

Gluten hydrolysing bacteria from Tilapia: a ray of hope in gluten intolerance

Snehal Gagare^{1,*}, Radhika Shevale¹, Anushka Walupante¹ and Sanjay Kharat²

¹Department of Biotechnology, Modern College of Arts, Science, and Commerce, Ganeshkhind, Pune 411 016, India.

²Department of Zoology, Modern College of Arts, Science and Commerce, Ganeshkhind, Pune 411 016, India.

Gluten intolerance can be recognised as an emerging health concern. Currently, there are few, if any, medications available to mitigate gluten intolerance symptoms, prompting the search for effective natural alternatives. Recent studies have demonstrated the significant potential of probiotic bacteria that hydrolyse gluten in alleviating symptoms of gluten intolerance. This study aims to evaluate the gluten-hydrolysing ability of five bacterial isolates from Tilapia (*Oreochromis niloticus*) and assess their in vitro probiotic attributes. Biochemical and molecular characterisation identified the isolates as *Bacillus licheniformis* (L1), *Bacillus tequilensis* (G1), *Lactococcus lactis* (G5), *Enterococcus faecium* (G7) and *Weissella confusa* (G9). All isolates were capable of surviving a wide pH range (3–9) and exhibited surface hydrophobicity and auto-aggregation properties. Furthermore, according to Clinical and Laboratory Standards Institute (CLSI) criteria, the isolates were susceptible to most of the tested antibiotics. The study concludes that the five isolates from Tilapia can hydrolyse gluten and possess essential probiotic properties, suggesting their potential as probiotic supplements for individuals with gluten intolerance.

Keywords: *Bacillus tequilensis*, gluten intolerance, health supplements, *Oreochromis niloticus*, probiotic.

been documented in the group where the autoimmune and allergic processes were not fully understood⁴. They were referred to as NCGS as a group. The term 'non-celiac gluten sensitivity', or NCGS, has received more attention recently⁵.

Gluten sensitivity is a relatively new condition with a broad range of symptoms. Patients specifically report extraintestinal signs and symptoms resembling irritable bowel syndrome (IBS) that start soon after consuming gluten. When gluten is eliminated from the diet, symptoms get better or go away, and they return when gluten is added back⁶.

The present study aims to develop alternative or supplementary treatments to a gluten-free diet. These include the use of probiotics, prolyl endopeptidase (PEP) and the suppression of tTG7. Probiotic bacteria with gluten-hydrolysing properties show significant promise in alleviating symptoms of gluten intolerance^{8,9}. Recent studies have investigated the gluten hydrolysis capacity and probiotic potential of *Lactobacillus brevis* KT16-2, isolated from artisanal cheese, for treating gluten intolerance¹⁰. Probiotic strains of *Bifidobacterium* and *Lactobacillus* have also been shown to be effective components of the gut microbiota¹¹.

Emerging research indicates that fish bacterial communities are a crucial source of probiotic bacteria with bacteriocinogenic potential¹². Tilapia (*Oreochromis niloticus*), a cichlid freshwater fish native to northern Africa and the southwestern Middle East, is now farmed extensively worldwide, including in India. Tilapia is highly significant in aquaculture, ranking among the top ten introduced