Longitudinal and secular trends in whole grain intake during adolescence: Findings from Project EAT

Teri L. Burgess-Champoux, PhD, RD, LD; Nicole I. Larson, MPH, RD; Dianne Neumark-Sztainer, PhD, MPH, RD; Peter J. Hannan, MStat; and Mary Story, PhD, RD

Division of Epidemiology and Community Health, School of Public Health
University of Minnesota

BACKGROUND

Whole grains and health

- Whole grain foods are rich sources of dietary fiber, vitamins (B-vitamins, vitamin E), minerals (selenium, zinc, copper, magnesium), and phytochemicals (Slavin et al. 2001).
- Substantial scientific evidence suggests an inverse association exists between whole grain intake and risk of coronary heart disease, type 2 diabetes, certain cancers, and obesity (Slavin 2004; Slavin et al. 2001).
- One study has suggested whole grain intake may be related to weight status in adolescents (Steffen et al. 2003).

Current whole grain recommendations and dietary intake

- Recommendation in the United States: Consumption of three whole grain servings per day; “make half your grains whole” (Food Guide Pyramid, 2005 Dietary Guidelines, Healthy People 2010).
- Despite these recommendations, NHANES (1999-2002) data showed that adolescents 12-19 years of age consumed only 0.7-1.0 mean daily servings of whole grain products (Cook and Friday, 2004).
- Major sources of whole grain foods for children and adolescents (2-18 years) include ready-to-eat cereals (30.9%), corn chips (21.7%), and yeast breads (18.1%) (CSFII data; Harnack et al. 2003).

RESEARCH QUESTIONS

- Does whole grain intake for male and female adolescents change longitudinally between early (middle school) to middle adolescence (high school) and from middle (high school) to late adolescence (post high school)?
- Was there a secular change in whole grain intake among adolescent males and females during middle adolescence between the years 1999-2004?
- Was there a secular change in whole grain food sources among adolescent males and females during middle adolescence between the years 1999-2004?

METHODS AND STUDY DESIGN

Project EAT (Eating Among Teens) I and II:

- Study design: Population-based, longitudinal study (N = 2516) in middle schools and high schools in St. Paul/Minneapolis Minnesota.

Study sample:

- Younger cohort (C1): 806 adolescents (366 males and 440 females)
- Older cohort (C2): 710 adolescents (374 males and 336 females)

- Mean age of the younger cohort = 12.8 years
- Mean age of the older cohort = 17.2 years
- Race/ethnicity: 48% White, 19% Black, 19% Asian, 6% Hispanic, 4% Native American, and 4% mixed or other.
- SES: 18% low, 19% low-middle, 27% middle, 23% upper-middle, 13% high

Measures:

- Youth and Adolescent Food Frequency Questionnaire (Rockett et al. 1995)
- Whole grain foods included: hot and cold breakfast cereals, dark bread, kasha/bulgur/couscous, popcorn, and corn chips

Statistical Analyses:

- Mixed-model regressions stratified by gender and adjusted for propensity weights, age, race/ethnicity, SES, and total energy intake were used to estimate and test change (in mean) intake of whole grain servings and total grain servings across time (longitudinal trends) and between the older cohort in 1999 and the younger cohort in 2004 (5-year secular trends).

RESULTS

- Longitudinal trends in whole grain intake during the transition from middle to late adolescence showed a significant increase in mean daily intake in males (0.11 servings) and females (0.06 servings; see figures).
- Secular trends in adolescent intake of whole grain foods during middle adolescence showed a significant increase for males but not females. Major sources of whole grains for this age group were corn chips, ready-to-eat cereals, and yeast breads (see figures).

CONCLUSIONS AND APPLICATIONS

- Favorable shifts in whole grain intake occurred during the transition from middle to late adolescence; however, overall reported whole grain intake (0.7-1.0 servings/day) of adolescents remained far less than the recommended levels (3.0 servings/day).
- Food choice behaviors change for adolescents during these developmental transitions (early to late adolescence). Incorporation of whole grain foods into the larger environments of adolescents (i.e. schools and community settings) may have the greatest impact on increasing intake to recommended levels.
- There is a need for behavioral interventions targeting adolescents and their families regarding the importance of whole grain foods as part of a healthy diet.