GALLSTONES AMONG YOUNG ADULTS: A CLINICAL AND RISK FACTOR ANALYSIS

Dr. Sadiq Aziz Sadiq[1*], Dr. Narmeen Taha Mustafa[2], Diya Omed Arif[3], Zheen Ibrahim Aswad[4], Zahra Fryad Hamad[5]

[1]MBChB, Clinical MD, FACS, General Surgeon Specialist, Erbil Teaching Hospital, Lecturer/ School of Medicine, University of Kurdistan-Hawler.
[2]MBChB, Clinical MD, FACS, General Surgeon Specialist, Erbil Teaching Hospital, AF/ School of Medicine, University of Kurdistan-Hawler.
[3]Medical Student at University of Kurdistan-Hawler.
[4]Medical Student at University of Kurdistan-Hawler.
[5]Medical Student at University of Kurdistan-Hawler.

*Corresponding Author: Dr. Sadiq Aziz Sadiq

MBChB, Clinical MD, FACS, General Surgeon Specialist, Erbil Teaching Hospital, Lecturer/ School of Medicine, University of Kurdistan-Hawler. **DOI:** https://doi.org/10.5281/zenodo.18105848

ABSTRACT

Background: Gallstone disease is no longer seen solely as a condition of older adults, with increasing diagnoses in those under 40. This study investigates the prevalence of gallstones among younger individuals, focusing on risk factors, clinical signs, and treatment options to enhance prevention, early detection, and therapy. **Methods:** A cross-sectional analysis was conducted on young adult patients (under 40 years old) with gallstone disease. Demographic data and lifestyle factors (such as diet and obesity), along with clinical symptoms and therapeutic outcomes, were collected. **Results:** The four main risk factors identified for gallstone development included metabolic disorders (9%), genetic predisposition (53.3%), obesity (9%), and high-fat diet consumption (24.6% daily; 42.2% several times per week). Female patients showed a higher incidence of gallstones (72.4%) compared to male patients (26.6%), likely due to hormonal factors, including oral contraceptive use (18.1%). The majority of patients experienced abdominal pain (17.6%), and more than half displayed symptoms of nausea and vomiting (17.6%). However, 6% of participants were asymptomatic. The majority of patients (84.4%) underwent surgical procedures for treatment, yet there were cases (1%) where patients refused medical advice regarding surgery. **Conclusion:** Early detection and preventive measures are crucial due to the increasing prevalence of gallstones in young adults. Public health initiatives targeting dietary habits and weight management can mitigate the risk of gallstone disease.

KEYWORDS: Gallstones, Young Adults, Risk Factors.

INTRODUCTION

Gallstone disease, or cholelithiasis, has traditionally been associated with the 'four Fs': fair, fat, fertile, and forty. However, emerging data suggests that gallstones are increasingly diagnosed in younger adults under the age of 40.[1,11] In particular, young women have demonstrated a higher prevalence, likely due to hormonal influences including estrogen exposure, pregnancy, and the use of oral contraceptives. According to Western medical literature, 4–20% of cholecystectomies are performed on patients aged 30 and younger.[11]

Although factors such as female gender, advanced age, and specific ethnicity remain non-modifiable risk factors, contributors such as obesity, sedentary lifestyle, metabolic disorders, rapid weight loss, cirrhosis, Crohn's disease, and gallbladder stasis are modifiable and treatable causes. High caloric consumption, high-fat diets, and low fiber intake have been established as major

dietary risk factors for gallstone formation. Conversely, the consumption of dietary fiber, vegetable proteins, nuts, calcium, vitamin C, and coffee, as well as engaging in physical activity, appears to offer protective benefits against gallstone development.[1-4,11]

While many patients remain asymptomatic, symptomatic cases can present with classic biliary colic—typically right upper quadrant or epigastric pain after meals, radiating to the right shoulder or back, often associated with nausea, vomiting, and bloating.[2] Patients requiring cholecystectomy may need prophylactic surgery if they have gallstones larger than 2.5 centimeters, congenital hemolytic anemia, non-functioning gallbladders, or if they intend to undergo bariatric surgery or colectomy. The symptoms of biliary tract disease differ significantly between persons under and over the age of 30; younger patients may not exhibit classical pain patterns and are less likely to report food intolerance, flatulence, and dyspepsia. As a result, diagnosis in this group may be delayed.[1-3,11] Females are five times more likely to develop this condition, with men comprising just one-fifth of the affected population.[11] The radiation of pain in young people complicates the diagnosis. Surgical removal of the gallbladder (cholecystectomy), particularly using laparoscopic techniques, is the standard treatment for symptomatic patients. The study focused on understanding gallstone disease in young adults by determining its prevalence requiring surgical intervention, identifying modifiable and non-modifiable risk factors, comparing clinical presentations with older populations, examining medical complications from late diagnosis and treatment, and evaluating the need for prompt testing and prevention to reduce morbidity in this demographic.

METHODOLOGY
This study employed a cross-sectional descriptive design to evaluate the rates, associated risk factors, and clinical presentations of gallstone disease in younger adults. The study focused on identifying essential factors involving lifestyle habits, family history, genetic predisposition, and metabolic patterns found in participants presenting with gallstones.

The study population consisted of 200 participants aged 18 to 30 years old who were diagnosed with gallbladder disease at hospital facilities or clinics, particularly in the cities of Erbil, Sulaymaniyah, and Duhok. The research utilized convenience sampling to recruit participants fulfilling the requirements based on their availability and willingness to participate. We focused on collecting recent data to assess the rising prevalence of gallstones in the younger population.

Data were collected using a structured questionnaire developed by the research team, which integrated standardized and newly created questions evaluating participant symptoms, dietary practices, medical history, and lifestyle factors. The survey contained both multiple-choice sections and short-answer questions to evaluate symptoms related to gallstones, food habits, family history, and medical conditions such as obesity, liver disease, and diabetes.[20] Clinical information about gallstone characteristics and selected treatment methods, including surgical intervention, medications, or dietary management, was added to the database.

Prior to data collection, the undergraduate research committee granted formal approval for ethical compliance. Each participant provided informed consent to participate, and all collected information remained confidential through anonymous data processing. Each participant maintained the freedom to withdraw their involvement at any moment without negative consequences. This research followed all ethical requirements specified by the institution to protect participants from potential harm while preserving privacy throughout the study period.

Data were analyzed using Microsoft Excel and SPSS version 22. Descriptive statistical methods, including frequencies, means, and standard deviations, were used to organize data and summarize demographic and clinical variables. ANOVA and Chi-square tests were used to examine relationships between dietary patterns, physical activity, obesity, and gallstone presence. Statistical significance was determined using a p-value of < 0.05 to identify meaningful relationships between risk factors and gallbladder disease prevalence.

RESULTS
The mean age was 35.78±14.234 years, mean weight was 82.84 ±82.84 and mean height was 163.41 ±17.295 cm as shown in table (1).

Table 1: Descriptive Statistics.

	Minimum	Maximum	Mean	Std. Deviation
Age	14	81	35.78	14.234
Weight in kg	45	190	82.84	82.84
Height in cm	1.83	188.00	163.41	17.295

The distribution of the studied sample was demonstrated in figure (1) which found that females accounted for 72.4% while males represented 27.6%.
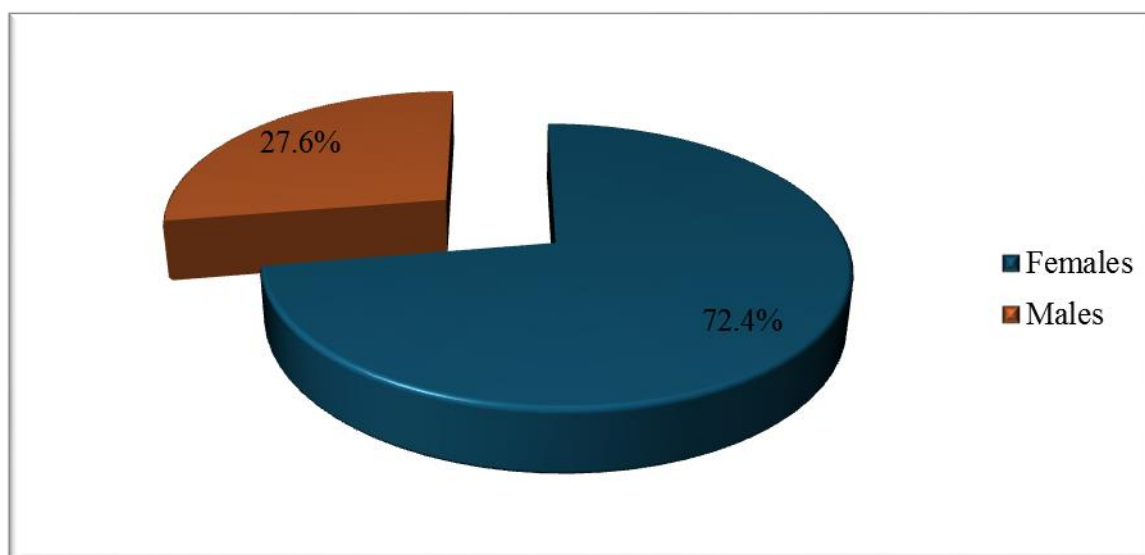
Figure 1: Distribution of the studied sample according to gender.

Table (2) demonstrated the distribution of the studied sample according to marital status and showed that married patients represented 72.4% while single patients accounted for 27.6%.

Table 2: Distribution of the studied sample according to marital status.

	Frequency	%	Valid%	Cumulative %
Married	144	72.4	72.4	74.4
Single	55	27.6	27.6	100.0
Total	199	100.0	100.0	

Distribution of the studied sample according to symptoms was demonstrated in table (3) which elicited that the most frequent presenting symptom was Abdominal pain with Nausea/Vomiting and Bloating/Indigestion which found among 17.6%.

Table 3: Distribution of the studied sample according to symptoms.

Symptoms	Frequency	(%)
No symptoms	1	0.5
Asymptomatic	12	6.0
Abdominal pain	8	4.0
Abdominal pain + Bloating/Indigestion	14	7.0
Abdominal pain + Nausea/Vomiting	35	17.6
Abdominal pain + Nausea/Vomiting + Bloating/Indigestion	35	17.6
Abdominal pain+ Nausea/Vomiting+ Dark Urine+ Bloating/Indigestion	16	8.0
Nausea/Vomiting	3	1.5
Nausea/Vomiting + Bloating/Indigestion	11	5.5
Bloating/Indigestion	8	4.0
Other combinations	46	23.2
Total	199	100.0

Distribution of the studied sample according to complications was elicited in table (4) which showed that shortness of breath accounted for 6.0% which was the most frequent complication.

Table 4: Distribution of the studied sample according to complications.

Complications	Frequency	%
No complications	137	68.8
Constipation	4	2.0
Shortness of breath	12	6.0
Shoulder pain	4	2.0
Severe abdominal pain	3	1.5
Severe nausea & vomiting	2	1.0

Cholecystitis (including variations)	5	2.5
Jaundice (including related issues)	3	1.5
Severe vomiting	2	1.0
Other complications	27	13.6
Total	199	100.0

Distribution of the studied sample according to family history of gallstones was demonstrated in table (5) which revealed that positive family history was found among 53.3% of the studied sample.

Table 5: Distribution of the studied sample according to family history of gallstones.

	Frequency	Percent	Valid Percent	Cumulative Percent
No	93	46.7	46.7	50.2
Yes	106	53.3	53.3	100.0
Total	199	100.0	100.0	

Table (6) demonstrated the distribution of the studied sample according to co-morbidities and showed that the most frequent conditions were obesity in 9.0% and diabetes in 7.5%.

Table 6: Distribution of the studied sample according to co-morbidities.

Condition	Frequency	Percentage (%)
No conditions	60	30.2
Obesity	18	9.0
Diabetes	15	7.5
Obesity + High cholesterol	14	7.0
High cholesterol	7	3.5
Liver disease	7	3.5
Hypertension (HTN)	9	4.5
Diabetes + High cholesterol	5	2.5
Gestational diabetes	4	2.0
Diabetes + Obesity	4	2.0
Constipation	4	2.0
PCOS	2	1.0
Type 1 Diabetes	3	1.5
Other conditions	47	23.6
Total	199	100.0

Distribution of the studied sample according to exercise was demonstrated in figure (6) which revealed that daily exercise found in 9.0%, several time/week in 13.6%, rarely in 42.2%, and occasionally in 35.2%.
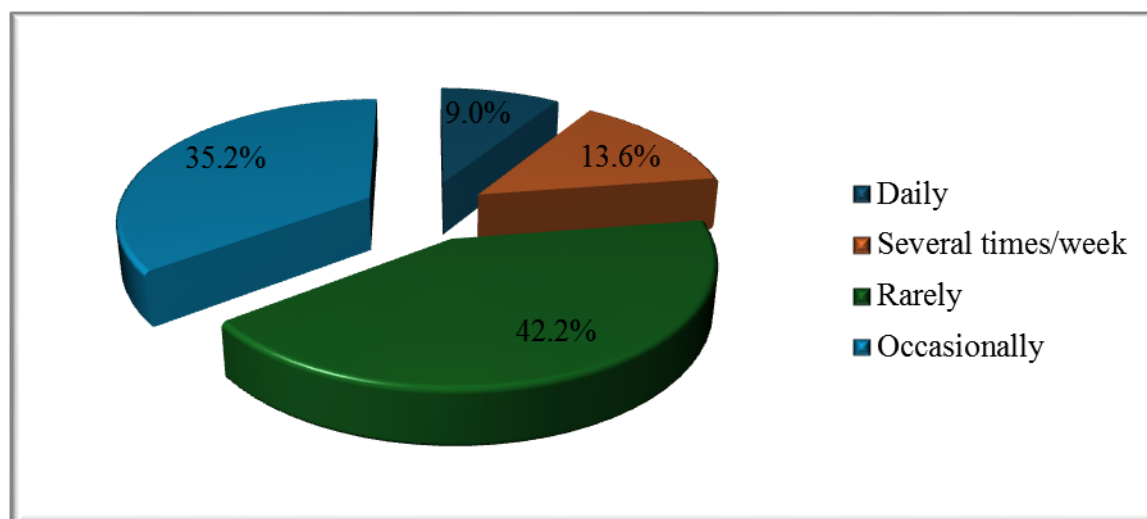

Figure (6): Distribution of the studied sample according to exercise.

Distribution of the studied sample according to high-fat foods was demonstrated in figure (7) which revealed that daily high-fat foods found in 24.6%, several time/week in 42.2%, rarely in 9.0%, and occasionally in 24.1%.
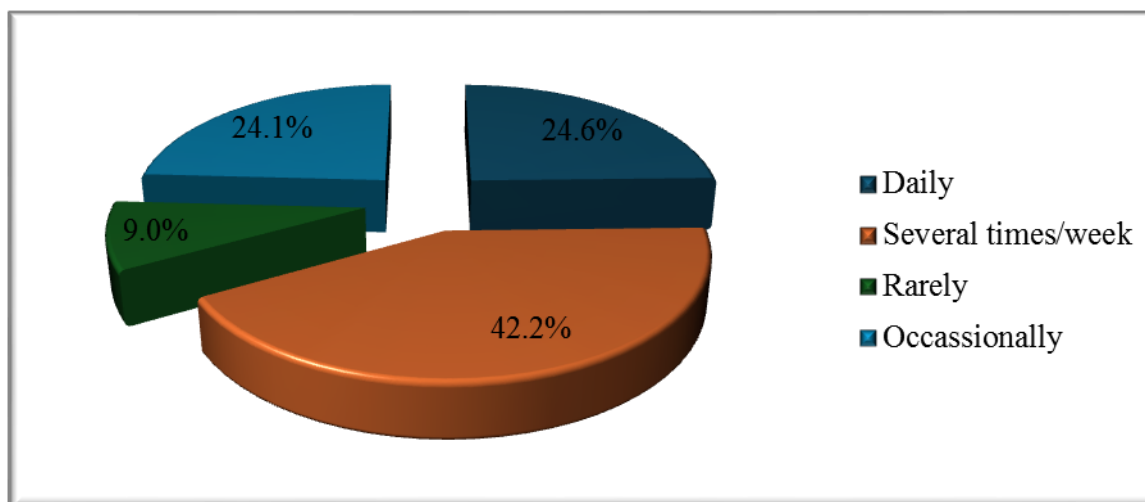

Figure (7): Distribution of the studied sample according to high-fat foods.

Table (6) showed the distribution of the studied sample according to findings of investigations (the stones, number, size and type) and found that 30 patients had multiple stones followed by innumerable stones in 25 patients and cholesterol stones in 20 patients.

Table 6: Distribution of the studied sample according to findings of investigations.

Stone Type	Number of Cases	Size Range (mm)	Comments
Single Large Stone	~10	10-33	Some caused obstruction
2-4 Stones	~15	4-25	Mixed types (cholesterol, pigment)
5-10 Stones	~8	5-33	Some caused cholecystitis
Multiple Stones	~30	3-20	Various sizes, mostly mixed types
Innumerable Stones	~25	Unspecified - 18	Couldn't identify sizes in most cases
Cholesterol Stones	~20	5-30	Some cases mixed with other types
Pigment Stones	~5	4-7	Less common than cholesterol stones
Gallbladder Polyps with Stones	~3	6-8	Polyps were present along with stones
Unspecified/Mixed Types	~15	Varies	Couldn't determine size/type in some cases

Distribution of the studied sample according to treatments was demonstrated in table (7) which found that surgery represented 84.4%, medication in 7.0%, while the diet and lifestyle modification was 5.5%.

Table 7: Distribution of the studied sample according to treatments.

Treatment Type	Number of Cases	Percentage (%)
Surgery (including post-delivery cases)	168	84.4%
Medication	14	7.0%
Diet & Lifestyle Modification	11	5.5%
Medication until delivery	1	0.5%
Surgery needed but patient refused	2	1.0%
None	1	0.5%
Total	199	100%

The ANOVA test showed no statistically significant effect of a high-fat diet on gallstone presence ($p = 0.631$, which is greater than 0.05) as shown in table (8).

Table 8: ANOVA Table (Effect of High-Fat Diet on Gallstone Presence).

Source	Sum of Squares	df	F-value	p-value
High-Fat Diet	0.431	3	0.577	0.631
Residual	48.534	195	—	—

DISCUSSION

The study Presents important information regarding the existence of gallstones among young adults, their associated risk factors, and their clinical symptomatology. The statistical results show that gallstone disease now affects patients under forty, challenging the traditional notion that this condition occurs mainly in middle-aged or elderly groups as reported by Shaffer study.[3] The study results align with existing research conducted by Kim et al.,[10] demonstrating that female patients commonly develop gallstones due to hormonal effects involving estrogen exposure. According to Barbara et al.[1], hormonal changes in women using oral contraceptives contribute to gallstone development.

Research data indicates that obesity and dietary behaviours function as primary risk elements promoting gallstones in young adults. The metabolic disturbances causing gallstone formation are supported by both the high incidence of obesity and repeated high-fat food consumption among participants as showed in Koebnick et al.,[5] study. Previous study of Mehta et al.[6] confirm that obesity affects cholesterol metabolism by causing bile cholesterol supersaturation, which results in stone formation. However, the results of the ANOVA analysis in this study failed to demonstrate statistical significance between high-fat diets and gallstones, indicating that genetic risk factors and metabolic conditions potentially play a larger role in triggering disease development in this specific cohort.

Research data revealed a significant hereditary component to gallstone disease, as 53.3% of study participants documented a family history of gallstones. Multiple research studies confirm that gallstone disease has genetic roots, particularly within specific ethnic backgrounds as demonstrated by Fosburg study.[11] Genetic susceptibility influences both bile composition and cholesterol metabolic mechanisms, explaining why individuals with a family history of gallstones tend to develop the condition, this was reported by Chilimuri et al.,[8] Gallstone development displays a complex nature because many patients experience concurrent metabolic illnesses like diabetes, high cholesterol, and liver disease. These conditions increase gallbladder stasis and alter bile composition, creating conditions that support stone formation.[4]

Participants showed varying clinical presentations, though most suffered from symptomatic gallstone disease. The most common indications included abdominal pain, recurrent nausea, vomiting, and bloating. Medical evidence shows that pain from gallstones usually occurs after meals because obstructing stones cause the gallbladder to contract.[2] Some patients remained asymptomatic, demonstrating the difficulty of diagnosing gallstone disease in its early stages. The clinical situation with asymptomatic gallstones remains complex; some individuals may not experience medical issues, while others suddenly encounter life-threatening biliary conditions.[3]

The analysis reported multiple health problems resulting from gallstone disease, leading to cholecystitis, jaundice, and serious gastrointestinal issues. Scientific findings of Sarrami et al., study[9] indicate that large stones or multiple stones increase complication risks, necessitating early treatment detection). The preferred method for treating gallstones in young adults involves surgical intervention via laparoscopic cholecystectomy. The worldwide medical community agrees that patients with symptomatic gallstones require surgical intervention as the definitive treatment approach.[7]

Although surgery is proven effective, many patients initially selected non-surgical management through medication and dietary modifications. These therapy methods provide momentary symptom relief yet fail to manage the biological factors creating gallstones.[8] Some patients refuse surgical intervention due to a lack of understanding regarding the advantages and disadvantages of available treatments. Due to mounting gallstone disease cases in young adults, preventive measures should emphasize lifestyle changes combining weight control, dietary adjustments, and physical exercise as reported by Kim et al.[10] Public health programs combining obesity prevention with healthy eating education demonstrate potential in reducing gallstone disease prevalence throughout this population.

CONCLUSION

The rising incidence of gallstone disease among young adults challenges the belief that it primarily affects older individuals. This condition is influenced by obesity, high-fat diets, genetic predisposition, metabolic disorders, and hormonal factors, especially in women. Accurate diagnosis is crucial, as symptoms can vary significantly, sometimes necessitating surgical intervention. However, some patients refuse laparoscopic cholecystectomy, highlighting the need for better education on medical options. Young adults should adopt lifestyle changes, particularly in weight management and exercise, to reduce risk. Further research on gallstone formation is necessary, and healthcare providers must focus on managing modifiable risks and educating the public to prevent new cases and complications in youths.

REFERENCES

1. Barbara L, Sama C, Morselli Labate AM, et al. A population study on the prevalence of gallstone disease: the Sirmione Study. Hepatology, 1987; 7: 913-7. https://doi.org/10.1002/hep.1840070520
2. Schirmer BD, Winters KL, Edlich RF. Cholelithiasis and cholecystitis. J Long Term Eff Med Implants, 2005; 15: 329-38. DOI: 10.1615/jlongtermeffmedimplants.v15.i3.90
3. Shaffer EA. Gallstone disease: epidemiology of gallbladder stone disease. Best Pract Res Clin

Gastroenterol, 2006; 20: 981-96. https://doi.org/10.1016/ j.bpg. 2006.05.004

4. Herzog D, Bouchard G. High rate of complicated idiopathic gallstone disease in pediatric patients of a North American tertiary care center. World J Gastroenterol, 2008; 14: 1544-8. https://doi.org/10.3748/wjg.14.1544

5. Koebnick C, Smith N, Black MH, et al. Pediatric obesity and gallstone disease. J Pediatr Gastroenterol Nutr. 2012; 55: 328-33. DOI: 10.1097/MPG.0b013e31 824d256f

6. Mehta S, Lopez ME, Chumpitazi BP, Mazziotti MV, Brandt ML, Fishman DS. Clinical characteristics and risk factors for symptomatic pediatric gallbladder disease. Pediatrics, 2012; 129: e82-8. https://doi.org/10.1542/peds.2011-0579

7. Constantinescu T, Huwood Al Jabouri AK, Brãtucu E, Olteanu C, Toma M, Stoiculescu A. Gallstone disease in young population: incidence, complications, therapeutic approach. Chirurgia (Bucur), 2012; 107: 579-82. https://pubmed.ncbi.nlm.nih.gov/23077988/

8. Chilimuri S, Gaduputi V, Tariq H, Nayudu S, Vakde T, Glandt M, Patel H.Symptomatic gallstones in the young: changing trends of the gallstone disease-related hospitalization in the state of New York: 1996 - 2010. J Clin Med Res, 2017; 9: 117-23. DOI: 10.14740/jocmr2847w

9. Sarrami M, Ridley W, Nightingale S, Wright T, Kumar R. Adolescent gallstones-need for early intervention in symptomatic idiopathic gallstones. Pediatr Surg Int, 2019; 35: 569-74. https://doi.org/10.1007/s00383-019-04461-w

10. Kim HS, Cho SK, Kim CS, Park JS. Big data and analysis of risk factors for gallbladder disease in the young generation of Korea. PLoS One, 2019; 14: e0211480.
    https://doi.org/10.1371/journal.pone.0211480

11. Fosburg RG. Gallstones in young adults: an analysis of 178 patients under thirty years of age. Am J Surg, 1963; 106: 82-8. https://doi.org/10.1016/0002-9610(63)90194-6