

Citation:

McCarl M, Harnack L, Limburg PJ, Anderson KE, Folsom AR. Incidence of colorectal cancer in relation to glycemic index and load in a cohort of women. *Cancer Epidemiol Biomarkers Prev*. 2006 May; 15(5): 892-896.

PubMed ID: [16702366](#)

Study Design:

Prospective Cohort Study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To determine whether glycemic index and glycemic load are positively associated with colorectal cancer in women, and whether they interact with obesity.

Inclusion Criteria:

Participants in the Iowa Women's Health Study, which includes women who were age 55 to 69 years at baseline in 1986.

Exclusion Criteria:

Women who had a prevalent cancer at baseline, who indicated implausible energy intake levels, who had 30 or more missing items in the food-frequency questionnaire (FFQ) or who had a colorectal cancer of non-typical morphology.

Description of Study Protocol:**Recruitment**

In January 1986, Iowa women aged 55 to 69 years (N=41,836) completed mailed questionnaires as part of the Iowa Women's Health Study.

Design

Prospective cohort with over 15 years of follow-up.

Dietary Intake/Dietary Assessment Methodology

A Harvard FFQ was used to determine subjects' usual dietary intake over the past year.

Statistical Analysis

- Age-adjusted incidence rates and relative risks of colorectal, colon and rectal cancers in relation to baseline characteristics were calculated using Poisson regression
- Multivariate-adjusted relative risks (RR) were computed using proportional hazards regression.

Data Collection Summary:

Timing of Measurements

- Dietary intake was assessed at baseline in 1986
- Cancer incidence from was assessed from 1986 to 2000.

Dependent Variables

Colorectal cancer, colon cancer, rectal cancer: Assessed by computer linkage with the State Health registry of Iowa, which includes a SEER cancer registry, and by using ICD codes.

Independent Variables

Glycemic index and glycemic load: FFQ at baseline.

Control Variables

- Age
- Energy
- Activity level
- Multivitamin use
- Diabetes
- Smoking
- Body mass index (BMI)
- Waist-hip ratio (WHR).

Description of Actual Data Sample:

- *Initial N*: 41,836 (completed baseline questionnaire)
- *Attrition (final N)*: 35,197 (after applying exclusion criteria)
- *Mean age*: 61.7 years
- *Ethnicity*: 99% Caucasian
- *Location*: Iowa.

Summary of Results:

Key Findings

- When adjusted for age and energy, there was no association between either glycemic index or glycemic load and incident colorectal cancer. Adjustment for other risk factors or adding other dietary variables to the model did not appreciably change the results. Separate analyses based on colon and rectal subsites were similarly unremarkable
- Stratified analyses stratified by BMI (less than 25, 25 to 30, 30kg/m² or more) showed that

high glycemic index and glycemic load were positively associated with colorectal cancer in the highest BMI category (P for interaction = 0.04 for glycemic index and 0.05 for glycemic load)

- Glycemic load, but not glycemic index, was positively associated with colon cancer in the highest category (P for trend <0.01), whereas glycemic load and glycemic index were both positively associated with rectal cancer in the highest BMI category (P for trend = 0.04 and 0.02, respectively).

Author Conclusion:

There is no overall association between diets with a high average glycemic index or glycemic load and colorectal cancer risk among non-obese, older women, but obese women may have increased risks.

Reviewer Comments:

Author-identified limitations and comments:

- The analysis was based on a single FFQ, which may be imprecise and lead to random error and an underestimation of the true association
- Due to the small number of rectal cancer cases, this analysis had low power
- The population was comprised of primarily Caucasian women 55 to 69 years old, so results may not be applicable to other populations.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes

1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	No
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	No
3.	Were study groups comparable?	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	???
4.4.	Were reasons for withdrawals similar across groups?	N/A

4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	N/A
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes

7.5.	Was the measurement of effect at an appropriate level of precision?	No
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	N/A
8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes