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Background: Individuals respond differently to dietary intake leading to different associations between diet and traits. Most studies have investigated large cohorts without subgrouping them.

Objective: The purpose was to identify non-uniform associations between diets and anthropometric traits that appeared to be in conflict with one another across subgroups.

Design: We used a cohort comprising 43,790 women and men, the Danish Diet, Cancer and Health study, which includes a baseline examination at age 50-64 years and a follow-up about 5 years later. The baseline examination involved anthropometrics, body fat percentage, a food frequency questionnaire and information on lifestyle. From the questionnaire data we computed association rules between the intake of food groups and changes in waist circumference and body weight. Using association rule mining on subgroups and gender-specific cohorts, we identified non-uniform associations. The two gender-specific cohorts were stratified into subgroups using a non-linear, self-organizing map based method.

Results: We found 22 and 7 cases of conflicting rules in 8 participant subgroups for different anthropometric traits in women and men, respectively. For example, in a subgroup of women moderate waist loss was associated with a dietary pattern characterized by low intake in both cabbages and wine, in conflict with the association trends of both dietary factors in the female cohort. The finding of more conflicting rules in women suggests that inter-individual differences in response to dietary intake are stronger in women than in men.

Conclusions: This combined stratification and association discovery approach revealed epidemiological relationships between dietary factors and changes in anthropometric traits in subgroups that take food group interactions into account. Conflicting rules adds an additional layer of complexity that should be integrated into the study of these relationships, for example in relation to genotypes.

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