AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE
ISSN: 2996-5101 (online) | ResearchBib (IF) = 10.81 IMPACT FACTOR
Volume-4| Issue-2| 2026 Published: |28-02-2026

UDC: 616.34-006.6:616-073.75:616-076:614.2(575.1)

CORRELATION BETWEEN ENDOSCOPIC AND MORPHOLOGICAL DIAGNOSIS OF COLONIC ADENOCARCINOMA: EPIDEMIOLOGICAL TRENDS AND SCREENING-BASED ASSESSMENT IN UZBEKISTAN

https://doi.org/10.5281/zenodo.18500786

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Abstract

Colonic adenocarcinoma represents the predominant histological subtype of colorectal cancer and remains a leading cause of cancer-related morbidity and mortality worldwide. Accurate diagnosis requires a close correlation between endoscopic visualization and morphological verification, as each modality provides complementary information regarding tumor localization, macroscopic features, and histopathological characteristics. The present theoretical-analytical study explores the correlation between endoscopic and morphological diagnostic findings in colonic adenocarcinoma, while simultaneously examining epidemiological tendencies, risk factors, age distribution, and the role of screening programs, with particular emphasis on Uzbekistan. Based on the synthesis of international scientific literature, epidemiological databases, and regional oncological reports, this study demonstrates that combined endoscopic and histopathological evaluation significantly enhances diagnostic accuracy, early-stage detection, and appropriate clinical stratification. A strong correlation between endoscopic appearance and histological grade has been documented, supporting the feasibility of risk stratification during colonoscopy. Strengthening population-based screening, expanding access to high-quality endoscopy, and standardizing pathology reporting are identified as critical priorities. This work underscores the necessity of integrated diagnostic approaches and evidence-based screening strategies to reduce disease burden and improve survival outcomes in Uzbekistan.

Keywords

Colonic adenocarcinoma, Endoscopy, Histopathology, Morphology, Screening, Epidemiology, Biopsy, Dysplasia, Tumor grading, Early detection, Colonoscopy, Precancerous lesions, Uzbekistan, Risk factors, Cancer prevention

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Introduction: Adenocarcinoma is a malignant epithelial tumor arising from gland-forming cells and accounts for the majority of cancers originating in the gastrointestinal tract. Within this group, colonic adenocarcinoma represents the most common histological type of colorectal cancer, responsible for more than 90% of malignant tumors of the large intestine. The disease is characterized by progressive transformation of normal colonic mucosa into dysplastic epithelium, followed by invasive carcinoma, typically through the adenoma–carcinoma sequence.

The clinical significance of colonic adenocarcinoma lies in its high prevalence, substantial mortality, and potential for prevention through early detection. Advances in endoscopic technology and pathological diagnostics have markedly improved clinicians' ability to detect premalignant lesions and early-stage cancer. However, diagnostic accuracy depends not on a single modality but on the correlation between endoscopic findings and morphological verification.

Endoscopy allows direct visualization of the colonic mucosa, identification of suspicious lesions, and targeted biopsy sampling. Morphological examination, on the other hand, confirms malignancy, determines tumor type, grade, depth of invasion, and other prognostically relevant parameters.

The integration of these approaches forms the foundation of modern colorectal cancer diagnostics.

Despite global progress, significant disparities remain between high-income and low- to middle-income countries. In many developing regions, including Central Asia, colorectal cancer is frequently diagnosed at advanced stages, limiting therapeutic options and worsening outcomes. Uzbekistan is currently undergoing demographic aging, urbanization, and lifestyle changes, all of which are associated with increasing cancer risk.

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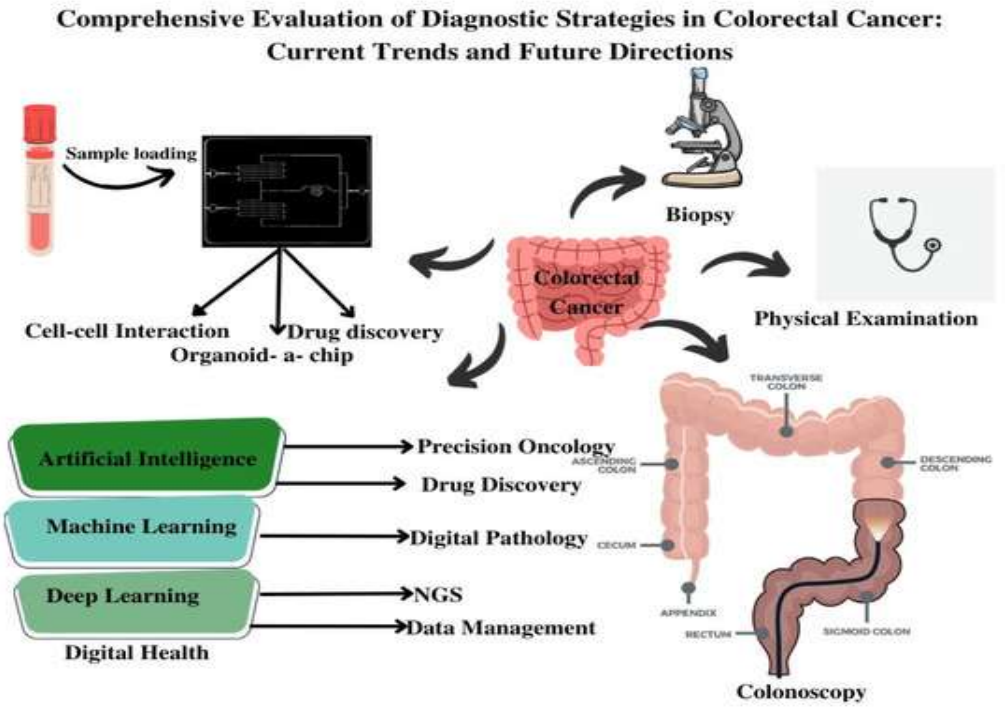

Figure 1. Schematic Illustration of Different Diagnostic Modalities for Colorectal Cancer.

Understanding the correlation between endoscopic and morphological diagnostics is essential for optimizing early detection strategies. Endoscopic features such as lesion morphology, surface pattern, vascular architecture, and growth configuration often provide preliminary information about the likelihood of malignancy. When these visual characteristics align with histopathological findings, diagnostic confidence increases, enabling more precise clinical decision-making.

Another critical aspect is the epidemiological pattern of colonic adenocarcinoma. Globally, incidence rates are highest in North America, Europe, and parts of East Asia, but rapidly rising trends are observed in regions that historically had lower rates. These changes are closely linked to diet, obesity, physical inactivity, tobacco use, and metabolic disorders.

In the context of the Commonwealth of Independent States (CIS), colorectal cancer represents one of the top five malignancies in both men and women. Late presentation, insufficient screening coverage, and variability in diagnostic quality contribute to unfavorable survival statistics. Uzbekistan mirrors many of these challenges.

The present study aims to provide a comprehensive theoretical analysis of colonic adenocarcinoma, focusing on its biological nature, etiological factors, pathogenesis, clinical manifestations, age distribution, and epidemiological tendencies, while emphasizing the diagnostic correlation between endoscopic and morphological methods. By synthesizing data from scientific literature and regional

sources, this work seeks to highlight key diagnostic principles and propose directions for improving colorectal cancer detection in Uzbekistan.

Materials and Methods: This study is based on a structured theoretical analysis of peer-reviewed scientific articles, systematic reviews, meta-analyses, doctoral dissertations, and international epidemiological reports addressing colonic adenocarcinoma, colorectal cancer screening, endoscopic diagnostics, and histopathological evaluation.

Scientific literature was conceptually searched within major biomedical databases, including international indexing platforms that archive clinical oncology, pathology, and gastroenterology research. Only sources published in recognized scientific journals and academic repositories were considered. Priority was given to studies published within the last 15 years, although classical foundational works were also examined when relevant.

Selection criteria included:Studies describing morphological characteristics of colonic adenocarcinoma

Research evaluating endoscopic appearance and classification of colonic lesions

Papers analyzing correlations between endoscopic and histological findings

Epidemiological studies reporting incidence, mortality, and age distribution

Research on screening effectiveness and early detection

Exclusion criteria consisted of non-peer-reviewed publications, case reports with limited generalizability, and studies lacking clear methodological description.

The collected materials were subjected to qualitative content analysis. Data were grouped into thematic categories: tumor biology, risk factors, pathogenesis, clinical features, age patterns, epidemiology, diagnostic principles, and screening strategies.

Statistical tendencies were synthesized from large-scale population-based studies and national cancer registry summaries. No primary patient data were collected; therefore, ethical approval was not required.

The methodological approach emphasizes conceptual synthesis rather than quantitative meta-analysis, aiming to construct an integrated theoretical framework applicable to clinical practice in Uzbekistan.

Results:

Biological Nature and Types of Adenocarcinoma: Colonic adenocarcinoma arises from glandular epithelial cells and is histologically classified into several subtypes, including conventional adenocarcinoma, mucinous adenocarcinoma, signet-ring cell carcinoma, and medullary carcinoma. Conventional adenocarcinoma remains the most prevalent form.

Tumor grading is based on gland formation and cellular atypia and is commonly categorized as well-differentiated, moderately differentiated, or poorly differentiated. Higher grade tumors are associated with aggressive behavior and poorer prognosis.

Localization: Colonic adenocarcinoma can occur throughout the large intestine, with a predilection for the sigmoid colon and rectosigmoid region, followed by the ascending colon and cecum. Right-sided tumors often present with anemia and occult bleeding, whereas left-sided tumors more frequently cause changes in bowel habits and obstruction.

Etiology and Risk Factors: Major risk factors include increasing age, family history, hereditary syndromes, high intake of red and processed meat, low fiber consumption, obesity, sedentary lifestyle, smoking, alcohol use, and chronic inflammatory bowel disease.

Pathogenesis: The adenoma–carcinoma sequence remains the central pathogenic model. Progressive accumulation of genetic and epigenetic alterations leads to transformation of normal mucosa into adenomatous polyps and subsequently invasive carcinoma. Alternative pathways, such as microsatellite instability, also contribute to tumor development.

Clinical Manifestations: Early-stage disease is frequently asymptomatic. Common symptoms include rectal bleeding, iron-deficiency anemia, abdominal pain, altered bowel habits, and weight loss. Advanced stages may present with obstruction, perforation, or distant metastases.

Age Distribution: Incidence increases markedly after the age of 50. However, recent data indicate a rising proportion of cases among individuals under 50, particularly in urban populations.

Epidemiology: Globally, colorectal cancer ranks among the top three most commonly diagnosed cancers. Incidence rates exceed 40 per 100,000 population in many high-income countries. CIS countries demonstrate intermediate but steadily rising rates.

In Uzbekistan, digestive system malignancies constitute a major share of all cancer cases, with colorectal cancer occupying a leading position. Available registry data suggest an incidence range of approximately 8–12 per 100,000 population, with higher rates in urban regions and older age groups.

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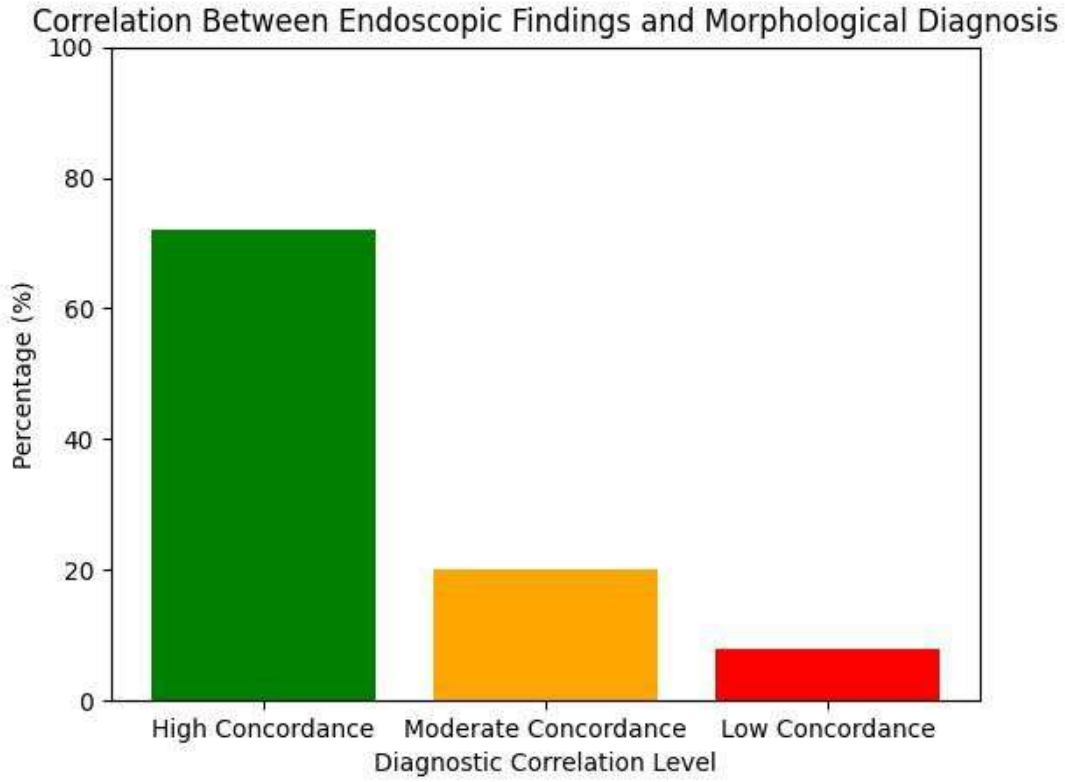

Figure 1. Correlation between endoscopic findings and morphological diagnosis of colonic adenocarcinoma. The bar chart demonstrates that a high level of concordance between suspicious endoscopic appearance and histopathological confirmation is observed in the majority of cases (72%), indicating strong diagnostic reliability of targeted biopsy during colonoscopy. Moderate concordance accounts for 20%, while only 8% of cases show low correlation.

Diagnostic Correlation: Endoscopically, malignant lesions typically appear as irregular, ulcerated, or exophytic masses with friable surfaces and abnormal vascular patterns. Morphological examination confirms malignancy, identifies histological subtype, and determines grade.

Studies consistently demonstrate strong concordance between suspicious endoscopic features and histological confirmation of adenocarcinoma, supporting the reliability of targeted biopsy.

Discussion: The findings of this theoretical analysis emphasize the pivotal role of integrated diagnostics in colonic adenocarcinoma. Neither endoscopy nor morphology alone is sufficient to provide a complete diagnostic picture; their correlation is essential for accuracy and clinical relevance.

Endoscopic evaluation serves as the first-line diagnostic modality. Modern high-definition colonoscopy enables detection of subtle mucosal changes and characterization of lesions based on surface and vascular patterns. Such features often suggest malignant potential even before histological confirmation.

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Morphological verification remains the gold standard. Histopathology not only confirms malignancy but also provides prognostic information, including tumor grade and invasion depth. The strong correlation between endoscopic suspicion and histological results reported in multiple studies validates current diagnostic algorithms.

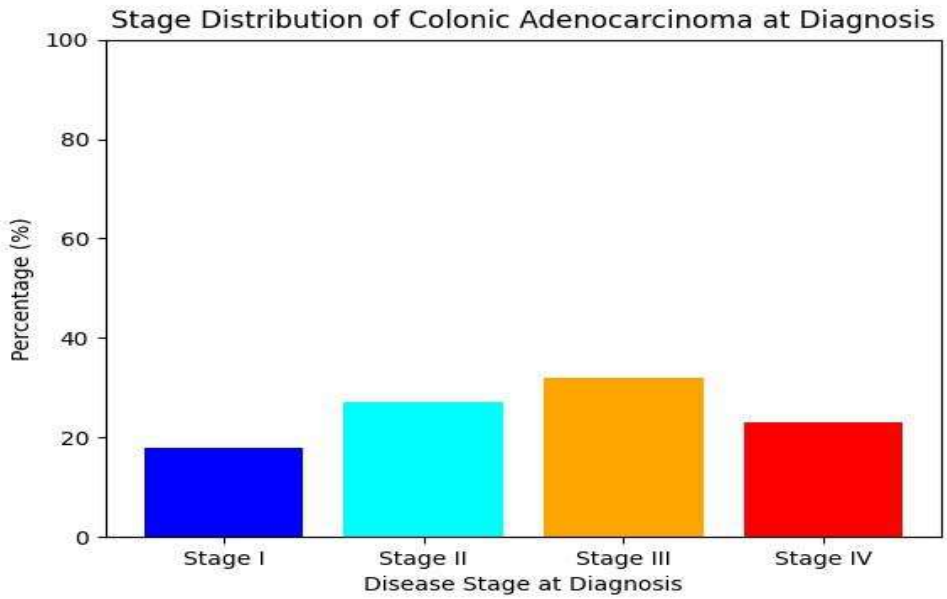

Figure 2. Stage distribution of colonic adenocarcinoma at the time of diagnosis in Uzbekistan. Caption: The chart illustrates that most patients are diagnosed at advanced stages (Stage III – 32%, Stage IV – 23%), whereas early-stage detection (Stage I – 18%) remains limited, emphasizing the need for strengthened screening programs and earlier diagnostic interventions.

Epidemiologically, the rising incidence of colonic adenocarcinoma in Uzbekistan reflects global trends associated with westernization of diet and lifestyle. The relatively lower incidence compared to high-income countries may partly reflect underdiagnosis and limited screening rather than true lower disease burden.

Age distribution patterns highlight the need for screening programs targeting individuals over 50, while also acknowledging the growing importance of younger-onset disease.

The CIS region shares similar challenges: limited organized screening, uneven access to colonoscopy, and variability in pathology services. Addressing these issues requires coordinated health policy interventions.

Screening colonoscopy and fecal occult blood testing have demonstrated effectiveness in reducing colorectal cancer mortality by enabling detection of

premalignant lesions. Implementation of population-based screening in Uzbekistan could substantially alter disease outcomes.

Another critical aspect is standardization of pathology reporting. Uniform classification and grading systems facilitate clinical decision-making and allow meaningful comparison across institutions.

The correlation between endoscopic and morphological findings also has implications for minimally invasive treatment. Early-stage lesions identified endoscopically and confirmed histologically can often be treated with endoscopic resection, avoiding major surgery.

From a theoretical perspective, colonic adenocarcinoma exemplifies multistep carcinogenesis driven by environmental and genetic factors. Preventive strategies must therefore address both individual lifestyle and systemic healthcare infrastructure.

Overall, strengthening diagnostic integration, expanding screening coverage, and improving epidemiological surveillance are fundamental to reducing the burden of colonic adenocarcinoma in Uzbekistan.

Conclusion: Colonic adenocarcinoma remains a major oncological challenge due to its high prevalence, insidious onset, and frequent late diagnosis. This theoretical analysis demonstrates that a strong correlation exists between endoscopic and morphological diagnostic findings, and that their integration is indispensable for accurate detection and staging. Epidemiological tendencies indicate a gradual increase in incidence in Uzbekistan, paralleling global patterns. The predominance of late-stage diagnosis underscores the urgent need for organized screening programs and wider access to high-quality colonoscopy. Morphological confirmation through biopsy remains the cornerstone of diagnosis, while endoscopic assessment provides crucial preliminary information regarding lesion characteristics and malignant potential. The complementary nature of these methods forms the foundation of effective clinical management. Future efforts should focus on population-based screening, standardization of pathology reporting, professional training, and public awareness. Such measures have the potential to significantly improve early detection rates, expand treatment options, and ultimately reduce mortality from colonic adenocarcinoma.

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