ORAL SESSION

ORAL SESSION 7B:
LIFESTYLE CHANGES/LIPIDS/SALT

SODIUM AND POTASSIUM INTAKE IN THE REPUBLIC OF MOLDOVA: A NATIONAL SURVEY

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Objective: In Moldova, cardiovascular disease is the main cause of morbidity and mortality. High blood pressure is the leading risk factor for the CVD burden. It is common habit in Moldova to add salt to food at the table and when cooking and to eat processed food. The aim was to measure population salt consumption, potassium and iodine in a random sample of men and women.

Design and method: A population survey was carried out in three steps: questionnaire survey, physical measurements and 24 h urine collections. The sample was selected with a stratified probabilistic method from the nationally representative master sample of the National Bureau of Statistics. From 1,950 households and individuals selected from the sampling frame, 1,307 (67%) provided suitable data for inclusion. Of these 449 (34%) were excluded during quality control check on completeness of urine collections. The final sample was of 858 participants (66% of the suitable sample), 326 men and 532 women, age 18–69 years.

Results: Mean urinary sodium (Na) was 173 [79] mmol/24 h, higher in men than women (184 [86] vs 166 [74] mmol/24 h, $p < 0.01$) and higher in rural than urban areas (180 [80] vs 160 [76] mmol/24 h, $p < 0.001$). Na excretion was equivalent to a mean salt consumption of 10.8 [4.9] g per day. Men consumed more salt than women (11.5 [5.4] vs 10.3 [4.6] g per day; $p = 0.001$). Salt consumption was higher in rural than urban areas (11.3 [5.0] vs 10.0 [4.8] g per day, $p < 0.001$). Only 11.3% had a salt consumption of 5 g per day or less; in rural areas the proportion was lower (10.0%) than in urban areas (13.5%). Mean urinary potassium (K) excretion was 73 [31] mmol/24 h, higher in men than women (76 [33] vs 71 [30] mmol/24 h, $p = 0.02$).The proportion of participants consuming adequate amounts of K (>90 mmol per day) was 49.7%, higher in men than women (52.5% vs 47.9%). 41% of the population have adequate iodine intake, whilst 29% are still deficient (only 2.9% severely) and 30% have excessive intake.

Conclusions: In the Republic of Moldova, salt intake is high and K intake is low.

CARDIORESPIRATORY FITNESS AND HEART FAILURE INCIDENCE IN HYPERTENSIVE PATIENTS

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Objective: Hypertension (HTN) is one of the most common risk factors for congestive heart failure (HF). Evidence suggests that increased cardiorespiratory fitness (CRF) may attenuate the risk of CHF in the general population. However, it is not known if the increased HF risk attributed to HTN can be attenuated by increased CRF. The hypothesis was that improved CRF will attenuate the risk of HF in hypertensive patients.

Design and method: We studied a total of 9,070 hypertensive men (mean age 59.5 ± 10.5) underwent routine exercise tolerance testing. None of the patients had a diagnosis of HF at baseline. Participants completed a maximal exercise tolerance test (ETT) as a part of clinical evaluation and Metabolic equivalents (METs) were estimated based on the peak exercise time and treadmill grade. We established four fitness categories based on age-stratified quartiles of peak metabolic equivalents (MET) achieved: Least-fit (4.4 ± 1.2 METs; n = 2,108); Low-Fit (6.6 ± 1.2 METs; n = 2,926); Moderately-Fit (7.9 ± 1.3 METs; n = 2,423); and Highly-Fit (10.6 ± 2.2 METs; n = 2,076). Cox proportional hazard models were applied after adjusting for age, BMI, race, family history of CV disease, CV/antihypertensive medications, and risk factors. P-values < 0.05 using two sided tests were considered statistically significant.

Results: During a mean follow-up period of 11.9 ± 6.5 (median 11.8), there were 1,216 incidences of CHF (12.7%) or 11.2 events per 1000 person-years of follow-up. The association between new onset CHF risk and fitness was inverse and graded. For every 1-MET increase in exercise capacity, the risk was lowered by 14% (HR = 0.86; CI: 0.84–0. 89; $p < 0.001$). When compared to the individuals in the Least-Fit category, the risk for developing CHF was progressively lower, ranging from 33% (HR = 0.67; CI: 0.58–0.78; $p < 0.001$) for the next fitness category (Low-Fit) to 44% (HR = 0.56; CI: 0.48–0.65; $p < 0.001$) for the Moderately-Fit and 62% those in the highest fitness category (HR = 0.38; CI: 0.32–0.46; $p < 0.001$).

Conclusions: Increased CRF modulates the risk of developing HF in hypertensive patients. The CRF-HF association is independent, inverse and graded. For every 1-MET increase in exercise capacity, the HF risk was lowered by 14%.

SHORT-TERM CHANGES IN DIETARY SODIUM INTAKE INFLUENCE SWEAT SODIUM CONCENTRATION AND MUSCLE SODIUM CONTENT IN HEALTHY SUBJECTS

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Objective: There is increasing evidence that sodium can be stored in the skin and muscles without being osmotically active, yet whether acute changes in dietary sodium intake alter sweat and muscle sodium content has not been investigated previously.

Design and method: In a cross-over design, we assessed muscle sodium content by 23Na magnetic resonance imaging (MRI) in 38 healthy normotensive volunteers (aged 33.5 ± 11.1 years, 76.3% female) after 5 days of high sodium diet (HS) (6 g of salt added to their normal diet) and 5 days of a low-sodium diet (LS). Women performed each study visit during the same phase of the menstrual cycle. In a sub-group of 18 participants (72.2% female) we conducted quantitative pilocarpine iontophoretic sweat collections and measured the sodium concentration in sweat. Office blood pressure, electrolytes, creatinine and circulating aldosterone levels were measured in all participants, and 24 h urine was collected

Results: Under HS conditions urinary sodium excretion, muscle sodium content and sweat sodium concentration all increased significantly (see Figure). Muscle sodium content by MRI (rm = 0.47, p = 0.03) and sodium sweat concentration (rm = 0.72, $p < 0.001$) correlated positively with salt intake as estimated by 24-hour urine sodium excretion. Age, gender or the phase of the menstrual cycle did not influence muscle or sweat sodium concentrations or their changes.
In contrast, plasma aldosterone levels were strongly and negatively associated with both muscle sodium content (rs = –0.42, p = 0.0001) and sweat sodium (rs = –0.52, p = 0.002). Sweat and muscle sodium content were not different in participants with a salt-sensitive blood pressure compared to non-sensitives.

Conclusions: Muscle and sweat sodium concentrations are significantly higher under high salt conditions in healthy male and female subjects, suggesting that muscle and sweat play a role in the dietary sodium balance in humans.

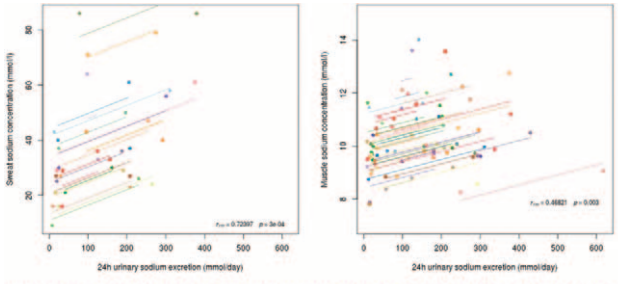

Figure . Repeated measures correlation between sweat and muscle sodium concentration and 24h urinary sodium excretion. Each dot represents a single observation for a participant. Observations from the same participant at different times are given the same color, with corresponding lines to show the common linear fit for each participant.

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