

# Comparative Analysis of A-Gliadin Gene Sequences for Celiac Disease Eliciting Epitopes in Old and Modern Indian Wheat Cultivars

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**Abstract** Prevalence of celiac disease (CD) has increased dramatically in the last 50 years in many countries including India where 5-8 million people are expected to have CD. The present investigation was planned to study if the modern wheat breeding strategies have modified CD eliciting epitopes of the  $\alpha$ -gliadin genes in wheat varieties which might be contributing towards increased incidence of CD. Wheat varieties released/cultivated in the period 1905-1965, 1966-1995 and 1996-2011 were selected for studying  $\alpha$ -gliadin gene sequences to assess the potential for causing CD. The study involved isolation and sequencing of  $\alpha$ -gliadin genes in old and modern wheat varieties followed by comparative *in silico* analysis of the T-cell stimulatory epitopes of the  $\alpha$ -gliadin genes. A lot of variation for the  $\alpha$ -gliadin gene sequences especially in the T-cell stimulatory epitopes  $\text{glia-}\alpha 9$ ,  $\text{glia-}\alpha 20$ ,  $\text{glia-}\alpha 2$  and  $\text{glia-}\alpha$  was observed in different wheat varieties. The old wheat varieties released in the period 1905-1965 had more variation in the epitopic regions. Modern varieties released between 1995-2011 had higher proportion of the intact T-cell stimulatory epitopes. We identified four wheat genotypes namely, C591, C273, 9D and K78 which have much lower load of the epitopes having potential to cause CD. Thus presence of non-immunogenic T-cell stimulatory epitopes in the old wheat cultivars envisage that it might be possible to find a safe wheat variety for CD patients subsequent to screening a much larger set of wheat cultivars released in different breeding programmes globally.