

Dietary Patterns and Food Processing Degree on Components of Metabolic Syndrome in Chinese Adults: A Cohort Study Based on the CHNS Database

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Abstract

Objective: To extend the research perspective from single nutrients or food groups to overall dietary patterns and the degree of industrial food processing, and to systematically evaluate their long-term associations with the incidence of metabolic syndrome (MetS) and its components (central obesity, dyslipidemia, hypertension, and hyperglycemia) in Chinese adults, thereby providing precise evidence for the formulation of more actionable, food system-based chronic disease prevention strategies. **Methods:** This study was based on three waves of follow-up data from the China Health and Nutrition Survey (CHNS) between 2011 and 2018, enrolling 6539 adults aged 18–65 years who were free of metabolic syndrome at baseline. Dietary intake was assessed using consecutive 3-day 24-hour dietary recalls combined with household food weighing. Two core exposure variables were constructed: (1) the “China Healthy Diet Index,” which quantified an individual’s adherence to the “Jiangnan Dietary Pattern” characterized by a high intake of cereals, tubers, mixed legumes, vegetables, fruits, aquatic products, dairy products, and legumes; and (2) the percentage of total energy intake contributed by ultra-processed foods, calculated according to the NOVA food classification system. The outcome events were incident metabolic syndrome and its individual components. Multivariable-adjusted Cox proportional hazards regression models were applied, and restricted cubic splines were fitted to explore potential non-linear dose-response relationships. **Results:** During a median follow-up of 7.4 years, 2016 incident cases of metabolic syndrome were documented. For each standard deviation increase in the Jiangnan Dietary Pattern adherence score, the risk of developing metabolic syndrome was reduced by 11% (HR = 0.89, 95% CI: 0.83–0.95), with particularly significant inverse associations observed for waist circumference, triglycerides, and blood glucose (all P for trend < 0.05). In contrast, the energy share from ultra-processed foods in the cohort rose rapidly from 6.8% at baseline to 11.2%. Compared with participants in the lowest quartile of ultra-processed food consumption, those in the highest quartile had a 33% increased risk of metabolic syndrome (HR = 1.33, 95% CI: 1.18–1.50), demonstrating a clear dose-response relationship (P for trend < 0.001). Notably, the harmful effect of ultra-processed food intake remained robust even after adjusting for the Jiangnan Dietary Pattern score. **Conclusion:** Not only “what to eat” is critical, but “how to eat” and “what kind of foods to eat” also profoundly influence metabolic health. High adherence to the Jiangnan Dietary Pattern, which is rich in plant-based foods and emphasizes light cooking, serves as a significant protective factor against metabolic syndrome, whereas the increasing consumption of ultra-processed foods, independent of traditional nutrients, has emerged as a novel risk factor driving metabolic syndrome. Public health policies should adopt a two-pronged approach: advocating healthy dietary patterns while simultaneously putting forward explicit, restrictive recommendations against the excessive consumption of