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Investigation of the Risk Factors and Associated Co-Morbid Conditions among Patients with Colorectal Cancer in Trinidad

Vijay Kumar Chattu ^{1,2,3,*} , Priya Gopie ⁴ , Rajiv K. Singh ⁵, Kimberly Singh ⁵, Sachin Singh ⁵, Sarah Singh ⁵, Javanna Smith ⁵, Vitra Sookram ⁵, DeAngello Saunders ⁵ and Krissi Thomas ⁵

¹ Department of Medicine, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada

² Occupational Medicine Clinic, St. Michael's Hospital, Toronto, ON M5C 2C5, Canada

³ Institute of International Relations, The University of the West Indies, St. Augustine, Trinidad and Tobago

⁴ Department of Haematology/Oncology, Sangre Grande Hospital, Eastern Regional Health Authority, Sangre Grande, Trinidad and Tobago; pgopie.tt@gmail.com

⁵ Department of Clinical Medical Sciences, Faculty of Medical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago; Rajiv.k.singh456@gmail.com (R.K.S.); Kimssingh09@gmail.com (K.S.); sachisingh99@gmail.com (S.S.); sarahleesingh13@gmail.com (S.S.); Javanna.smith@my.uwi.edu (J.S.); vitra.sookram@gmail.com (V.S.); angsaun@gmail.com (D.S.); Krissi2009@hotmail.com (K.T.)

* Correspondence: vijay.chattu@mail.utoronto.ca; Tel.: +1-416-864-6060

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Abstract: Colorectal cancer (CRC) is the third most common cancer, and the fourth most common cause of cancer mortality worldwide. In Trinidad and Tobago, it is the third most common type of cancer in both sexes. Since there is scanty research on the risk factors associated with CRC, this study was conducted to determine the correlation between risk factors, including associated comorbid conditions, and CRC in Trinidad. A cross-sectional study was conducted amongst diagnosed CRC patients (>18 years) using a pre-tested questionnaire consisting of sections on demographic data, lifestyle before diagnosis, quality of life, and depression status. Additional information such as recurrence of cancer, Body Mass Index (BMI), Hypertension (HT), blood glucose levels and family history of cancer were collected from the medical records. Of the total participants, the majority were males (58%), and the mean age of diagnosis in both sexes was 65 years. The retrospective chart review showed that 68% were found to have a comorbid condition (Diabetes or HT). Upon review of the medical records, 93.2% of the subjects did not have a familial history. However, the questionnaire data showed that 73% of subjects had a family history. Around 50% of CRC patients were alcohol consumers and 30% were cigarette smokers prior to their cancer diagnosis. Interestingly, a majority of patients (91%) had never been screened for CRC prior to their diagnosis. Subjects with CRC displayed minimal depression, indicating that being diagnosed with CRC did not have a grave impact on their state of mind or quality of life. Our findings showed that prevalence of CRC was higher in males and amongst individuals of African descent. However, larger prospective studies may be warranted to fully demonstrate this effect.

Keywords: colorectal cancer; hypertension; diabetes mellitus; depression; quality of life; Trinidad and Tobago; prevention; risk factors; alcohol; smoking; screening

1. Introduction

Colorectal cancer (CRC) refers to cancer that originates in the colon or rectum due to uncontrolled cell growth of the inner lining of the large intestine. This type of cancer typically develops due to exposure of the colonic mucosa to carcinogenic compounds and subsequent formation of polyps [1].

Several lifestyle factors serve as a harbinger to the development of CRC. These factors include physical inactivity, smoking, and consumption of alcohol, all of which are commonplace in Trinidadian culture. Preventative measures for CRC encompass both regular screening and lifestyle alterations, which prove to reduce the incidence of CRC mortality via early detection of polyps and minimizing exposure to established risk factors, respectively. Currently, there is a paucity of data on CRC in Trinidad. A recent study from Trinidad [2] highlighted that there is no local information available regarding the association between the risk factors and incidence of CRC, though the central idea of public health is to reduce the incidence of a disease through intervention strategies. The global burden of CRC is predicted to rise by 60% to more than 2.2 million new cases and 1.1 million deaths by 2030. Patterns and trends in CRC incidence and mortality correlate with human development levels and their gradual changes may reflect the adoption of a more westernized lifestyle [3]. In the Americas, CRC is the fourth most common cancer amongst both genders; incidence and mortality rates in the United States of America (USA) and Canada are generally higher than in Latin America and the Caribbean (LAC), with the exception of Uruguay, Argentina, Barbados, and Trinidad and Tobago, where incidence rates are close to those of Canada and the USA. It is forecasted that CRC incidence in the Americas will rise by 60% to 396,000 new cases by 2030, and this increase will be more dramatic in LAC with lower chances of survival compared to USA and Canada [4]. The third most common type of cancer in Trinidad and Tobago is CRC and the country also has a high prevalence of cardiovascular diseases (CVD) and Type II DM, both components of Metabolic Syndrome (MetS) that are risk factors for CRC [5]. There is a paucity of research on the risk factors associated with CRC in Trinidad and Tobago. Therefore, the purpose of this research study is to determine the correlation between the risk factors and associated comorbid conditions amongst patients with CRC in Trinidad and Tobago.

2. Materials and Methods

2.1. Study Design

A retrospective cross-sectional study was conducted by (i) questionnaire administration and (ii) medical chart review. Ethical approval was obtained from Eric Williams Medical Sciences Complex (EWMSC) part of North Central Regional Health Authority (NCRHA) and the Sangre Grande Hospital (SGH) from Eastern Regional Health Authority (ERHA). This study was approved by the Campus Research Ethics Committee (CEC) at the University of the West Indies, St. Augustine (Ref: CEC784/11/18), North Central Regional Health Authority (Ref: Letter dated 3 June 2019) and from Eastern Regional Health Authority (Ref: PHO: 37/19).

2.2. Participants

The study population involved residents of Trinidad over the age of eighteen (18) years, diagnosed with CRC of any stage. Eligible participants with CRC were identified at the outpatient clinics of the EWMSC and SGH. Questionnaires were administered to determine the correlation between the risk factors, including associated co-morbid conditions, and CRC in Trinidad. Participants were selected by convenience sampling.

2.3. Instruments

A questionnaire was given to each participant. Each contained four (4) sections including demographic data, lifestyle before diagnosis, quality of life, and depression screening. These consisted of open-ended and close-ended questions. This tool contained questions from questionnaires that were validated and freely available with no patent restrictions such as the PHQ-9 Questionnaire and the University of Washington Quality of Life Questionnaire. Data was collected at EWMSC and SGH between the months of June and July 2019. A list of participants with hospital registration numbers was formulated and submitted to the Medical Records Department at EWMSC to retrieve the accompanying medical records.

2.4. Review of Medical Records

A separate retrospective chart review was also conducted. Patients diagnosed with CRC from 2015–2019 were identified from pathology records at EWMSC. The medical records for these patients were obtained and analyzed. Data to determine the risk factors and associated co-morbid conditions were collected from these charts. However, SGH sends its pathology specimens for processing to the Port-of-Spain General Hospital and unfortunately, we did not have the IRB approval to access the pathology records from the Port-of-Spain General Hospital. Therefore, we were not able to do a retrospective medical chart review at SGH.

2.5. Data Analysis

Collected data was entered in the Statistical Package for the Social Sciences (SPSS) version 23. Descriptive analysis, calculation of means, other estimates, and simple percentages were utilized to determine the risk factors present in CRC patients over the age of eighteen (18) in Trinidad.

3. Results

3.1. Demographic Findings

Retrospective chart review was completed for 88 CRC patients at EWMSC. Questionnaires were completed for 22 CRC patients at EWMSC and SGH. Both retrospective chart review data and questionnaire data showed that most CRC patients were male. Additionally, both retrospective chart review data and questionnaire data showed that the most frequent age of CRC diagnosis was 51–75 years, with the median age being 65 years for both sexes. From the questionnaire data, most patients were of African descent. From the questionnaire data, most patients had at least a primary school education. Additionally, most of the interviewees were retired (45%). Findings are summarized below (Table 1).

Table 1. Demographics and clinical features of participants and cases.

Variable	Percentage (%)	
	Results of Questionnaire (22) N (%)	Retrospective Analysis (88) N (%)
Gender		
Male	13 (59)	51 (58)
Female	09 (41)	37 (42)
Age		
25–50 years	3 (14)	9 (10)
51–75 years	15 (68)	56 (64)
76–100 years	04 (18)	23 (26)
Ethnicity		
African	11 (50)	N/A
Chinese	01 (05)	
East Indian	06 (27)	
Mixed	04 (18)	
Education		
No Education	2 (09)	N/A
Primary Education	9 (41)	
Secondary Education	4 (18)	
Technical Training	4 (18)	
Bachelor's Degree Education	3 (14)	

Table 1. Cont.

Variable		Percentage (%)
Occupation		
Employed	05 (23)	N/A
Unemployed	07 (32)	
Retired	10 (45)	
Family History of Cancer		
Yes	16 (73)	6 (7)
No	06 (27)	82 (93)
Depression Screening (PHQ-9)		
Minimal Depression	14 (64)	N/A
Mild Depression	5 (23)	
Moderate Depression	3 (13)	
Anxiety Experienced due to Cancer Diagnosis		
No Anxiety	17 (77)	N/A
Little Anxiety	3 (14)	
Anxious	2 (9)	
Health-Related Quality of life rating (QoL)		
Very Good	6 (27)	N/A
Good	9 (41)	
Fair	7 (32)	
Co-morbid Conditions before Cancer Diagnosis		
No Diabetes	16 (73)	N/A
Diabetes	4 (18)	
Pre-diabetic	2 (9)	
Hypertension	12 (55)	
No Hypertension	10 (45)	
Smoking History before Cancer Diagnosis		
Yes	7 (32)	N/A
No	15 (68)	
Alcohol Use before Cancer Diagnosis		
No Consumption	12 (54)	N/A
Beer	1 (5)	
Hard Liquor	8 (36)	
Wine	1 (5)	
Exercise Frequency before Cancer Diagnosis		
No Exercise	3 (14)	N/A
Exercised < 3 times per week	8 (36)	
Exercised > 3 times per week	2 (9)	
Exercised everyday	9 (41)	
Fast Food Consumption before Cancer Diagnosis		
Less than five times a month	13 (59)	N/A
Once per week	05 (23)	
Twice per week	01 (05)	
Three or more times per week	03 (13)	

Table 1. Cont.

Variable	Percentage (%)	
Consumption of Vegetable-based and Processed foods before Cancer Diagnosis		
Vegetable Based Foods		
Less than five times a month	1 (5)	
Once per week	4 (18)	
Twice per week	2 (9)	
Three or more times per week	15 (68)	
Processed Foods		
Less than five times a month	9 (41)	N/A
Once per week	7 (32)	
Twice per week	3 (13.5)	
Three or more times per week	3 (13.5)	
CRC Screening Prior to Diagnosis		
Yes	01 (5)	
No	21 (95)	N/A

3.2. Family History

With respect to family history of cancer, upon medical chart review for any type of cancer that was documented in a first degree relative in the family history, it was found that 7% of patients had a recorded family history of cancer. Conversely, upon direct questioning about a family history of any type of cancer in a first degree relative, 73% of the questionnaire-administered patients reported a family history of cancer.

3.3. Depression and Anxiety

Depression screening via questionnaire showed that most patients had minimal depression (64%). Additionally, from the questionnaire, we determined that most patients had no anxiety (77%).

3.4. Co-Morbid Conditions

Upon questionnaire review, 18% of patients had diabetes mellitus, and 55% had hypertension. Around 32% of patients reported tobacco use, and 46% reported alcohol use.

3.5. Lifestyle Factors

Most patients reported regular exercise, with 41% stating daily exercise. Most patients reported infrequent fast food consumption less than five times per month (59%). Additionally, most patients reported eating vegetable-based foods three or more times per week (68%), and eating processed foods less than five times per month (41%).

3.6. Screening for Colorectal Cancer

Colorectal cancer screening was only performed on 5% of patients.

4. Discussion

4.1. Demographics

A study conducted by the American Cancer Society in 2014 [6] indicated that the risk of CRC rises with age; the median age at diagnosis for colon cancer is 68 years in males and 72 years in females; for rectal cancer it is 63 years of age in both males and females [6]. The majority of our patients diagnosed with CRC were between the ages of 51–75 years of age. Our data is therefore consistent with that of previous studies [1], where CRC trends reflect patterns in older age groups (>50 years), where the most cases occur. In that same study, CRC incidence rates are approximately

30% higher in men than in women [6], which concur with our findings where 58% of our subjects were males. Based on our findings, 50% of the subjects belonged to the Afro-Trinidadian ethnic group. This accounted for the majority of patients being African, which was similar to a study [7] that found Africans have a greater predisposition to developing CRC. Hence, our findings are in accord with this pre-existing data. A possible explanation for this is that the African population has the greatest risk because of low levels of serum vitamin D due to their darker skin color, which requires more sun exposure to achieve sufficient levels [7].

4.2. Risk Factors

Based on the retrospective chart review, 93.2% of the patients did not have a family history of cancer. On the other hand, the data collected from questionnaires yielded 72.7% of patients having a family history of cancer. The high percentage of participants responding “yes” to the question concerning family history of cancer on the questionnaire could be attributed to recall bias. These results contradict each other, indicating a discrepancy where there was incomplete documentation in the medical records. The lack of clinical features available on the medical records (ethnicity, education, co-morbidities, etc.) is striking. In a busy clinic, healthcare personnel may neglect to record this information, even if the information is requested from the patient. The need for electronic medical records may help to circumvent this problem of missing data. If there are mandatory fields that must be filled out before an electronic medical record is deemed complete, it will force all healthcare personnel, including clerks, nurses, and physicians to record this necessary information. Additionally, timely audits of paper medical records, by the medical records department would be helpful to highlight missing data and to implement solutions. For example, the need for re-education of the staff on proper medical record documentation.

A case-control study reported that a history of CRC in first-degree relatives increased the risk of developing CRC two-fold [8]. Our questionnaire results concur with this finding. However, data from the retrospective chart review contradict this finding. This could be because family history of cancer in the medical records is under-reported due to inadequate history-making and documentation in the notes for these patients. Alternatively, our contradictory results may indicate that other risk factors such as diet and lifestyle could possibly be more significant in the development of CRC, rather than familial predisposition, [8] in our population.

4.3. Nutrition and Lifestyle

The American Cancer Society reported that individuals who are the most sedentary have a 25% to 50% elevated risk of colon cancer compared to those who are least sedentary [6]. Our study found that half of the subjects (50%) exercised more than three times per week to almost every day, whereas the other half (50%) exercised less than three times per week to almost never. A negative association between physical activity and CRC corroborates with other recent studies [9] indicating a more preventative role for physical activity. Differences in the intensity of exercise and length of time allotted to exercise per week may have varied among subjects and would account for the impact of physical activity and its effect on developing CRC.

Fast foods have been shown to increase the risk of developing CRC due to its elevated fat and animal protein content [10]. Around 41% of study participants ate fast food at least once per week, some as frequent as three or more times per week. Therefore, such a frequent intake of high fat diets by the subjects would have caused an imbalance in the normal microbiome of the large intestine [9] (colon, rectum) thus increasing the risk of CRC. It is most probable that dietary fiber obtained mainly from vegetable-based foods decreases the risk of CRC because of less exposure to carcinogens and increased peristaltic movements [6,11]. However, the majority (68.2%) of the subjects from this study diagnosed with CRC ate vegetable-based foods three or more times per week giving a negative relationship between fiber intake and CRC [10]. A possible explanation for this may be that the subjects may have recall bias with respect to the positive behavior of reporting vegetable consumption.

Data collected from completed questionnaires indicated that approximately 30% of subjects smoked cigarettes. It has also been established through prior research that smoking lowers survival rates for diagnosed CRC patients [6]. The International Agency for Research on Cancer stated that there is sufficient evidence to infer that tobacco smoking causes CRC [9].

A study done by Rossi et al [12] has indicated that alcohol consumption was linked to a significantly increased risk of CRC. According to data retrieved from completed questionnaires, 45.5% of the patients diagnosed with CRC consumed alcohol. A possible explanation for this could be the alcohol dosage relationships [9], as well as individual differences in alcohol metabolism, some of which the metabolites may exert more extensive carcinogenic effects on the colon and rectum [12].

4.4. Co-Morbid Conditions

MetS includes hyperglycemia, hypertension, increased levels of triglyceride, and decreased levels of low-density lipoprotein, and central obesity [13], accounts for over 50% of the population of Trinidad and Tobago [14]. Many studies demonstrate a relationship between MetS and risk factors for CRC [15]. We tried to establish a relationship between the diseases that encompass MetS, for example, DM HT and CRC. However, our findings did not show any evidence that these diseases, which encompass MetS, are associated with CRC. This could be due to our small sample size. It is important to note that the majority (68.2%) of the subjects had at least one pre-existing comorbid condition prior to diagnosis with CRC, some having more than one. The study reported by the American Cancer Society indicated that comorbidities alter the risk of developing CRC, especially those with a history of chronic inflammatory bowel disease who have almost double the risk of developing CRC [6]. Pre-existing comorbidities can also impact survival rates of those diagnosed with CRC.

With respect to diabetes, the findings from our research differs from that of a previously established meta-analysis of case-control and cohort studies, which concluded that persons with diabetes have approximately 30% increased relative risk of developing CRC in comparison to non-diabetic individuals [16]. Type 2 DM and CRC share similar risk factors, including physical inactivity, obesity, and a sedentary lifestyle [6]. Based on our data collected from questionnaires, 72.7% of the subjects were non-diabetic. However, it could be that diabetes was under-diagnosed and under-reported as a co-morbid condition in the patients' charts for our study.

Our study's small sample size could have also accounted for the discrepancy between the meta-analysis and our study's results. Data collected from questionnaires for subjects with hypertension amounted to 45.5%. The study by Stocks et al [17] showed that HT is related to a moderate increased risk of CRC incidence, however, due to the sample size, our study could not determine a correlation between hypertension and CRC.

4.5. Depression and Health-Related Quality of Life

A study by Khalil et al found that the prevalence of both anxiety and depression were elevated among cancer patients [18]. However, in our study, we found that 72.7% of our CRC patients had no anxiety about their cancer as well as 63.64% of the patients that were within the minimal depression category and a possible explanation for this is the free-spirited mentality of Trinidadians and the presence of a strong support system. Laghousi et al. reported that women appeared to be more affected than men, with affected physical and social functioning after development of cancer [19]. However, in our study we found that the majority of CRC patients rated their health-related quality of life as "very good" (27.3%) and "good" (40.9%) almost equally across both genders and with no one choosing the options of "poor" or "very poor" in the questionnaire. This contradiction can be explained due to the difference of health care systems of our CRC patients and those of the published study [19] in treatment and symptom management. This is in conjunction with the aforementioned comparison of our CRC patients having minimal anxiety and depression.

4.6. Screening for CRC

The majority of the subjects (95.5%) have never been screened for CRC prior to their diagnosis. Screening is a preventative action that facilitates early detection and removal of precancerous growths [9]. The region has a strong policy with high-level political commitment and there is a great need by the government to effectively implement the comprehensive 15-point multisectoral “Port of Spain Summit Declaration” that is aimed to stop the epidemic of chronic NCDs in the Caribbean region [20]. Therefore, without screening, the incidence of colorectal cancer increases, and additionally, screening may detect cancer at an early stage when the disease is still curable, and the associated mortality is low. However, if the patient’s disease is only diagnosed after he/she becomes symptomatic, he/she may be diagnosed at a later stage and would be associated with worse prognosis and mortality.

5. Conclusions

This study provided beneficial information on colorectal cancer risk factors, and the co-morbidities associated with colorectal cancer. Men and women were diagnosed later in life with colorectal cancer at a mean age of 65 years. Men were at an increased risk of developing colorectal cancer as compared to women. Patients of African descent had a higher incidence of colorectal cancer as compared to other ethnicities. The consumption of processed foods, decreased intake of vegetable-based foods, smoking cigarettes, and alcohol consumption may increase the susceptibility of developing colorectal cancer. These findings should be investigated in future studies, with a specific focus on tumorigenesis and the incidence of specific mutations in these at-risk populations. Subjects displayed minimal depression, indicating that being diagnosed with colorectal cancer did not have a grave impact on their quality of life and state of mind. Screening tools such as colonoscopies are underutilized, thus contributing to later detection rates and higher colorectal cancer incidence and mortality.

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References

1. AMA. What Is Colorectal Cancer? *American Cancer Society*. Available online: <https://www.cancer.org/cancer/colon-rectal-cancer/about/what-is-colorectal-cancer.html> (accessed on 29 July 2019).
2. Rampersad, M.K.; Mohammed, S.R.; Jurawan, R. A single centre retrospective review of colorectal cancer in trinidad over a three year period. *Gastroenterol. Hepatol.* **2017**, *8*, 00264.
3. Arnold, M.; Sierra, M.S.; Laversanne, M.; Soerjomataram, I.; Jemal, A.; Bray, F. Global patterns and trends in colorectal cancer incidence and mortality. *Gut* **2017**, *66*. [[CrossRef](#)] [[PubMed](#)]
4. Colorectal Cancer Screening in the Americas. Pan American Health Organization. 2016. Available online: <https://www.paho.org/hq/dmdocuments/2016/Colorectal-Cancer-Screening-Landscape-English.pdf> (accessed on 29 July 2019).
5. Chadee, D.; Seemungal, T.; Pinto Pereira, L.M.; Chadee, M.; Maharaj, R.; Teelucksingh, S. Prevalence of self-reported diabetes, hypertension and heart disease in individuals seeking State funding in Trinidad and Tobago, West Indies. *J. Epidemiol. Global Health* **2013**, *3*, 95–103. [[CrossRef](#)] [[PubMed](#)]
6. Colorectal Cancer Facts & Figures: Facts about Colon Cancer. American Cancer Society. Available online: <https://www.cancer.org/research/cancer-facts-statistics/colorectal-cancer-facts-figures.html> (accessed on 14 July 2019).

7. Augustus, G.J.; Ellis, N.A. Colorectal cancer disparity in african americans risk factors and carcinogenic mechanisms. *Am. J. Pathol.* **2018**, *188*, 291–303. [[CrossRef](#)] [[PubMed](#)]
8. Negri, E.; Gentile, A.; Franceschi, S.; La Vecchia, C. Family history and the risk of stomach and colorectal cancer. *Cancer* **1992**, *70*, 50–55.
9. Wu, A.H.; Paganini-Hill, A.; Ross, R.K.; Henderson, B.E. Alcohol, physical activity and other risk factors for colorectal cancer: A prospective study. *Br. J. Cancer* **1987**, *55*, 687–694. [[CrossRef](#)] [[PubMed](#)]
10. Drasar, B.S.; Irving, D. Environmental factors and cancer of the colon and breast. *Br. J. Cancer* **1973**, *27*, 167–172. [[CrossRef](#)] [[PubMed](#)]
11. Theodoratou, E.; Farrington, S.M.; Tenesa, A.; McNeill, G.; Cetnarskyj, R.; Korakakis, E.; Din, F.V.; Porteous, M.E.; Dunlop, M.G.; Campbell, H. Associations between dietary and lifestyle risk factors and colorectal cancer in the Scottish population. *Eur. J. Cancer Prev.* **2014**, *23*, 8–17. [[CrossRef](#)] [[PubMed](#)]
12. Rossi, M.; Jahanzaib Anwar, M.; Usman, A.; Keshavarzian, A.; Bishehsari, F. Colorectal cancer and alcohol consumption-populations to molecules. *Cancers* **2018**, *10*, 38. [[CrossRef](#)] [[PubMed](#)]
13. Esposito, K.; Chiodini, P.; Colao, A.; Lenzi, A.; Giugliano, D. Metabolic syndrome and risk of cancer: A systematic review and meta-analysis. *Diabetes Care* **2012**, *35*, 2402–2411. [[CrossRef](#)] [[PubMed](#)]
14. Tseng, M.; DeVillis, R.F. Correlates of the “western” and “prudent” diet patterns in the US. *Ann. Epidemiol.* **2000**, *10*, 481–482. [[CrossRef](#)]
15. Pais, R.; Silaghi, H.; Silaghi, A.C.; Rusu, M.L.; Dumitrascu, D.L. Metabolic syndrome and risk of subsequent colorectal cancer. *World J. Gastroenterol.* **2009**, *15*, 5141. [[CrossRef](#)] [[PubMed](#)]
16. Overbeek, J.A.; Kuiper, J.G.; van der Heijden, A.A.; Labots, M.; Haug, U.; Herings, R.M.; Nijpels, G. Sex-and site-specific differences in colorectal cancer risk among people with type 2 diabetes. *Int. J. Colorectal Dis.* **2019**, *34*, 269–276. [[CrossRef](#)] [[PubMed](#)]
17. Stocks, T.; Lukanova, A.; Johansson, M.; Rinaldi, S.; Palmqvist, R.; Hallmans, G.; Kaaks, R.; Stattin, P. Components of the metabolic syndrome and colorectal cancer risk; a prospective study. *Int. J. Obes.* **2008**, *32*, 304–314. [[CrossRef](#)] [[PubMed](#)]
18. Khalil, A.; Faheem, M.; Fahim, A.; Innocent, H.; Mansoor, Z.; Rizvi, S.; Farrukh, H. Prevalence of depression and anxiety amongst cancer patients in a hospital setting: A cross-sectional study. *Psychiatry J.* **2016**, *2016*, 3964806. [[CrossRef](#)] [[PubMed](#)]
19. Laghousi, D.; Jafari, E.; Nikbakht, H.; Nasiri, B.; Shamshirgaran, M.; Aminisani, N. Gender differences in health-related quality of life among patients with colorectal cancer. *J. Gastrointest. Oncol.* **2019**, *10*, 453. [[CrossRef](#)] [[PubMed](#)]
20. Chattu, V.K.; Knight, A.W. Port of Spain Summit Declaration as a successful outcome of global health diplomacy in the Caribbean region: A systematic review. *Health Promot. Perspect.* **2019**, *9*, 174. [[CrossRef](#)] [[PubMed](#)]



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