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GENDER BASED DIFFERENCES IN THE PRESENTATION AND COMPLICATIONS OF CHOLELITHIASIS: A PROSPECTIVE OBSERVATIONAL STUDY FROM A TERTIARY CARE CENTRE IN WESTERN INDIA

General Surgery

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ABSTRACT

Background: Gallstone disease (GSD) classically exhibits female predominance; however, male patients who develop cholelithiasis may progress disproportionately to severe complications — a phenomenon termed the "gender paradox."**Methods:** A prospective observational cross-sectional study was conducted at a tertiary care hospital in Ahmedabad from January 2023 to July 2024. Only patients with complicated GSD were enrolled (n=60); patients with uncomplicated gallstone disease were explicitly excluded. Clinical, biochemical, and operative data were compared by gender. **Results:** Among 60 patients with complicated GSD, males comprised 53.3% (n=32) and females 46.7% (n=28), yielding an M:F ratio of 1.14 — indicating males outnumbered females in complicated disease. Males showed significantly higher tobacco use (55.0% vs 32.1%), alcohol use (46.9% vs 14.3%), diabetes mellitus (34.4% vs 25.0%), elevated ALP (43.8% vs 32.1%), and neutrophilia (53.1% vs 42.9%). Gallbladder perforation, choledocholithiasis, and pancreatitis (each 13.33%) predominated in males. Open surgical conversion was 51.7% overall.**Conclusion:** Male patients with gallstone disease are significantly more likely to develop complications. The higher addiction burden, metabolic comorbidity load, and delayed health-seeking behaviour in males are principal drivers. Early elective cholecystectomy is strongly recommended in male patients.

KEYWORDS

Cholelithiasis, Gender paradox, Complicated gallstone disease, Cholecystectomy, Male sex risk

INTRODUCTION

Gallstone disease (GSD) is a major global cause of morbidity, and cholecystectomy is the most commonly performed elective abdominal surgery.[1] The classical "4F" epidemiology — Fat, Female, Forty, Fertile — defines female sex as the dominant risk factor for gallstone formation through oestrogen-mediated cholesterol supersaturation and impaired gallbladder motility.[2]

However, a clinically important paradox emerges when attention shifts from gallstone prevalence to complication rates. Male patients, once they develop cholelithiasis, appear to bear a disproportionate burden of complications including gallbladder perforation, cholangitis, gangrenous cholecystitis, and biliary pancreatitis.[3] This divergence constitutes the "Gender Paradox of Gallstone Disease."

Contributing mechanisms include greater addiction burden (tobacco and alcohol), higher prevalence of metabolic comorbidities, delayed health-seeking behaviour in males, and cultural barriers to early consultation.[4] Despite clinical significance, sex-stratified analyses of complicated GSD remain sparse in the Indian literature. This study prospectively characterises gender-based differences in 60 cases of complicated GSD at a tertiary care centre in Gujarat, and aims to demonstrate that male sex is a predictor of complication in cholelithiasis.

METHODOLOGY

Study Design: Prospective observational cross-sectional study. Setting: Dept. of General Surgery, Narendra Modi Medical College & Sheth L.G. General Hospital, Ahmedabad. Period: January 2023 – July 2024.

Inclusion Criteria: Indoor patients with complicated GSD, age >18 years, written informed consent obtained. Patients with uncomplicated gallstone disease were explicitly excluded from this study. Only those presenting with documented complications of cholelithiasis were enrolled.

Exclusion Criteria: Uncomplicated gallstone disease; diagnostic dilemma; prior GI operative complications; refusal of consent.

A structured proforma captured demographics, addiction history (tobacco/alcohol), comorbidities, symptoms and signs, investigations (CBC, LFT, RFT, amylase, lipase, USG, CECT/MRCP/ERCP as indicated), operative details, and histopathological findings. Data were stratified by gender and proportions compared against published series.[2,5,6]

RESULTS

Gender Distribution

Among the 60 patients with complicated GSD, males constituted 53.3% (n=32) and females 46.7% (n=28). The M:F ratio of 1.14 (32:28) confirms that males outnumbered females in the complicated disease cohort. While females are known to have a higher overall prevalence of gallstones in the general population,[2] the reversal seen here among exclusively complicated cases indicates that males are significantly more prone to developing complications once gallstones form. This closely mirrors the M:F ratio of 0.853 reported by Sun et al.[2] in a 3,573-patient complicated GSD series. Mean age was 47.5 years; peak incidence was in the 41–54 year group (26.7%), consistent with Hinduja et al.[5] who reported a mean of 45.6 years.

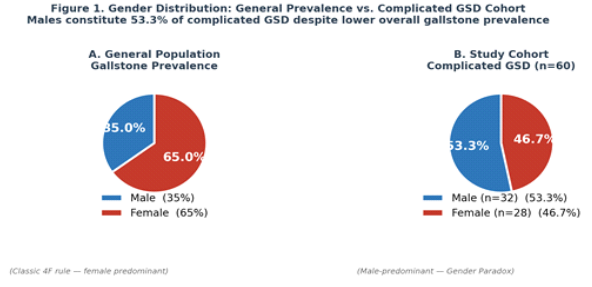

Figure 1. Pie charts comparing gender split: (A) general population gallstone prevalence showing classic female predominance, vs. (B) study cohort of complicated GSD (n=60) showing male predominance (53.3%; M:F ratio 1.14), confirming the gender paradox.

Addiction Profile & Comorbidities (Table 1)

Males carried markedly higher addiction and metabolic burden. Tobacco use was 55.0% in males vs 32.1% in females; alcohol use 46.9% vs 14.3%. A meta-analysis of 4.2 million subjects established an 11% increased GSD risk per 10 cigarettes/day.[4] Diabetes mellitus was present in 34.4% of males vs 25.0% of females; hypertension in 28.1% vs 21.4%.[4]

Table 1. Risk Factor Profile by Gender

Parameter	Male (n=32)	Female (n=28)
Tobacco Use	55.0%	32.1%
Alcohol Use	46.9%	14.3%
Diabetes Mellitus	34.4%	25.0%
Hypertension	28.1%	21.4%
Tuberculosis	25.0%	14.3%
IHD	15.6%	7.1%

Biochemical Derangements (Table 2)

Males demonstrated more pronounced derangements across all parameters. Elevated ALP was found in 43.8% males vs 32.1% females; elevated transaminases 43.8% vs 32.1%; hyperbilirubinaemia 18.8% vs 10.7%; elevated amylase/lipase 25.0% vs 17.9%; neutrophilia 53.1% vs 42.9%, reflecting greater systemic inflammatory response in male patients.[2]

Table 2. Biochemical Parameters by Gender

Biochemical Parameter	Male (n=32)	Female (n=28)
Elevated ALP	43.8%	32.1%
Elevated Transaminases	43.8%	32.1%
Hyperbilirubinaemia	18.8%	10.7%
Elevated Amylase/Lipase	25.0%	17.9%
Neutrophilia	53.1%	42.9%

Complication Spectrum & Operative Management

The three most common complications — gallbladder perforation, choledocholithiasis, and gallstone-induced pancreatitis — each occurred in 13.33% of cases, all more prevalent in males. Pseudocyst of pancreas was seen in 10%; Mirizzi syndrome and empyema GB each in 5%. Rare findings (GB adenocarcinoma, gangrenous GB, iatrogenic CBD injury) were each seen in one patient. Open cholecystectomy was performed in 51.7%; CBD exploration was required in 16.7%; bilioenteric anastomosis in 21.7%.[9]

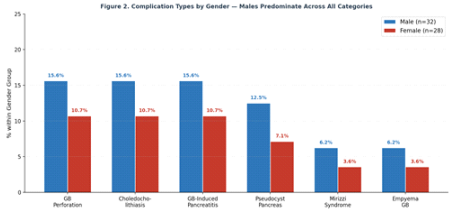

Figure 2. Distribution of complication types by gender. Males predominate across all major complication categories.

DISCUSSION

This study demonstrates the gender paradox of complications of GSD; while females have a higher general prevalence of gallstones, males in this cohort of exclusively complicated cases outnumbered females (M:F ratio 1.14). This mirrors the 0.853 ratio reported by Sun et al.[2] and the findings of Cho JY et al.,[3] who documented male sex as an independent predictor of operative complications and conversion to open surgery. The fact that uncomplicated gallstone disease patients were excluded from this study strengthens this observation, isolating the association between male sex and complication.

The higher addiction burden in males — tobacco (55.0% vs 32.1%) and alcohol (46.9% vs 14.3%) — is a principal driver. Tobacco promotes bile lithogenicity and impairs gallbladder contractility; alcohol modulates bile composition and pancreatic enzyme activation.[4] Shpitz et al.[7] established that diabetes mellitus independently predisposes to gangrenous and perforated cholecystitis through autonomic neuropathy of the gallbladder — consistent with our 34.4% DM prevalence in male patients.

Culturally, male patients in India are more likely to delay consultation, attributing biliary colic to dietary indiscretion, presenting at advanced disease stages.[8] The higher open surgery rate (51.7% overall) compared to international series (Kum et al., 13%)[6] reflects this advanced presentation and limited laparoscopic infrastructure for complex biliary procedures.findings are consistent with the GANGA Survey's documentation of increased complicated GSD prevalence in northern and eastern Indian populations. [9] The finding,that complications and adhesions are more common in male population which lead to higher conversion to open cholecystectomy is consistent with Peter ambe et al.[10]

CONCLUSION

In this study of exclusively complicated gallstone disease cases, males outnumbered females (M:F ratio 1.14), conclusively demonstrating that male patients with cholelithiasis are significantly more likely to develop complications than their female counterparts. The higher addiction burden, greater metabolic comorbidity load, and delayed health-seeking behaviour converge to accelerate disease progression in males. Male sex should be recognised as a high-risk indicator for complicated GSD, warranting prioritised surgical planning, metabolic optimisation, and early elective laparoscopic cholecystectomy to prevent the significant morbidity demonstrated in this study.

REFERENCES

1. Bailey, R. E., & Love, M. (2018). Bailey & Love's Short Practice of Surgery (27th ed.). CRC Press.
2. Sun, H., Tang, H., Jiang, S., Zeng, L., Chen, E. Q., Zhou, T. Y., & Wang, Y. J. (2009). Gender and metabolic differences of gallstone diseases. World Journal of Gastroenterology, 15(15), 1886–1891. https://doi.org/10.3748/wjg.15.1886
3. Cho JY, Han H, Yoon Y, Ahn KS. Risk Factors for Acute Cholecystitis and a Complicated Clinical Course in Patients With Symptomatic Cholelithiasis. Arch Surg. 2010;145(4):329–333. doi:10.1001/archsurg.2010.35
4. Pak, M., & Lindseth, G. (2016). Risk factors for cholelithiasis. Gastroenterology Nursing, 39(4), 297–309. https://doi.org/10.1097/SGA.0000000000000235
5. Hinduja, T. K., Shaikh, S. M., Jalbani, M. H., & Shaikh, N. A. (2008). Early laparoscopic cholecystectomy. Professional Medical Journal, 15(1), 162–167.
6. Kum, C. K., Eypasch, E., Lefering, R., Paul, A., Neugebauer, E., & Troidl, H. (1996). Laparoscopic cholecystectomy for acute cholecystitis: Is it really safe? Surgical Endoscopy. https://doi.org/10.1007/s002689900008
7. Shpitz, B., Sigal, A., Kaufman, Z., & Dinbar, A. (1995). Acute cholecystitis in diabetic patients. American Surgeon, 61(11), 964–967.
8. Eldar, S., Eitan, A., Bickel, A., Sabo, E., Cohen, A., Abrahamson, J., & Matter, I. (1999). The impact of patient delay and physician delay on the outcome of laparoscopic cholecystectomy for acute cholecystitis. American Journal of Surgery, 178(4), 303–307. https://doi.org/10.1016/s0002-9610(99)00172-5
9. Unisa, S., Jagannath, P., Dhir, V., Khandelwal, C., Sarangi, L., & Roy, T. K. (2011). Population-based study to estimate prevalence and determine risk factors of gallbladder diseases in the rural Gangetic basin of North India. HPB, 13(2), 117–125. https://doi.org/10.1111/j.1477-2574.2010.00255.x