## Condensed Version and key points from the study:

# 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

**Study Design**

- A randomized, double-blinded, placebo-controlled trial with 60 participants (30 men, 30 women) of Indian ethnicity, average age ~43, all diagnosed with metabolic syndrome.
- Participants consumed high-concentration hydrogen-rich water (HRW) — over 5.5 millimoles of $H_2$ per day via dissolving tablets — for 24 weeks, compared to an indistinguishable placebo.

**Blood Sugar & Metabolic Results**

- Fasting blood glucose dropped from ~121.5 mg/dL to ~103.1 mg/dL in the HRW group, effectively moving the average from the upper to the lower range of prediabetic criteria.
- HbA1c (a long-term blood sugar marker) was reduced by approximately 12%.

**Lipid Profile Results**

- **Total cholesterol was significantly reduced** by roughly 18.5 mg/dL, and triglycerides fell by approximately 47 mg/dL, while the placebo group saw no meaningful change.
- **The ratio of total cholesterol to HDL improved** by about 7.2%, and the triglyceride-to-HDL risk ratio dropped by 22.9% in the HRW group.

**Inflammation & Oxidative Stress**

- **Key inflammatory markers** — TNF-α, IL-6, and CRP — were all significantly reduced in the HRW group compared to placebo.
- **Oxidative stress markers** (MDA and diene conjugates) decreased, while antioxidant vitamins E and C increased in the HRW group.

**Body Composition**

- HRW produced a mild but statistically **significant reduction in BMI** and waist-to-hip ratio, while the placebo group showed no change.

Safety

- All 60 participants completed the trial, and both interventions were well tolerated with **no reported adverse effects.**

Conclusion

- The authors concluded that long-term, high-concentration HRW may serve as a useful adjunct therapy for reducing metabolic syndrome risk factors, and suggest larger prospective trials are warranted.

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