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Snus use and mortality

Associations, potential mechanisms,
and socioeconomic aspects

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Akademisk avhandling

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Abstract

Snus is a smokeless tobacco product made of a moist powder of ground tobacco. It is used mainly in the Nordic countries, although increasingly popular internationally. The Swedish snus tradition dates back to the seventeenth century, and it is now used daily by about 23% of the male and 6% of the female population. Snus contains high levels of nicotine as well as carcinogenic substances and microorganisms that could potentially cause adverse health effects. The physiological effects of snus use include acutely raised blood pressure and heart rate, and increased cardiac oxygen demand, while the psychological response results in alertness and anxiety reduction. The high nicotine content causes rapid onset of addiction.

Previous research on snus use and health is largely inconclusive, but indicates increased risks of all-cause, cardiovascular and cancer mortality. This thesis aimed to further investigate the health effects of snus use, with a focus on mortality, potential underlying mechanisms, and the impact of socioeconomic factors.

Four original papers form the base of this thesis. The first study was performed on a pooled dataset of eight Swedish cohorts (The Swedish Collaboration on Health Effects of Snus use), including over 169 000 men. We found an increased risk of all-cause (HR 1.28, 95% CI 1.20; 1.35), cardiovascular, and other cause mortality, and indications of raised cancer mortality. The second study was set within an interventional program in northern Sweden (Västerbotten Intervention Programme) and included 46 000 men and women. It showed increased mortality overall (estimates similar to first study), from cardiovascular diseases, and external causes (e.g., accidents and suicide) that remained after controlling for socioeconomic status. We found these associations in groups of varying socioeconomic background (e.g., both basic education and high-income groups), suggesting that increased mortality risks among snus users are not restricted to certain socioeconomic groups.

Studies three and four investigated potential underlying mechanisms that might contribute to increased mortality among snus users, including established cardiometabolic risk factors in study three (the metabolic syndrome and its components: obesity, hypertension, type 2-diabetes and abnormal blood lipids) and more novel risk factors in study four (low-grade inflammation, low vitamin D-concentrations, and altered testosterone levels). The analytical samples were drawn from a long-term follow-up study of around 900 16-year-olds in a municipality in northern Sweden (Northern Sweden Cohort, study three) and more than 6 000 participants in another population-based cohort (the Northern Sweden MONICA study, study four). We found no associations between snus use and established cardiometabolic risk factors, but there was evidence of lower concentrations of inflammatory and vitamin D-status biomarkers in both men and women, and higher testosterone concentrations in men who were currently using snus.

We conclude that snus use is associated with increased all-cause and cardiovascular mortality, and to death by other causes, that may be restricted to external causes. Cancer mortality may also be increased among snus users. The associations cannot be fully explained by differences in socioeconomic status among snus users and non-users. Established cardiometabolic risk factors do not seem to be the main mechanisms behind these associations. Lower inflammatory biomarker levels among snus users may serve as a protective factor, while lower vitamin D-concentrations and increased testosterone levels may be part of an underlying mechanism linking snus use to increased mortality.

Keywords

Snus, smokeless tobacco, Swedish snus, snuff, all-cause mortality, cardiovascular mortality, cancer mortality, cardiovascular risk factors, metabolic syndrome, CRP, 25-hydroxyvitamin D, testosterone

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