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None declared.

Dietary Patterns and Hyperuricemia in Adult Subjects: A Systematic Review and Meta-Analysis of Observational Studies

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Review question / Objective: **Previous studies have shown that dietary patterns were associated with hyperuricemia (HUA). The correlations of dietary patterns with HUA risk remain controversial. To evaluate the association between diet and HUA risk focused on the combination of diet and interaction of nutrients, the present systematic review and meta-analysis was to identify the major dietary patterns and provide an assessment of the association between dietary patterns and HUA risk in adult population. The findings showed that the "Healthy" and "Meat/Western" patterns were significantly related to decreased and increased HUA risk, respectively. We expect that our study will be a useful reference for further studies on dietary factors and may be helpful for developing dietary guidelines for HUA patients.**
Eligibility criteria: **The inclusion criteria were as follows: (a) evaluated the association between dietary patterns and HUA risk in adults; (b) observational study; (c) provided relevant data, including odds ratio (OR), relative risk (RR) or hazard ratio (HR) estimates with 95% confidence intervals (CIs); (d) published in English. The exclusion criteria were as follows: (a) no measure of whole diet (e.g., dietary screeners or individual questions); (b) low-quality studies, duplicate studies, individual case reports and studies without available data.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 08 September 2022 and was last updated on 08 September 2022 (registration number INPLASY202290034).

INTRODUCTION

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focused on the combination of diet and interaction of nutrients, the present systematic review and meta-analysis was to identify the major dietary patterns and provide an assessment of the association between dietary patterns and HUA risk in adult population. The findings showed that the "Healthy" and "Meat/Western" patterns were significantly related to decreased and increased HUA risk, respectively. We expect that our study will be a useful reference for further studies on dietary factors and may be helpful for developing dietary guidelines for HUA patients.

Condition being studied: Hyperuricemia (HUA) is a metabolic disease caused by purine metabolic disorder. With the economic growth and lifestyle styles, the prevalence of HUA was increasing rapidly over the world in recent years. Previous studies demonstrated that HUA was recognized as an important risk factor for some chronic diseases, such as hypertension, diabetes,metabolic syndrome, chronic kidney disease[6] and cardiovascular disease. Moreover, some factors, including genetic, environment and alcohol consumption, especially diet might contribute to the risk for developing HUA. Evidence has indicated that diet and nutrients were critical to the management of HUA. Due to the correlation of diet and nutrients, it might be difficult to identify the specific effect of each aspect of diet and could be partially confounded by the effect of other food ingredients. Nutritional epidemiology studies have reported the association between diet and HUA risk which were mainly paying attention to individual foods and nutrients rather than focusing on the combination of diet and interaction of nutrients. In this context, dietary patterns as a representative of comprehensive dietary variables, examined the diet in relation to chronic diseases and assessed the effect of overall diet. A cohort study showed that adherence to the Mediterranean diet decreased the risk of HUA, and a cross-sectional study indicated that adherence to the 'animal products and fried foods pattern' and 'soyabean products and fruit pattern' were obviously associated with increased and reduced HUA risk, respectively. Whereas, no significant association was found between vegetable and fruit pattern and serum uric acid level in another study among the Taiwanese. Considering the inconsistencies of these results, the effect of dietary patterns on HUA is still unclear. To date, systematic reviews and meta-analysis that can help conclude these researches are also not reported. Therefore, we conduct the systematic reviews and meta-analysis whose aim is to identify the major dietary patterns and provide an assessment of the association between dietary patterns and HUA risk in adult population.

METHODS

Participant or population: Adults over the age of 18.

Intervention: None.

Comparator: None.

Study designs to be included: We searched seven electronic databases up to 31 January 2022 for studies that investigated adherence to the "Healthy" pattern and "Meat/Western" pattern in relation to HUA. Estimates were pool using random-effects models with stratification by observational study, heterogeneity and publication bias were evaluated.

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Information sources: A comprehensive literature search, without restrictions, was conducted up to 31 January 2022 through

PubMed (http://www.ncbi.nlm.nih.gov/pubmed/), Web of Science (http://wokinfo.com/), Cochrane (https://www.cochranelibrary.com/), Embase (https://www.embase.com/), Medicine (https://www.medicine.com/), ScienceDirect (https://www.sciencedirect.com/) and Medline (https://www.medline.com/) databases to determine all the original papers on the correlation of dietary patterns with HUA risk.

Main outcome(s): The meta-analysis included 10 observational studies that identified the "Healthy" and the "Meat/Western" dietary patterns. The "Healthy" pattern was related to decreased the risk of HUA (odds ratio (OR) = 0.73; 95% confidence interval (CI): 0.61–0.88) and significantly reduced the risk in cohort study (OR=0.79; 95% CI: 0.72–0.86) and in Eastern countries (OR=0.79; 95% CI: 0.64–0.98) and Western countries (OR=0.53; 95% CI: 0.30–0.92). The "Meat/Western" pattern was associated with an elevated risk of HUA (OR=1.26; 95% CI: 1.17–1.37) and the correlation still existed in the stratified analysis by study design.

Quality assessment / Risk of bias analysis: The Newcastle-Ottawa Scale was use to assess the quality of studies, which judges each study on three fields: the selection of the study groups; the comparability of the groups; and the determination of the outcome of interest. The scale allowed a range of points from 0 to 9, with higher scores indicating the better quality. No publication bias was detected by the Egger's test in the overall analysis in the meta-analysis on the "Healthy" pattern(p=0.162) and "Meat/Western" pattern (p=0.072).

Strategy of data synthesis: The Cochran's Q statistic based on chi-square test and the I2 statistic were used to assess heterogeneity in results across studies.[29] The I2 statistic yields results ranged from 0% to 100% (I2=0%–25%, no heterogeneity; I2 =25%–50%, moderate heterogeneity; I2 =50%–75%, large heterogeneity; and I2 =75%–100%, extreme heterogeneity).[30] If the probability of publication depends on the results of the study, the meta-analysis results may be biased. The methods of Begg and Mazumdar[31] and Egger et al. [32] were used to examine publication bias. If a potential bias was detected, a sensitivity analysis was further performed to evaluate the robustness of combined effect estimates, as well as the possible effect of the bias, and to correct the bias. A sensitivity analysis was also performed to investigate the impact of a single study on the overall risk estimate by omitting one study per round. In addition, the cumulative meta-analysis was conducted by updating the pooled estimate of the treatment effect each time trial results with a more recent publication date were added. A correlation P-value less than 0.05 was considered statistically significant. The results of the meta-analysis were displayed in the form of a graph with forest plots representing the effect size in OR and the corresponding 95% CIs.

Subgroup analysis: In the "Healthy" pattern meta-analysis, the stratification by study design revealed a significant decreased the risk of HUA in the cohort studies only. Stratifying the analysis by geographic location, the risk of HUA reduced significantly in Eastern countries (OR=0.79; 95% CI: 0.64–0.98) and Western countries (OR=0.53; 95% CI: 0.30–0.92). Furthermore, similar results stratified by geographic area were also displayed in Asia and Europe. However, in the "Meat/Western" pattern meta-analysis, when stratifying the analysis by study design the HUA risk significantly increased in cohort (OR=1.20; 95% CI: 1.12–1.29), cross-sectional (OR=1.39; 95% CI:1.15–1.68) and case control (OR=1.50; 95% CI: 1.21–1.84) studies.

Sensitivity analysis: All the sensitivity analyses indicated the stability of our results and there had been no material modification of the estimates in any single study. When outlier study by Zhang et al. [15] (OR=0.32; 95% CI: 0.19–0.57) was removed from the "Healthy" pattern analysis, the risk estimates changed slightly. Additionally, small change was also observed in the risk estimates when outlier

study by Zhang et al.[20] (OR=1.16; 95% CI: 1.05–1.28) was removed from the "Meat/ Western" pattern analysis.

Country(ies) involved: China.

Keywords: dietary pattern; hyperuricemia; adult; systematic review; meta-analysis.

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