Nagaraja SB. Modified Kuppuswamy socioeconomic scale: stratification and updates. International Journal of Community Medicine and Public Health. 2023 Oct 31;10 (11):4415–8.
12. World Health Organization. Regional Office for the Western Pacific. The Asia-Pacific perspective: redefining obesity and its treatment. Health Communications Australia, Sydney.2000:17. https://iris.who.int/handle/10665/206936
13. Indian Council of Medical Research. Nutrient Requirements for Indians – Recommended Dietary Allowances and Estimated Average Requirements. Hyderabad: National Institute of Nutrition. 2024:29.https://mitaksharaacademy.com/wp-content/uploads/2024/05/RDA-revised-2024.pdf
14. Johansson K, Sundström J, Marcus C, Hemmingsson E, Neovius M. Risk of symptomatic gallstones and cholecystectomy after a very-low-calorie diet or low-calorie diet in a commercial weight loss program: 1-year matched cohort study. International journal of obesity. 2014 Feb;38(2):279-84.
15. Tsai CJ, Leitzmann MF, Willett WC, Giovannucci EL. Dietary protein and the risk of cholecystectomy in a cohort of US women: the Nurses' Health Study. Am J Epidemiol. 2004;160(1):11–8.
16. Tsai CJ, Leitzmann MF, Willett WC, Giovannucci EL. Glycemic load, glycemic index, and carbohydrate intake in relation to risk of cholecystectomy in women. Gastroenterology. 2005 Jul 1;129(1):105-12.
17. Butt W, Aslam M, Sharmeen Z, Fareed M, Pervaiz HZ. Assessment of Dietary Practices Among Adults Suffering from Cholelithiasis Attending Teritary Care Hospitals, Lahore. Asian Journal of Allied Health Sciences (AJAHS). 2020;5(4):17-20.
18. Figueiredo JC, Haiman C, Porcel J, Buxbaum J, Stram D, Tambe N, Cozen W, Wilkens L, Le Marchand L, Setiawan VW. Sex and ethnic/racial-specific risk factors for gallbladder disease. BMC gastroenterology. 2017 Dec;17:1-2.
19. Wirth J, Song M, Fung TT, Joshi AD, Tabung FK, Chan AT, Weikert C, Leitzmann M, Willett WC, Giovannucci E, Wu K. Diet-quality scores and the risk of symptomatic gallstone disease: a prospective cohort study of male US health professionals. International journal of epidemiology. 2018 Dec 1;47(6):1938-46.
20. Park Y, Kim D, Lee JS, Kim YN, Jeong YK, Lee KG, Choi D. Association between diet and gallstones of cholesterol and pigment among patients with cholecystectomy: a case-control study in Korea. Journal of health, population and nutrition. 2017 Dec;36:1-7.