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Associations between total cereals, whole grain, carbohydrate intakes and the risk of type 2 diabetes mellitus

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Abstract

Introduction: The associations between grains and carbohydrate intake and type 2 diabetes mellitus are controversial. This study aimed to evaluate the relationship between grains, carbohydrate intakes and the risk of type 2 diabetes mellitus in China.

Materials and Methods: This was a 1:2 (sex/age) matched case-control study, participants were adults. Cases were diabetics diagnosed within 3 months and the controls were without disorder of glucose metabolism. Face-to-face interviews were conducted to collect information on their socio-demographic characteristics, lifestyle factors, and dietary intakes using structured questionnaires. Grains were divided into whole, refined and common grain, and the carbohydrate intake was also calculated. The study participants were divided into quartiles (Q1 (lowest), Q2, Q3, and Q4) by food and nutrients intakes separately. Multivariable conditional logistic regression was used to explore the association of foods and nutrients with type 2 diabetes mellitus after adjusting for potential confounders. Trend test were performed by treating quartiles variables as continuous variables.

Results and Discussion: Our study enrolled 384 type 2 diabetes mellitus patients (males 162, females 222) and 768 controls (males 324, females 444). Multivariable conditional logistic regression analysis(Ver. 21.0; PSS Inc.,Chicago,IL,USA) showed that moderate amount intake of total cereals was inversely associated with type 2 diabetes mellitus. The adjusted OR of the second quartile (Q2, 223g/d) and the third quartile (Q3, 255g/d) were 0.60(95%CI:0.38–0.93) and 0.51(95%CI:0.33–0.79), respectively, compared with the lowest quartile (Q1, 165g/d), but this inverse association was not found in the highest quartile (Q4, 307g/d) and the OR was 0.74(95%CI:0.47–1.15). There was significant negative association between whole grains intake and type 2 diabetes mellitus with the OR of the highest intake 0.48(95%CI:0.31–0.77) compared with the lowest intake($P_{trend} = 0.001$).No association was found between refined grains intake intake and type 2 diabetes mellitus, and neither did common grain intake. Higher carbohydrate intake may have a beneficial effect on type 2 diabetes mellitus. The best effect was found in the second quartile intake (Q2, 264g/d), with an adjusted OR of 0.56 (95%CI:0.37–0.84) compared with the lowest quartile intake (Q1, 220g/d).The OR of Q3 (285g/d) and Q4 (334g/d) were 0.69 (95%CI:0.48–1.00) and 0.66 (95CI:0.44–1.00) respectively(P_{trend} p = 0.017).

Conclusion: Moderate amount of total cereals intake may benefit to type 2 diabetes mellitus, however, much lower and higher intake can increase the risk. Higher intake of whole grains was associated with a lower risk of type 2 diabetes mellitus. Carbohydrate intake was negative associated with type 2 diabetes mellitus.

Conflict of Interest
There is no conflict of interest