



Body fatness, diabetes, physical activity and risk of kidney stones: a systematic review and meta-analysis of cohort studies

Alberto Trinchieri¹

Received: 17 March 2019 / Accepted: 28 August 2019 / Published online: 10 September 2019
© Springer Nature B.V. 2019

I read with great interest the systematic review of Aune et al. [1] addressed to the association between risk of formation of kidney stones and overweight, diabetes and physical activity level.

The topic is interesting and very relevant to public health as it confirms that urinary stone disease should be considered, in all respects, as an “affluence” disease.

On the other hand, the design of the study and the discussion of its results require to raise some questions about methodology.

The first concerns the regionality of epidemiological observations. The study took into account a limited number of studies from only 3 countries (United States of America, China and Japan) although the major contribution to statistical evidence can be attributed mainly to studies carried out in the United States and China. As is well known the dietary pattern of these two countries is very characteristic and very different from that of all other countries, in particular from that of the countries of the Mediterranean area [2].

On the other hand, obesity is, net of individual or genetic metabolic factors, the result of imbalance between food energy intake and energy expenditure due to physical activity. However, at same level of energy intake, the underlying dietary pattern can be very different in terms of macronutrients and micronutrients. There are evidences that the risk of kidney stone formation is linked to specific dietary patterns, briefly to an increased intake of protein and sodium and a reduced intake of calcium and potassium (reduced consumption of fruit and vegetables). The quantitative increase in food implies an increased intake of those nutrients that are prevalent in each country, specifically protein in the United States and sodium in China. In presence of the same level of energy imbalance and consequent overweight, the effect on the risk factors of formation of kidney stones will

therefore be amplified in some countries compared to other countries whose populations consume more balanced diets with a good supply of fruits and vegetables. Furthermore, the prevalence of obesity varies in different countries and, in particular, morbid obesity is not so widespread outside the United States.

Studies of less degree of evidence show that in countries whose populations consume a Mediterranean diet the prevalence of overweight and obesity is not different in kidney stone formers than the general population [3] and that body mass index is not related to an increased biochemical risk of calcium stone formation, which is more dependent on the renal acid load of the diet [4].

In conclusion, it is questionable to give a universal significance to regional observations, substantiating the scientific hegemony of those countries which have the necessary resources to carry out large-scale studies. Unfortunately the scarce financial resources of the Mediterranean countries do not allow the realization of studies on minor topics such as kidney stones and the data of epidemiological studies aimed at the study of other pathologies more relevant in terms of public health (cancer, cardiovascular disease) are not easy to access for stone researchers.

The second question focuses on the desirability of greater involvement of clinicians in the systematic review process as they may be carrying additional information beyond the epidemiologist or other specialists. In particular, it is questionable to consider renal stone disease as a single entity because it must be distinguished according to the composition of the stone. In particular, uric stone disease that is related to insulin resistance certainly has stronger links with obesity and diabetes.

We should ideally mix the methodological soundness of the medical statistician with the experience in the field of the expert in kidney stones.

✉ Alberto Trinchieri
alberto.trinchieri@gmail.com

¹ School of Urology, University of Milan, Milan, Italy

References

1. Aune D, Mahamat-Saleh Y, Norat T, Riboli E. Body fatness, diabetes, physical activity and risk of kidney stones: a systematic review and meta-analysis of cohort studies. *Eur J Epidemiol.* 2018;33:1033–1047.
2. Zhang R, Wang Z, Fei Y, Zhou B, Zheng S, Wang L, Huang L, Jiang S, Liu Z, Jiang J, Yu Y. The difference in nutrient intakes between Chinese and Mediterranean, Japanese and American diets. *Nutrients.* 2015;7:4661–88.
3. Trinchieri A, Croppi E, Montanari E. Obesity and urolithiasis: evidence of regional influences. *Urolithiasis.* 2017;45:271–8.
4. Esperto F, Miano R, Marangella M, Trinchieri A. Impact of food quantity and quality on the biochemical risk of renal stone formation. *Scand J Urol.* 2018;52:225–9.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.