Emaculate Verla Tebit
Dr. sc. hum.

Active and Passive Smoking and the Risk of Colorectal Cancer

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Master of Science in Community Health and Health Management in Developing Countries, September 2002 an der Ruprecht Karls Universität, Heidelberg.
Bachelor of Medicine; Bachelor of Surgery (MB;BS), October 1998, University of Ilorin, Ilorin, Nigeria.

Promotionsfach: Deutsches Krebsforschungszentrum
Doktormutter: Frau Prof. Dr.sc. hum. J. Chang-Claude

There have been fairly consistent findings of a positive association between smoking and colorectal adenomas but studies on smoking and colorectal cancer have yielded inconsistent results. It was hypothesized that a long induction period is needed for smoking to cause colorectal cancer (CRC). However, issues relating to the duration, intensity, and cumulative dose of smoking and the effect of smoking cessation still need to be clarified. In addition, literature on passive smoking and colorectal cancer is very sparse and no study has been conducted in Germany to assess the effect of tobacco smoke exposure on colorectal cancer risk. This study was therefore conducted to address these issues.
In a population-based case-control study conducted in a region of Southern Germany, 542 cases of invasive colorectal cancer aged 30 years and above newly diagnosed from January 1 2003 to June 30 2004, and 614 controls matched to each case by sex, 5-year age group and area of residence were recruited. Subjects provided detailed information on demographic factors and other risk factors of colorectal cancer including lifetime active and passive smoking histories through personal interviews. Conditional logistic regression modelling stratified by 5-year age group was used to assess the effect of active and passive smoking on the risk of colorectal cancer. All potential confounders were taken into account in the analysis.

No association was observed between ever active, current or former active smoking on the risk of colorectal cancer. Age at initiation of smoking and number of cigarettes smoked daily also did not impact risk in this study. However, compared to never smokers, active smoking for 30 years and above was associated with a 27% risk increase for colorectal cancer. High cumulative dose of greater than 30 pack-years was associated with a 60% risk increase of colorectal cancer, with a statistically significant linear trend for pack-years of smoking. This is consistent with evidence from the literature and supports the hypothesis that a long induction period is needed for smoking to cause colorectal cancer. Among smokers, after adjusting for cumulative dose, smoking cessation for 20 years or more was associated with risk reduction compared to current smokers with a trend of risk reduction for each year since smoking cessation ($p = 0.07$). This finding is consistent with literature although some studies noted persistently elevated risk after many years of quitting smoking. Stratification by tumor localization into colon and rectal cancers did not yield major differences in the results. Although this is consistent with literature, evidence also suggests that rectal cancer might be associated with higher risk estimates for smoking than colon cancer.

The effect of exposure to passive smoke was assessed among never smokers. Passive smoking overall did not emerge as a risk factor for colorectal cancer in this study. However, women who were recently exposed or exposed at a high cumulative dose to tobacco smoke from their husbands or partners were at 3-fold increased risk of colorectal cancer compared to women never exposed to passive smoke. Previous studies, which had examined the effect of passive smoking on the risk of colorectal cancer, have reported mixed results, including a protective effect in women, increased risk in men or no effect. There are only three other studies on passive smoking and colorectal cancer and more work needs to be done in this field.

There was no significant effect modification of the association between active smoking and colorectal cancer by other risk factors. However, those who smoked heavily and had low levels of education had more than 80% risk increase, while those who smoked heavily, but had high levels of education did not have elevated risk, when compared to never smokers with high level of education. Obese heavy smokers had a two fold increased risk, while heavy smokers who were not obese had only a 30% risk increase, compared to non-smokers who were not obese. Available evidence

of effect modification by other risk factors is scarce and probably needs further research.

In conclusion, the observations of positive association between smoking and colorectal cancer, the significant dose-response gradient for increasing risk with increasing cumulative dose (pack-years) of exposure, and the possible risk reduction after withdrawal of smoking are all suggestive of a causal role of smoking on the risk of CRC. Public health messages about the hazards of smoking and exposure to environmental tobacco smoke should be emphasized in Germany where smoking prevalence is very high.