

# Mouth Rinsing with Solutions of Different Taste Properties as an Ergogenic Aid in Team Sports: A Systematic Review of the Literature

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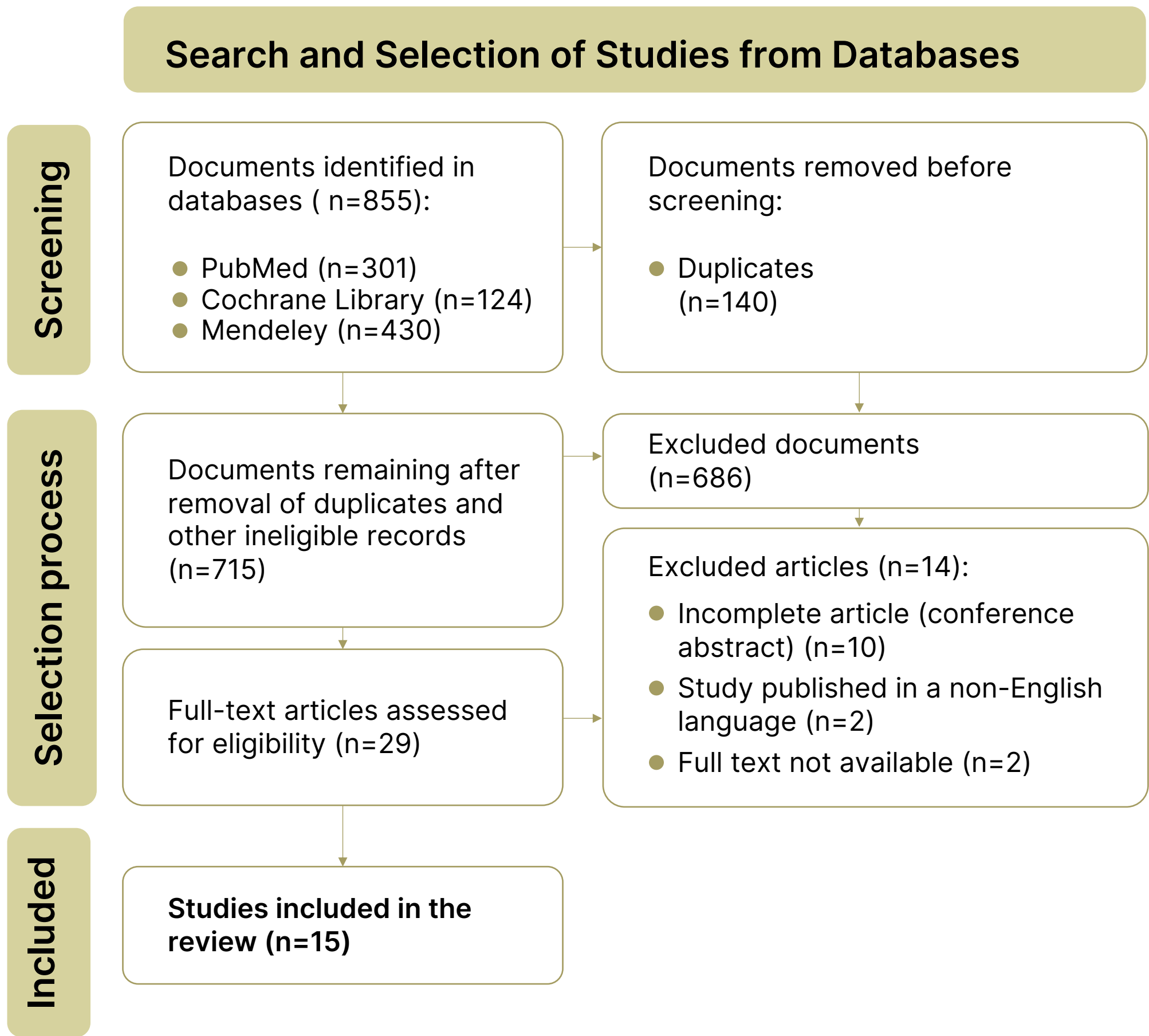


## Objective:

To study the effects of mouth rinsing with solutions of different taste characteristics on performance indicators and internal load parameters in team sport athletes.

## Data Sources:

A systematic review was conducted according to PRISMA guidelines with pre-defined PICOS criteria. Publication searches were performed in the Cochrane Library, PubMed, and Mendeley databases. Study quality was assessed using the Cochrane risk-of-bias tool for randomized trials (RoB2).



## Main Results:

Fifteen studies involving 246 team sport athletes met the inclusion criteria, all with a low risk of bias. Carbohydrate-based solutions (CHO MR) were the most commonly studied (n=8), followed by carbohydrate-caffeine solutions (CHO + CAF MR, n=3), caffeine-based solutions (CAF MR, n=2), menthol-based solutions (MEN MR, n=2), and capsaicin-based solutions (CAP MR, n=1). Key performance outcomes included speed-strength parameters, external and internal load, repeated sprint ability, endurance, perceptual skills, and thermal sensation. CHO MR showed no ergogenic effect when used before physical activity but demonstrated significant positive effects on speed-strength parameters and internal load when used during training. CHO + CAF MR or CAF MR improved speed-strength, perceptual skills, and external and internal load parameters when used pre-activity but had no ergogenic effect during training. MEN MR positively influenced thermal sensation when used during physical activity. CAP MR, evaluated in only 1 study, showed no significant effects on performance or thermal sensation. None of the studies reported adverse effects or negative impacts on performance, internal, or external load for any solution type.



	D1	D2	D3	D4	D5	Overall
Bortolotti et al., 2013	●	●	●	●	●	●
De Oliveira et al., 2019	●	●	●	●	●	●
De Oliveira et al., 2020	●	●	●	●	●	●
Karayigit et al., 2017	●	●	●	●	●	●
Nyman et al., 2022	●	●	●	●	●	●
Pribyslavska et al., 2015	●	●	●	●	●	●
Rollo et al., 2015	●	●	●	●	●	●
Nehme et al., 2022	●	●	●	●	●	●
Gough et al., 2022	●	●	●	●	●	●
Dolan et al., 2017	●	●	●	●	●	●
Bataineh et al., 2017	●	●	●	●	●	●
Viridinli et al., 2022	●	●	●	●	●	●
Taheri et al., 2023	●	●	●	●	●	●
Gibson et al., 2019	●	●	●	●	●	●
Jerram et al., 2023	●	●	●	●	●	●

Domains:  
D1: Bias arising from the randomization process  
D2: Bias due to deviations from intended intervention  
D3: Bias due to missing outcome data  
D4: Bias in measurement of the outcome  
D5: Bias in selection of the reported result

Judgment:  
● Some concerns  
● Low

## Conclusions:

Mouth rinsing with carbohydrate solutions during physical activity and caffeine or carbohydrate-caffeine solutions before physical activity **can be used as ergogenic aids to enhance performance in team sport athletes**. Mouth rinsing with **menthol** solutions during physical activity **improves thermal sensation**. Further research, particularly involving professional athletes, is needed to develop precise recommendations.

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