Lower-sodium salt substitutes: premature public health strategy or promising adjunct?

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Lower-sodium salt substitutes (LSSS), typically composed of sodium chloride (NaCl) partially replaced with potassium chloride (KCl), have been promoted as a scalable intervention to reduce cardiovascular morbidity and mortality. By simultaneously lowering sodium intake and increasing potassium intake, LSSS are positioned as a dual-mechanism strategy for blood pressure reduction [1]. While evidence suggests that LSSS can reduce blood pressure and may improve cardiovascular outcomes [2–5], their translation into nationwide public health policy remains contested. Current recommendations advocating systematic implementation risk overstating the certainty, generalizability, and mechanistic clarity of the available evidence.

Xu *et al.*'s Australian Consensus Statement recommends prioritizing LSSS as a scalable public health intervention and supports its integration into future hypertension management guidelines [6]. However, this dual framing, positioning LSSS as both a population-wide intervention and an individualized clinical tool, reveals conceptual ambiguity. Public health interventions require broad applicability and minimal clinical gatekeeping, whereas clinical hypertension management necessitates patient-specific risk assessment. The tension between these approaches raises questions about feasibility and coherence in implementation strategy.

Furthermore, the strength of evidence underpinning these recommendations warrants scrutiny. The World Health Organization classifies its recommendation on potassium-enriched salt substitutes as conditional, supported by moderate-to-low certainty evidence [1]. Emphasizing guideline endorsement without contextualizing the grading of evidence may inadvertently imply a stronger consensus than currently exists [2]. While large-scale trials, most notably the Salt Substitute and Stroke Study (SSaSS) [5] and the Peruvian community-based trial [3], demonstrate reductions in blood pressure and, in the case of SSaSS, improvements in cardiovascular outcomes, the mortality data derive predominantly from a single large Chinese trial [5,6]. Reliance on one major study limits confidence in global generalizability [6].

Applicability is further complicated by regional differences in dietary sodium sources [7]. In settings such as rural China, where discretionary salt use [with a dominant use of mono-sodium glutamate (MSG)] contributes substantially to sodium intake, salt substitution may reduce sodium exposure. In contrast, in many Western countries, most sodium consumption originates from processed and commercially prepared foods. In these contexts, household salt replacement may exert comparatively modest effects on overall sodium intake, potentially limiting population-level impact. Without context-specific implementation modelling and effectiveness data, nationwide rollout in Western settings may be premature [6,8].

Mechanistic ambiguity further complicates policy alignment. The antihypertensive effects of LSSS are frequently attributed to the combined effects of sodium reduction and potassium supplementation. However, closer examination of trial data suggests that sodium reductions have often been smaller than anticipated [6,8]. In SSaSS, the salt-substitute group demonstrated only modest reductions in sodium intake relative to expectations based on formulation [2,6,8]. Similarly, in the Peruvian trial [3], significant increases in potassium intake were observed without statistically significant reductions in sodium [8]. These findings raise the possibility that blood pressure reductions may be driven predominantly by increased potassium intake rather than meaningful sodium reduction [2,6,8].

If the principal benefit of LSSS is a higher potassium intake rather than sodium reduction, positioning LSSS primarily within sodium-reduction policy frameworks may represent a policy misalignment. This distinction is not trivial: sodium-reduction strategies aim to restructure food systems and reduce population exposure to excess sodium, whereas potassium supplementation approaches focus on nutrient supplementation [9]. Clearer articulation of the dominant mechanism is necessary to determine the most appropriate policy domain.

Safety considerations introduce additional complexity. The risk of hyperkalemia is frequently described as minimal, with trials and meta-analyses reporting no significant increase in adverse outcomes [6]. However, most high-risk individuals, including those with advanced chronic kidney disease or on potassium-sparing medications, were excluded from major trials [1,3,5–6]. Consequently, the absence of observed harm may reflect selective study populations rather

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than confirmed safety across real-world populations. The same consensus statements that advocate nationwide implementation simultaneously recommend individual clinical assessment [6], including kidney function testing and medication review, before use in patients with hypertension. Such requirements inherently constrain scalability and undermine the feasibility of universal adoption.

From an intervention development perspective, as articulated in Wight *et al.*'s Six Steps in Quality Intervention Development (6SQuID)[10], gaps remain in external validity, context-specific modelling, and harm evaluation. While efficacy has been demonstrated in selected populations [6], broader effectiveness, safety in high-risk groups, and implementation feasibility in processed-food-dominant dietary environments remain insufficiently addressed. Premature scaling without resolving these uncertainties risks policy overreach [2,8].

None of these concerns negate the potential value of LSSS. Increasing dietary potassium and reducing sodium intake are well-established strategies for lowering blood pressure and reducing stroke and cardiovascular disease risk [11–12]. LSSS may ultimately prove to be a pragmatic tool within hypertension management. However, current evidence does not yet justify unqualified, systematic nationwide implementation, particularly in Western populations or among individuals at elevated risk of hyperkalemia [6].

Future research should prioritize inclusion of high-risk populations, and context-specific implementation modelling. Policymakers must also determine whether LSSS are most appropriately situated within sodium-reduction frameworks, potassium supplementation strategies, or targeted clinical interventions. Until these questions are resolved, cautious, context-sensitive integration may be more appropriate than broad public health mandate.

Conflicts of interest

There are no conflicts of interest.

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