Risk factors of colorectal cancer in Africa: A systematic review and meta-analysis

Nkengeh N. Tazinkeng, MD[1,2,3]; Ethan F. Pearlstein, MD[4]; Martha Manda-Mapalo, MD[5]; Ayooluwatomiwa D. Adekunle, MD, MPH[3,6]; Kelsey Sawyer, MS[7]; Joao Filipe G. Monteiro PhD[7]; Kanwal Bains, MBBS[8]; Evaristus S. Chukwudike MD[3,9]; Mouhand F. Mohamed, MD[3,7]; Stella-Maris C. Egboh, MD[3,10]; Comfort Asante, MBChB[3,11]; Akwi W. Asombang, MD, MPH[2,3,12]

[1]Solidarity Hospital Buea [2]Massachusetts General Hospital, [3]African Association of Future Gastroenterologists (AAFG) [4]Albany Medical College, [5]University of New Mexico [6]St. Luke Hospital, Washington University [7]Brown University [8]University of Arizona [9]University of Calabar Teaching Hospital, [10]Federal Medical Center,Yenagoa, [11]Ndola Teaching Hospital, [12]Harvard Medical School

Introduction

- Colorectal cancer (CRC) is the second leading cause of cancer-related death worldwide.
- A recent meta-analysis estimated a pooled CRC age-standardized incidence rate of 5.25 per 100,000, though suggested this to be an under-estimate of the true rate.
- Due to the heterogeneity of dietary and lifestyle practices throughout the African continent, our work sought to define risk factors for the development of CRC in Africa.

Methods

- We systematically searched PubMed, Embase, Global Health, CINAHL, Cochrane CENTRAL, and African Index Medicus for studies written in English, examining risk factors of CRC in Africa.
- Meta-analysis was performed to compare different risk factors in constituent studies. Jamovi software was used for statistical analysis utilizing a random-effects model.
- Analysis of CRC studies was supplemented by estimated relative risk (RR) comparing various risk factors.

Results

- Of 2479 studies screened, 149 were included for the quantitative analysis (n=93707).
- Family history of CRC was associated with a RR of 2.14 and 95% CI [1.68-2.72], n=340.
- Individuals with diets based on high calcium, or vegetable consumption had 45% and 8% lower risks of having CRC, with respective RR of 0.55 [0.44-0.69] and 0.92 [0.84-0.99].
- Diets based on carbohydrate, dairy, sugary food/drinks, or meat consumption indicated 14, 31, 43, or 45% higher risks of CRC, and 1.14 [1.03-1.26], 1.31 [1.21-1.42], 1.43 [1.32-1.57], 1.45 [1.36-1.54], n=5303.
- Physical activity was associated with lower RR of having CRC (81% less), 0.19 [0.15-.26].
- Individuals that were obese, had been exposed to carcinogenic chemicals, had a history of alcohol use, or tobacco use indicated 43, 45, 54, 65% higher risks of CRC, with 1.43 [1.02-2.03], 1.45 [1.23-1.68], 1.54 [1.28-1.84], 1.65 [1.45-1.9], n=8995.
- With the exception of family history, there was considerable heterogeneity among studies (I^2 > 80%).

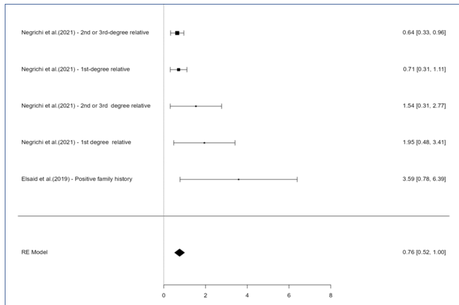

Figure 1: Family history as a risk factor of CRC in Africa, log relative-risk by case-control studies comparison.

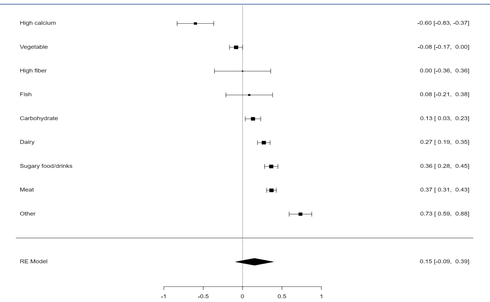

Figure 2: Dietary risk factors of CRC in Africa, log relative-risk by case-control studies comparison.

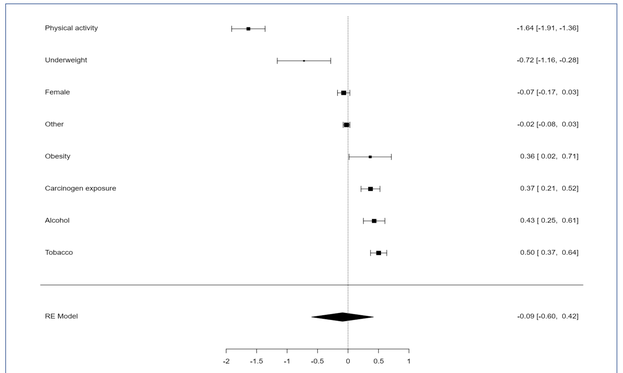

Figure 3: Lifestyle risk factors of CRC in Africa, log relative-risk by case-control studies comparison.

Conclusion

- There are both modifiable and non-modifiable risk factors that are distinct to Africa and vary across the continent.
- Our review revealed that obesity, carcinogen exposure, tobacco or alcohol use, and diets high in carbohydrates, dairy, and red meat increase CRC risk.
- On the contrary, high calcium or vegetable-based diets, and physical activity are protective against the development of CRC.
- Further work is needed to characterize CRC risk factors by region and to understand the impact of risk factor mitigation efforts on the overall incidence of CRC.