RESEARCH MADE SIMPLE

Hydrogen-rich water and metabolic syndrome

A clear summary of a 24-week randomised, double-blind, placebo-controlled trial

The short answer: Several metabolic risk markers improved after 24 weeks. Compared with placebo, high-concentration hydrogen-rich water was associated with lower fasting glucose, HbA1c, triglycerides, total cholesterol and several inflammation and oxidative-stress markers. The trial was encouraging, but small and not evidence that hydrogen water treats or prevents diabetes or cardiovascular disease.

How was the study organised?

60 participants 30 men and 30 women of Indian ethnicity; mean age about 43; all met at least three metabolic-syndrome criteria	Two equal groups High-concentration hydrogen-rich water: 30 Matched placebo drink: 30
24 weeks Randomised and double-blind; all 60 participants completed the study	Hydrogen protocol One tablet in 250 mL water, three times daily; more than 5.5 mmol H2 per day (over 11 mg)

Participants were asked to maintain their lifestyle. Food, alcohol, tobacco and physical activity were recorded in diaries and assessed by a dietitian. Measurements were taken at baseline and at 24 weeks; there were no intermediate follow-ups.

What did the study find?

Outcome	Hydrogen group: baseline to week 24	Compared with placebo
Blood sugar	Fasting glucose: 121.5 to 103.1 mg/dL. HbA1c: 5.8% to 5.1%.	Both treatment-by-time differences were significant (P<0.01 and P<0.001). Placebo glucose rose slightly and HbA1c changed little.
Blood fats	Total cholesterol: 187.7 to 169.2 mg/dL. Triglycerides: 189.8 to 142.4 mg/dL.	Both improved significantly versus placebo. LDL did not reach significance (P=0.06); HDL fell slightly in the hydrogen group.
Inflammation	TNF-alpha: 4.8 to 3.9. IL-6: 1.9 to 1.6. CRP changed only slightly after rounding.	Treatment-by-time differences favoured hydrogen for all three reported inflammatory markers (P<0.05).
Oxidative balance	MDA and diene conjugates decreased; vitamins C and E increased.	These differences favoured hydrogen (P<0.001). TBARS did not differ significantly (P=0.31).
Body measures / pulse	BMI: 28.9 to 28.2 kg/m2. Waist-to-hip ratio: 1.00 to 0.99. Resting heart rate: 86 to 83 bpm.	Small but statistically significant treatment-by-time differences were reported.
Safety	All participants completed the trial; both drinks were described as well tolerated.	No ill effects were reported, although the paper gives limited detail on active safety monitoring.

WHAT THE RESULTS REALLY MEAN

Encouraging risk-marker changes - not proof of disease prevention

Why the findings matter

This was a six-month human trial with randomisation, a matched placebo and balanced numbers of men and women. Several related measures - glucose control, triglycerides, inflammation and oxidative balance - moved in a favourable direction.

The fall in mean fasting glucose and HbA1c is potentially relevant, but averages do not show how many individuals improved or whether medication needs changed.

What metabolic syndrome means

Metabolic syndrome is a cluster of risk factors such as abdominal obesity, raised blood pressure, high glucose, high triglycerides and low HDL. Improving laboratory risk markers is useful, but it is not the same as proving fewer cases of diabetes, heart attack or stroke.

Important limitations

• Only 60 participants from one Indian clinical setting; results may not generalise broadly.
• Many outcomes were tested, with no clearly stated single primary endpoint; this raises the chance of positive findings occurring among multiple comparisons.
• Only baseline and week-24 measurements were analysed, so the timing and durability of changes are unknown.
• Some baseline variables were already different or borderline different between groups, including diene conjugates, nitrite and waist-to-hip ratio.
• Lifestyle diaries were collected, but comparative diet and activity results were not reported.
• Background medication use and medication changes were not clearly detailed.
• No clinical outcomes such as new diabetes or cardiovascular events were measured.
• The tablet manufacturer partly funded the study and supplied the products; one author reported hydrogen-related speaking and consultancy fees.

Best interpretation

High-dose hydrogen-rich water was associated with improvements in several metabolic and inflammatory biomarkers over 24 weeks. This supports larger independent trials, but it should be described as a possible adjunct to - not a replacement for - diet, exercise and prescribed medical care.

Quick glossary

HbA1c	An estimate of average blood glucose over roughly the previous two to three months
Triglycerides	A type of fat in the blood; persistently high levels are one metabolic risk factor
CRP / cytokines	Blood markers associated with inflammation; they do not diagnose a specific illness by themselves
Treatment-by-time	Whether the groups changed differently over the study, rather than whether one group changed on its own

Original study LeBaron TW, Singh RB, Fatima G, et al. The Effects of 24-Week, High-Concentration Hydrogen-Rich Water on Body Composition, Blood Lipid Profiles and Inflammation Biomarkers in Men and Women with Metabolic Syndrome: A Randomized Controlled Trial. Diabetes, Metabolic Syndrome and Obesity. 2020;13:889-896. Read the full original study | DOI: 10.2147/DMSO.S240122

Educational summary only. Molecular hydrogen is still being researched and should not be presented as a treatment, cure or substitute for medical care. Anyone with metabolic syndrome should follow advice from their healthcare professional.