

## RESEARCH

# Compared with fresh *injera*, stale *injera* increases satiety in healthy subjects, but does not decrease the glycemic index

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**Funding information**

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**Abstract**

**Background and Objectives:** The impact of food structure on postprandial physiological responses has received sustained attention in recent years. Changes in the glycemic response and satiety score to commonly consumed starchy foods may have a positive impact on health. However, no data on Ethiopian staple foods has been reported. This study aimed at investigating the effects of structural changes in *injera* (stale and fresh with similar macronutrient content) on glycemic and satiety responses in 10 healthy subjects during 2 h in a randomized cross-over design.

**Findings:** With increasing hardness, stale *injera* had a marked higher satiety index (iAUC =  $407 \pm 14$ ;  $p = .001$ ) than fresh *injera* (iAUC =  $333 \pm 18$ ). Besides, stale *injera* had a slightly, but not significant, lower glycemic index (GI) than fresh *injera* (stale,  $35.9 \pm 3.6$ ; fresh,  $40.2 \pm 3.0$ ).

**Conclusions:** *Injera* staling increased satiety but not glycemic response, and may provide a simple means for improving its health potential.

**Significance and Novelty:** The effect of *injera* staling on satiety/glycemic responses has never been studied before. *Injera* is a staple food in Ethiopia, eaten several times a day. Therefore, stale *injera* may help reducing food intake of subsequent unhealthy foods through increased satiety.

**KEYWORDS**

fresh *injera*, glycemic response, satiety, stale *injera*

## 1 | INTRODUCTION

Designing and processing starchy foods to promote weight loss and minimize the risk of chronic diseases is an important research topic (Fardet, 2015). Controlling the quantity and quality of consumed carbohydrates is especially important (Dereje et al., 2019). Changes in the glycemic response and satiety of commonly consumed starchy foods have been proven to have favorable impacts on health, notably diabetes (Brand-Miller et al., 2003). The increased frequency of food consumption with the habit of snacking, outside home, and increased ultra-processed food consumption may contribute to the

increasing prevalence of obesity and type 2 diabetes (Askari et al., 2020; Moradi et al., 2021). Following the expansion of food processing companies, unequal economic distribution and urbanization in Ethiopia, there is a high risk of poor dietary habits (Wolle et al., 2020). Thus, identifying satiety-increasing and/or glycemic-lowering food-related factors may help reduce some metabolic diet-related disorders.

Glycemic index (GI) is an in vivo measure of the relative impact of carbohydrate-containing foods on postprandial blood glucose whereas glycemic load (GL) is defined as the product of the GI value of food and its carbohydrate content. GL incorporates both the quality