Adherence to Mediterranean Diet, Dietary Salt Intake, and Susceptibility to Nephrolithiasis

A recent study shows that patients suffering from nephrolithiasis have a lower degree of adherence to the Mediterranean Diet and a higher consumption of salt than those without this pathology and that the combined effect of these unhealthful eating habits significantly increases the risk of NL.

Nephrolithiasis (NL) affects between ten and fifteen percent of the world population and is a significant risk factor for serious complications such as osteoporosis and chronic kidney disease. Epidemiological data suggest that NL incidence is raising worldwide probably because of the spread of unhealthy dietary patterns, in particular diets disregarding the principles of the Mediterranean Diet (MD) and the need to maintain a low salt intake, two measures showing a protective role against NL (1-2).

In a recent article published in Nutrients (3), we evaluated the degree of adhesion to MD and to low salt intake in patients affected by NL and referred to extracorporeal shock wave. We also quantified the relationship between MD adhesion, salt intake and the biochemical risk factors for NL. Lastly, we estimated the impact of the combination of MD adhesion and salt intake on NL risk. To achieve these purposes, we enrolled stone forming patients (SF) from the "Extracorporeal Shock Wave Lithotripsy" Center of Federico II University Hospitals and a group of non-stone forming control subjects (NSF) recruited among chaperones and from employees from both Federico II University and the Sea Hospital in Naples. NSF and SF subjects were matched for age-, sex- and body mass index (BMI). The whole population was enrolled from January 1st, 2018 to December 12th, 2019. Both groups were living in the Campania region, a geographical area featuring a high incidence of NL.

We included only subjects older than 18 years, affected by calcium kidney stones and considered eligible for extracorporeal shock wave lithotripsy. We excluded subjects suffering from primary or secondary hyper/hypoparathyroidism, hyper/hypothyroidism, gout diathesis, chronic diarrheal conditions, body mass index (BMI) higher than 35 Kg/m^2 or lower than 17.5 Kg/m^2, ongoing cancer disease, protein malnutrition, diabetes mellitus, incomplete data collection, and/or no consent to participate.

All the subjects underwent a dietary assessment by two validated questionnaires: MEDI-LITE for MD adhesion (4) and MINISAL for salt intake (5). To evaluate the combined impact of both, the whole population was dichotomized to the median values of both questionnaires. From the combination of the latter, we obtained four groups, that featured as following: high MD adhesion and low salt intake (group A); high MD adhesion but high salt intake (group B); low MD adhesion but low salt intake (group C); low MD adhesion and high salt intake (group D). In the first 48 SF patients sequentially enrolled, we measured the following metabolic risk factors for NL from a 24hour urine collection: sodium, potassium, citrate, ossalate, magnesium, calcium, phosphate and urate.

We included in the analysis 255 SF patients (117; 45.9% males; age 53.1 ± 10.4 years, BMI 27.7 ± 4.97 kg/m^2) and 535 NSF controls (245; 45.8% males, age 55.1 ± 12.7 years, BMI 26.7 ± 4.98 kg/m^2). The SF patients displayed a lower degree of adhesion to MD than NSF (MEDI-LITE scores: 9.71 ± 2.11 vs. 11.55 ± 1.97; $p < 0.01$): at multivariate analysis, for each point of increase in the MEDI-LITE score the risk of NL was reduced by 36%. The SF group also presented a higher salt intake than NSF controls (MINISAL scores: 9.01 ± 1.23 vs. 8.65 ± 1.57; $p = 0.04$): at multivariate analysis, for each point of increase of the MINISAL score the risk of NL raised by 13%. In the combined evaluation of the two dietary factors, group A (high MEDI-LITE score and low MINISAL score) contained more NSF and less SF participants. On the opposite, the subjects in group D (low MEDI-LITE score and high MINISAL score) were mostly represented by SF and less frequently by NSF. Finally, direct relationships were detected between urinary citrate and MEDI-LITE score ($r=0.356$, $p=0.013$), and between MINISAL score and urinary sodium ($r=0.322$, $p=0.026$) and urate excretion ($r=0.322$, $p=0.035$).

In conclusion, the study results indicate that SF patients have a lower degree of adhesion to MD and a higher salt intake then NSF. The combined effect of both unhealthy dietary factors significantly increases the risk of NL. The data support the value of a more intensive action for primary and secondary prevention based on

nutritional recommendations, including both a better adhesion to a Mediterranean dietary pattern and a substantial reduction in dietary salt intake.

Veronica Abate, Università degli Studi di Napoli Federico II

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