RESEARCH PAPER

Incidence and Risk Factors of Cholangiocarcinoma in Sulaymaniyah Governorate: A Population-Based Study

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ABSTRACT
Cholangiocarcinoma is a rare highly malignant disease of the bile duct with a poor prognosis, and with a significant geographical variation in incidence, most of which are diagnosed as advanced, extrahepatic disease in older males. The study was to find out the incidence of cholangiocarcinoma in Sulaymaniyah Governorate. Identify its clinical and demographic profile; assess risk factors. The study was conducted in Sulaymaniyah Governorate (population of about 1.7 million) using all newly diagnosed cholangiocarcinoma cases of the population between May 2025 and May 2026, in a cross-sectional prospective study. Demographic, clinical and risk factor information was obtained for each case. Incidence rates were computed and descriptive analyses were carried out. There were 25 new cases of cholangiocarcinoma diagnosed. Most patients were male (72%) with a mean age of 70.2 years (range 58–89). There were 20% intrahepatic, and 80% of cases (70% perihilar, 30% distal) were extrahepatic. Most were at an advanced stage and had obstructive jaundice. Only 20% were surgical candidates, and 60% of these patients died within one year of diagnosis, while 80% were unresectable at diagnosis. Comorbidities included diabetes (40%), cirrhosis (20%), hepatitis B (16% locally), hepatitis C (4% locally), and smoking (32%) and obesity/metabolic syndrome (36%). In Sulaymaniyah, cholangiocarcinoma is a rare form of cancer. It mainly affects elderly men and most often presents as perihilar tumors, which are usually diagnosed at a late stage. Diabetes is the most common risk factor and hepatitis C is the least common risk factor.

Keywords: *Cholangiocarcinoma, Incidence, Risk Factors, Sulaymaniyah.*
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1.INTRODUCTION

When the lining of the bile ducts becomes cancerous, it's called Cholangiocarcinoma, which is rare but quite aggressive. [1,2] Cholangiocarcinoma is uncommon in most parts of the world, but its death rate is high because it is often diagnosed late and it has few treatments.[1,3]

Specifically, as to the incidence rate of cholangiocarcinoma in Iraq and the Kurdistan Region, there is, at present, very little data, and this has been the case throughout the history of the disease. The lack of granular data seriously undermines the true clinical burden of the disease and current study conducted in Sulaymaniyah Governorate is very critical. This prospective follow-up surveillance study is a representative epidemiological baseline study for the entire Kurdistan Region, and for the first time, allows pure biliary tract malignancies to be isolated from other gastrointestinal malignancies. Consequently, this research effectively bridges a major national data gap, providing essential localized insights into an aggressive disease characterized by advanced presentation and high mortality. Southeast Asia has the highest incidence rate of Cholangiocarcinoma, as it is endemic to liver fluke. [2, 4,5], while Europe and North America are regarded as substantially lower incidence regions. [6,8] Epidemiological data regarding Cholangiocarcinoma within the Kurdistan region remain heavily limited. A distinct shortage of strong population-based studies leaves regional disease burden, risk factor distribution, and clinical presentation largely uncharacterized. Such insight is critical for guiding region-specific preventive policies and encouraging early detection.[9] The pathogenesis of Cholangiocarcinoma is complex. Multiple factors play a role, such as chronic inflammation, infection, metabolic, and environmental factors.[1,4] Several risk factors have been established, such as Primary sclerosing cholangitis and hepatolithiasis, besides Cirrhosis, viral hepatitis, and, on the other hand, metabolic syndromes like Diabetes and obesity.[3,6,7] Variable exposure to epidemiological and

environmental factors reflects the difference in risk factor contributions.[8]

This study aimed to determine the incidence of cholangiocarcinoma in Sulaymaniyah Governorate. Determine its clinical and demographic profile, and evaluate associated risk factors.

2. METHODS

From May 2025 to May 2026, all newly diagnosed cases of cholangiocarcinoma were included in this population-based cross-sectional study. A study was conducted in Sulaymaniyah Governorate. Inclusion criteria required a confirmatory diagnosis by histopathology or by clinical and radiological findings consistent with cholangiocarcinoma, as documented in medical records. Cases were identified by multidisciplinary teams, including Gastroenterology, hepatology, oncology, radiology, and histopathology, at a tertiary Teaching Hospital.

Ethical Considerations: The study was approved by the Kurdistan Higher Council of Medical Specialists Ethics Committee (Issue No.: ----, Date: -/-/2025). Informed written consent was obtained from all participants prior to data collection.

Statistical Analysis: For the statistical review, we processed the dataset using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Rather than complex models, descriptive statistics were used to offer a clear picture of the clinical, demographic, anatomical and treatment profile, and patient comorbidities. This included applying frequencies and percentages to categorical data and computing means and ranges for continuous data, such as age. We calculated the incidence rate of crude new diagnoses per 100,000 in the local population baseline and performed a short exploratory binary logistic regression. This exploratory step was made to determine whether there were any special factors indicating advanced disease (M1), calculated at the common P-value cut-off of $P< 0.05$.

3. RESULTS

We detected 25 new cases of cholangiocarcinoma during the 1-year period when the data were collected. Patient mean ages ± SD were 70.2±7.69. The majority of the study group were men (72%, 18 patients) with the remaining 28% (7 patients) being female.

However, when it comes to geography, the distribution of patients was almost evenly divided between urban and peripheral areas. Only slightly less than half of the respondents (52%) lived directly out of Sulaymaniyah city. The remaining 48% originated from other nearby towns and cities including Halabja, Rania and Kalar. It has been such an eye opener for the main medical hubs on how much they depend on referrals from outside the city and adjacent medical districts.

Anatomically, 20 cases (80%) occurred outside the liver parenchyma. Of this group, 14 cases (70%) were perihilar tumors, with the majority of these being Klatskin tumors, at the confluence of the right and left hepatic ducts. The remaining 6 extrahepatic cases (30%) involved the common hepatic duct below the confluence. Meanwhile, intrahepatic cholangiocarcinoma affecting the small intrahepatic ducts accounted for the remaining 20% (5 cases) of the study. These results are mapped out in “Figure 1”.

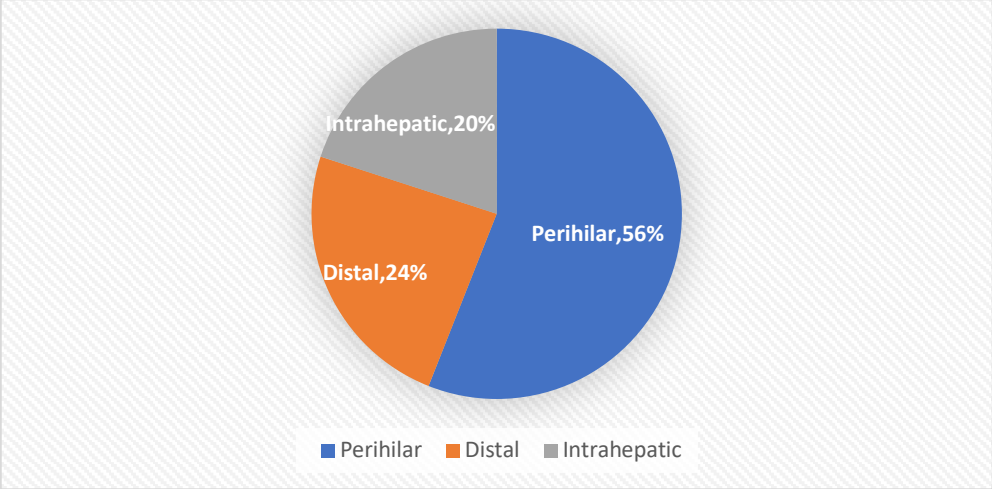

Figure (1). Anatomical distribution of cholangiocarcinoma cases in Sulaymaniyah Governorate.

The majority of patients presented with obstructive jaundice, while dull right upper quadrant pain was the least common; these results are clarified in “Table 1”. This means that the disease had already progressed to stages III or IV by the time they were evaluated.

Table 1: Anatomical Subtype and Expected Clinical Presentation

Clinical Symptom	**Perihilar (*n* = 14)** *[56.0% of study]*	**Distal (*n* = 6)** *[24.0% of study]*	**Intrahepatic (n = 5)** *[20.0% of study]*	**Total Expected Manifestation (*n*=25)**
Obstructive Jaundice	14 (100.0%)	6 (100.0%)	1 (20.0%)	21 (84.0%)
Dull Right Upper Quadrant Pain	4 (28.6%)	2 (33.3%)	5 (100.0%)	11 (44.0%)
(Weight Loss / Anorexia)	9 (64.3%)	4 (66.7%	5 (100.0%)	18 (72.0%)
Pruritus	12 (85.7%	5 (83.3%)	0 (0.0%)	17 (68.0%)
Dark Urine	14 (100.0%)	6 (100.0%)	0 (0.0%)	20 (80.0%)

When looking at the data, metabolic derangements clearly became the most widespread issue we encountered. Diabetes mellitus stood out at a matching 40% of cases, while Viral hepatitis, especially viral hepatitis C, plays an unremarkable role in this study. Risk factor distribution throughout the study is clarified in "Figure 2".

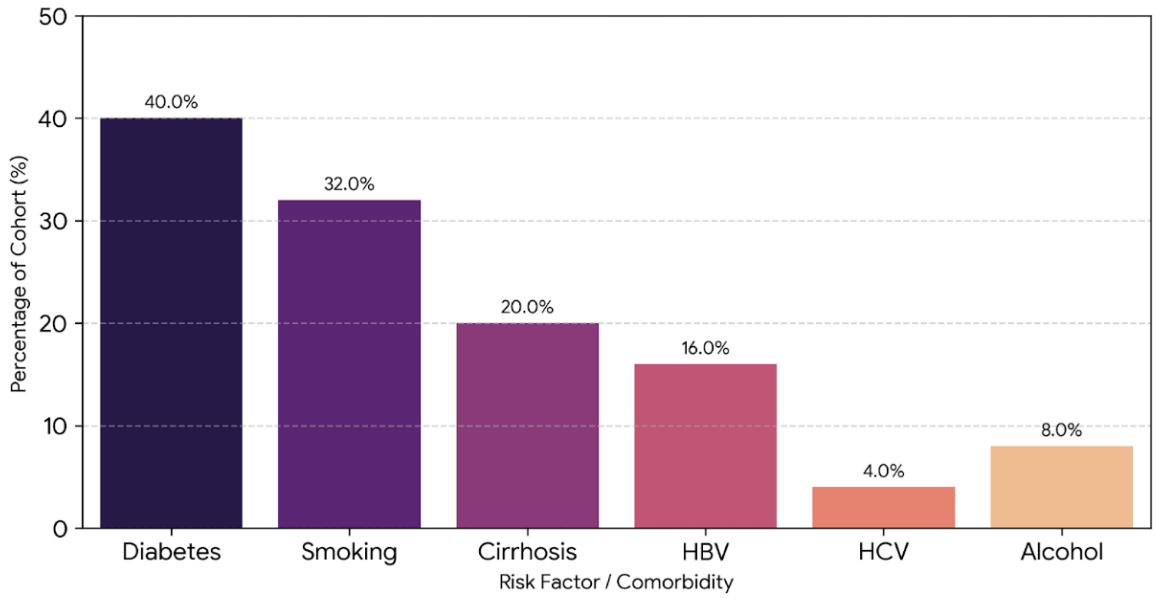

Figure 2: Prevalence profile of Risk factors and Comorbidities (%)

The late-stage presentation was reflected in the TNM staging profiles. Five patients (20%) presented with T4N2M1 disease, and 4 patients (16%) presented with T3N1M1 disease. We found that early-stage disease (T1–T2N0M0) was confirmed in only 5 individuals (20%). These clinical distributions emphasize a distinct concentration of advanced perihilar disease within the Sulaymaniyah population. In our study, the majority of patients were eligible only for palliative treatments, and a minority received radiotherapy. These outcomes and management plans are explained in "Table 2".

Table 2: Anatomical Subtype × Implemented Treatment Plan

Anatomical Subtype	**Palliative**	**Chemotherapy**	**Resection (Curative)**	**Radiotherapy**	**Total (n)**
Perihilar	6	5	1	2	
Distal	3	1	2	0	6
Intrahepatic	3	0	2	0	5
Total (n)	**12**	**6**	**5**	**2**	**25**
Cohort %	**48.0%**	**24.0%**	**20.0%**	**8.0%**	**100.0%**

Binary logistic regression analysis was performed to identify independent predictors of advanced disease; this was an exploratory analysis limited by small sample size. Although diabetes mellitus (OR = 4.57, 95% CI: 0.43–48.5) and cirrhosis (OR = 2.34, 95% CI: 0.23–23.7) were associated with higher odds of advanced-stage presentation, none of the variables reached statistical significance ($p > 0.05$) Table (3).

Table 3: Binary Logistic Regression Analysis for Predictors of Advanced Disease (M1)

Variable	Odds Ratio (OR)	95% CI for OR	p-value
Age	1.04	0.95 – 1.15	0.38
Male Gender	1.34	0.18 – 9.85	0.77
Diabetes Mellitus	4.57	0.43 – 48.5	0.21
HBV Infection	2.66	0.20 – 35.2	0.46
Cirrhosis	2.34	0.23 – 23.7	0.49

4. DISCUSSION

We are looking at some of the very first systematic data on cholangiocarcinoma incidence and clinical behavior within the Sulaymaniyah Governorate. The estimated crude annual incidence rate of our study was 1.7 per 100,000 persons, which is within the lower half of the global incidence range, which is common for low-risk populations. This estimate is similar to reports from neighboring Iran, which have shown the number of cases to be between 1.4 and 1.7 per 100,000 population, based on regional surveillance efforts.[10] It is comparable to background incidence rates reported throughout Europe and in the United States, which are generally between 1 and 2 cases per 100,000 persons.[11] In these areas, cholangiocarcinoma are rare cancers that are mainly caused by common metabolic factors such as diabetes, obesity, and the like.[12] In contrast, a large epidemiological divide has been noted between hyper-endemic areas of the world, such as northeast Thailand, where annual incidence rates exceeded 85 per 100,000 due to regional-specific dietary and environmental exposures (foodborne liver parasite infections) and hypo-endemic areas. [11,12] The age-standardized rate for all biliary tract malignancies is only slightly higher at 2.5 to 2.9 per 100,000. The largest number in our demographic patter is the old man. The mean age is 70.2 and men comprise 72% of the patients. This very high male ratio exceeds the standard male-female ratio in the regional registries of Turkey (51%)[13] and Saudi Arabia (66%)[14] which have a much younger mean age (62–65 years). A gender gap of 72% is a significant difference compared to the typical age-anchored profile that is generally seen in Western countries such as Denmark,[15] which may highlight the effects of differential exposures to the male population in Sulaymaniyah, including occupational, genetic, and environmental exposures.

Extrahepatic tumors (especially perihilar) predominated in our experience. The data obtained from the Sulaymaniyah Governorate show that these tumors are directly affected by the environmental conditions in the region, as well as by the infectious conditions of the region, which is what has been mentioned by Banales et al.[1] Our findings reflect a completely different anatomical trend, as compared to the vast majority of epidemiological studies from the West, such as the United States or Denmark,[11] which reveal growing anatomical conditions such as fatty liver disease. Rather, the distribution is perihilar and similar to the classic distribution observed in some Asian and Middle Eastern populations in Sulaymaniyah.[1,] The presence of locally generated chronic inflammatory stimuli, such as repeated episodes of cholangitis or regional toxicant exposure, dominates anatomical tropism to the extrahepatic segments, in these territories.[16] This extrahepatic majority is, in our study, a major geographical contrast to current, Western, trends, and implies that cholangiocarcinogenesis in the Kurdistan Region is still primarily driven by local environmental factors and not a general metabolic change.[1,11]

Consideration of individual risk factors within this population supports prominent roles for metabolic and chronic liver pathways in local tumor genesis. Specifically, high rates of diabetes and obesity promote the emerging global consensus that metabolic syndrome is an important and increasingly significant contributor to biliary cancers. Studies describing these metabolic linkages has been published by Banales et al.[1] and Petrick et al.[7]

Metabolic diseases have been neglected in the past as the risk factor for cholangiocarcinoma; however, studies have been focusing only on infectious causes or stones originating from the bile duct itself. Regardless metabolic diseases have been shown in large pooled data from Liver Cancer Pooling Project to increase the risk of developing cholangiocarcinoma independently by as much as 50% to 80%.[2] We found that metabolic diseases were highly prevalent in our Sulaymaniyah cohort perfectly aligning with this new worldwide trend.[1] By confirming that metabolic syndrome underpins a substantial portion of local presentations, our findings illustrate that the epidemiological transition toward non-communicable, lifestyle-driven oncogenesis is now actively shaping the clinical landscape of the Kurdistan Region.[1,17] Furthermore, the presence of cirrhosis in our

cohort underscores how chronic tissue inflammation and ongoing parenchymal injury pave the way for tumor development, mechanisms supported by Petrick et al.[7] and Khan et al.[6] On the other hand, viral hepatitis played a minor role, which aligns well with wider regional epidemiological trends in similar populations, as reported by the Global Burden of Disease Collaboration[8]. While areas historically burdened by unchecked viral endemics face persistent infection-mediated malignancies,[18] massive systematic datasets from the Middle East confirm that the relative oncogenic fraction of biliary tract tumors attributable to chronic hepatitis B and C has dropped substantially.[8] This shifting paradigm is directly tied to highly successful, decades-long national neonatal vaccination frameworks and widespread access to direct-acting antiviral therapies across neighboring territories.[19] Consequently, our finding that viral etiologies are taking a back seat perfectly mirrors this broader regional transition, as modern cohorts increasingly switch from viral-driven to metabolic-driven oncogenesis.[1,19]

Treatment options for this group were very limited. Most patients could not undergo surgery aimed at a cure, a pattern similar to international findings, in which late-stage disease prevents surgical treatment. Kelley et al.[3] and Khan et al.[6] document these exact surgical limitations. As a direct result, the management strategy for the vast majority of our patients had to pivot entirely to palliation. The focus shifted to endoscopic/percutaneous stenting and biliary drainage interventions. During this time, I realized the importance of symptom control/preservation of quality of life with advanced disease. This clinical course is similar to what Kelley et al.[3] reported and Khan et al.[6] observed.

Of course, these conclusions should be tempered by some limitations of our study. The small sample size and hospital-based registry design leave open the possibility of selection bias and may affect the generalizability of our results. Furthermore, we were unable to obtain histopathologic confirmation for each individual patient. This is reflective of the local clinical challenges encountered when definitively diagnosing these tumors. Very similar limitations are presented by Kelley et al.[3] in their clinicopathologic review.

To sum up, this survey revealed that an immediate emphasis on earlier identification for high-risk populations such as those diagnosed with chronic liver disease or metabolic syndrome would be most useful. Focusing on improved cancer registries, increased diagnostic capability, and public prevention strategies on a regional level would be most appropriate. Moving forward, larger, multicenter population studies are highly necessary to fully map out regional disease behavior and ultimately improve patient survival rates in this area, an ongoing data need heavily advocated by Khan et al.[6]

5. CONCLUSION

We identified 25 new cases of cholangiocarcinoma during the study period. Although this cancer is rare in Sulaymaniyah, it is still highly lethal. Most patients were older men, with an average age of 70.2 years, and men accounted for 72% of cases. Most cases were extrahepatic, and 70% of those were perihilar. Because early detection is so challenging, 48% of patients needed immediate palliative care, mainly through biliary stenting to relieve blockages.

The data indicate that metabolic syndrome and chronic liver disease are the predominant clinical baselines within this study. Most patients were diagnosed too late for surgery. At diagnosis, 80% of patients already had tumors that could not be removed, which helps explain the one-year mortality rate of 60%.

Conflict of Interest

All authors confirm that there are no financial affiliations or commercial conflicts of interest associated with this research project.

REFERENCES

1. Banales JM, Marin JJG, Lamarca A, Rodrigues PM, Khan SA, Roberts LR, et al. Cholangiocarcinoma 2020: the next horizon in mechanisms and management. Nat Rev Gastroenterol Hepatol. **17(9)**, 557–588. doi: 10.1038/s41575-020-0310-z. (2020)

2. Valle JW, Kelley RK, Nervi B, Oh DY, Zhu AX. Biliary tract cancer. Lancet. **397(10272),** 428–444. doi: 10.1016/S0140-6736(21)00153-7. (2021)

3. Kelley RK, Bridgewater J, Gores GJ, Zhu AX. Systemic therapies for biliary tract cancer: recent advances and future directions. Nat Rev Clin Oncol. **20(6),**389–404. doi: 10.1038/s41571-023-00743-z. (2023)

4. Rizvi S, Khan SA, Hallemeier CL, Kelley RK, Gores GJ. Cholangiocarcinoma: evolving concepts and therapeutic strategies. Nat Rev Gastroenterol Hepatol. **19(5)**:333–348. doi: 10.1038/s41575-021-00510-y. (2022)

5. Sripa B, Tangkawattana S, Brindley PJ. Liver fluke-induced cholangiocarcinoma: epidemiology and mechanisms. Nat Rev Gastroenterol Hepatol. **18(7)**, 437–455. doi: 10.1038/s41575-021-00440-9. (2021)

6. Khan SA, Tavolari S, Brandi G. Cholangiocarcinoma: epidemiology and management update. Lancet Oncol. **25(2)**, e78–e90. doi: 10.1016/S1470-2045(23)00479-0. (2024)

7. Petrick JL, Kelly SP, Altekruse SF, McGlynn KA. Metabolic risk factors and hepatobiliary cancers. Hepatology. **73(3)**, 1040–1052. doi: 10.1002/hep.31441. (2021)

8. Global Burden of Disease Liver Cancer Collaboration. The changing epidemiology of liver and

biliary tract cancers. Lancet Gastroenterol Hepatol. **9(1)**, 15–30. doi: 10.1016/S2468-1253(23)00312-0. (2024)
9. Abdulwahab HM. Malignant biliary obstruction. Sulaimaniyah. Kurdistan Journal of Medical Sciences. **2(1)**, 45–52. (2016)
10. Ashkbari A, Amlashi FI, Besharat S, Mofidi M, Amiriani T, Fazel A, et al. Primary Biliary Tract Cancers in Golestan, Iran: 13-Year Experience of Golestan Population-Based Cancer Registry. Arch Iran Med. **26(9),** 504–509. doi: 10.34172/aim.2023.76. (2023)
11. Florio AA, Ferlay J, Znaor A, Ruggieri D, Alvarez CS, Laversanne M, et al. Global trends in intrahepatic and extrahepatic cholangiocarcinoma incidence from 1993 to 2012. Cancer. **126(11)**, 2666–2678. doi: 10.1002/cncr.32803. (2020)
12. Parsi MA. Obesity and cholangiocarcinoma. World J Gastroenterol. **19(4)**, 457–462. doi: 10.3748/wjg.v19.i4.457. (2013)
13. Akkus E, Kayaalp M, Ergozoglu MA, Koc Kus IK, Bayram D, Kilictas B, et al. Resectable Stage Early-Onset Biliary Tract Cancer: Survival and Prognostic Scoring (EOB-RS and EOB-OS) in Turkish Patients (TOG/GI-SAFRADJU-2502-EO). JCO Global Oncology. **12**, e2500655. doi: 10.1200/GO-25-00655. (2026)
14. Alshamsan B. Diagnostic Role of Triphasic Multidetector Computed Tomography (MDCT) in the Characterization of Cholangiocarcinoma with Histopathological Reference. Saudi J Med. **9(4),** 115–119. (2024)
15. ensen MD, Turati F, La Vecchia C. Cholangiocarcinoma in Denmark: Time-trends in age-stratified incidence and registry mortality. Hepatoma Res. **8(19)**. doi: 10.20517/2394-5079.2021.130. (2022)
16. Khan SA, Emadossadaty S, Ladep NG, Thomas HC, Elliott P, Taylor-Robinson SD, et al. Rising trends in cholangiocarcinoma incidence in Western populations: an analysis of international registry data. J Hepatol. **57(2)**, 335–341. doi: 10.1016/j.jhep.2012.03.028. (2012)
17. Chen Y, Large J, Bitcapp B, Nci Dceg. Metabolic syndrome and cholangiocarcinoma: large numbers, small risks, but big implications. HepatoBiliary Surg Nutr. **15(2),** 112–114. doi: 10.21037/hbsn-2025-744. (2026)
18. Ouyang G, Liu Q, Wu Y, Liu Z, Lu W, Liao S, et al. Global, regional, and national burden of gallbladder and biliary tract diseases: A systematic analysis of prevalence, incidence, deaths, and disability-adjusted life years with projections to 2050. J Hepatol. **82(3)**, 412–424. doi: 10.1016/j.jhep.2024.10.018. (2025)
19. Alshammari KI. Hepatobiliary cancers in Saudi Arabia from 2000 to 2025: Evolving etiological shifts from viral hepatitis to metabolic syndrome. Saudi J Gastroenterol. **31(2)**, 98–105. doi: 10.4103/sjg.sjg_24_411. (2025)