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*Original Article*

# Histopathological Grades of Colorectal Cancer: A One-Year Single-Center Study

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## ABCTRACT

**Background**: Colorectal cancer (CRC) poses a major global health burden. It necessitates careful assessment for prognosis and treatment planning. Histopathological grading plays a key role in prognosis and treatment planning. Local studies are essential to understand CRC characteristics in specific populations and guide national health strategies. This study aimed to assess the histopathological grading patterns among individuals diagnosed with CRC during a one-year interval at the National Cancer Institute in Subrata, Libya, in 2024. **Material and Methods:** A cross-sectional retrospective analytic study was conducted involving 202 patients consecutively selected from the medical records of Subrata National Cancer Institute in 2024 using descriptive statistics and the chi-square test for association through SPSS software. **Results:** This study reveals that the majority of patients (78.7%) had Grade II tumors, with the highest frequency (35.1%) in patients over 60 years of age. Grade I and Grade III accounted for 17.8% and 3.5% of cases, respectively. A statistically significant association was found between histopathological grade and age ($\chi^2 = 14.9$, $p = 0.021$) **Conclusion:** These findings underscore the urgent need for implementing targeted regional strategies, including enhanced public awareness campaigns, robust screening programs for early detection, and strengthening of the diagnostic infrastructure to improve CRC outcomes in Libya.

**Keywords:** histopathology grade, age, colorectal cancer, Libya.

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## INTRODUCTION:

Colorectal cancer (CRC), an aggressive malignancy originating in the large bowel (colon and rectum), is a leading cause of cancer-related sickness and death across the globe [1,2]. The global burden is growing, especially in developing nations where lifestyle changes and insufficient screening programs contribute to rising incidence rates. [3] The histological subtype (grade) of colorectal cancer (CRC) is clinically essential for prognostic categorization of affected patients, highlighting the necessity of early detection methods in high-risk populations. Colorectal adenocarcinoma is the most common histological subtype in more than 90% of colorectal cancer (CRC) patients. These adenocarcinomas are commonly classified into four categories (I-IV) using the Broder classification system: highly differentiated (Grade I), moderately differentiated (Grade II), poorly differentiated (Grade III), and undifferentiated (Grade IV). This rating is based on the amount of glandular tissue impacted [4]. While most CRCs are differentiated adenocarcinomas, about 10% are categorized as poorly differentiated adenocarcinoma (Por), 10% as mucinous carcinoma (Muc), and 1% as signet-ring cell carcinoma [5,6] . The Por/Muc/Sig histological subtypes of CRC demonstrate a strong association with deficient mismatch repair (dMMR), resultant microsatellite instability (MSI), and B-rapid accelerated fibrosarcoma (BRAF) gene mutations. Given that these genetic alterations correlate with poor prognosis in Stage III, the histological classification itself could function as a prognostic factor, possibly obviating the need for routine dMMR/MSI/BRAF analysis in this context [7-10]. .Histopathological grading of CRC is a major component in staging and prognosis, influencing therapeutic methods and patient outcomes [4]. Regional studies are essential to identify local disease characteristics and inform policy. In Libya, epidemiological data on CRC are scarce, with few researches describing the histological patterns and grades of tumors observed in clinical practice. Given histopathology's critical role in directing treatment, there is an urgent need for localized investigations that describe tumor features in varied populations. This study aims to fill that gap by presenting a one-year retrospective analysis of CRC histopathological grading from the National Cancer Institute in Subrata, Libya a leading center for cancer care in the region. We aim to describe the grading of the tumor according to age group, contributing to a better understanding of CRC pathology in the Libyan context.

## MATERIALS AND METHODS:

This retrospective, analytical cross-sectional study was conducted at the Subrata National Cancer Institute. The study population consisted of 202 patients who were consecutively selected from the institute's database. The primary inclusion criterion was a histologically confirmed diagnosis of primary colorectal cancer (CRC). Patients were excluded if their medical records contained incomplete information or if their histopathological findings were inadequate for analysis. Data were collected from medical records for the year 2024. The variables analyzed included patient age and the histological type of adenocarcinoma. The histopathological grade of CRC was categorized as Grade I (Well-differentiated), Grade II (Moderately differentiated), and Grade III (Poorly differentiated). Statistical analysis was performed using SPSS software. Descriptive statistics were employed to summarize the data, and the Chi-Square test was used to assess the statistical distribution and association among the histopathological grades. Ethical approval for the study was granted by the Director General of the National Cancer Institute in Subrata City. To maintain patient privacy, all data were fully anonymized by removing personal identifiers, ensuring strict confidentiality. The use of all collected data was restricted solely to the purposes of this research.

## RESULTS:

Based on data collected from the medical records of the histopathology laboratory of the Subrata Nation Cancer Institute (SNCI) in 2024, the total number of colorectal malignancies was 202 patients. From table 1, 36 (17.8%) patients were diagnosed with Grade I adenocarcinoma, 159 (78.7%) of patients with Grade II adenocarcinoma, and 7 (3.5%) of the total cases were Grade III adenocarcinoma. This study showed that the majority of cases presented with Grade II adenocarcinoma in the age group > 60 (35.1% of total cases). The chi-square test value (14.9) and significance level (0.021) suggest a statistically significant association between age and histopathological classification, indicating that cancer grading may be influenced by patient age.

**Table 1:** Distribution of CRC Grades by Age Group

| *Age Group* | *Grade I* | *Grade II* | *Grade III* | *Total* |
|---|---|---|---|---|
| *≤40* | 1 (0.5%) | 14 (6.9%) | 3 (1.5%) | 18 (8.9%) |
| *41-50* | 7 (3.5%) | 21 (10.4%) | 1 (0.5%) | 29 (14.4%) |
| *51-60* | 15 (7.4%) | 53 (26.2%) | 0 (0%) | 68 (33.7%) |
| *>60* | 13 (6.4%) | 71 (35.1%) | 3 (1.5%) | 87 (43.1%) |
| *Total* | 36 (17.8%) | 159 (78.7%) | 7 (3.5%) | 202 (100.0%) |
| *Chi-Square Test* | 14.9 | | | |
| *Significance Level* | 0.021 | | | |

## DISCUSSION:

Colorectal carcinoma is a type of colon cancer that results from uncontrolled cell proliferation [11-13]. Distant metastasis is the leading cause of death in CRC, whereas the liver is the most common location, followed by the lungs and the peritoneum. According to many studies, several factors influence the prognosis of CRC patients, including sex, age, initial tumor resection, number of metastases, and tumor differentiation degree[14, 15]. The risk of CRC began to rise after the age of 40 and increased rapidly between the ages of 50 and 55, increasing every decade thereafter [16].In our study, the majority of CRC patients treated at SNCI in 2024 (35.1%) were above the age of 60 and the study found that all 202 individuals with histopathologic examinations had adenocarcinoma (100%). The results of this study largely match global trends in CRC pathology, with moderately differentiated adenocarcinoma being the most common grade. This is consistent with findings from other Middle Eastern and North African nations (MENA). However, the comparatively high frequency of poorly differentiated tumors (24.2%) is significant and may indicate later-stage diagnosis or aggressive tumor characteristics in the local community [17]. Many previous researches are agreement with this study in that the degree of differentiation of the vast majority (78.7%) were grade II; moderately differentiation adenocarcinoma (35.1% of age group >60), followed by (17.8%) grade I; well differentiation and (3.5%) grade III; poorly differentiation, [18-21] These findings suggested that histological assessment is very significant for the evaluation of clinical and management of CRC patient. Besides that, this study showed a significant correlation between the adenocarcinoma differentiation and age ($p < 0.001$ indicating that cancer grading may be influenced by patient age. Whereas a study done in 2023 demonstrated that a strong association between age groups (EAO versus LAO) and histological features ($p < 0.001$) [22]. This aligns with broader research trends showing younger CRC patients often present with more aggressive tumor biology, including higher-grade malignancies[23, 24]. However, some studies, like the 2022 analysis from Cengkareng Hospital, found no significant age-differentiation correlation ($p=0.476$), highlighting the need for population-specific investigations [25].

## CONCLUSION:

In conclusion, while the precise relationship between advanced age and higher colorectal cancer grade necessitates further research controlling for confounders, this single-center Libyan study identifies a notable prevalence of aggressive tumor grades. This underscores the critical importance of robust early detection programs, improved diagnostic resources, and dedicated public health initiatives to decrease the CRC burden within this population and potentially inform similar contexts.

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