

Original Article

Immunohistochemical evaluation of glutaminase-1 enzyme in oral squamous cell carcinoma

Madhuri Shital Chougule,¹ B.R. Patil,³ Vijayalakshmi S. Kotrashetti,⁴ Priya S. Joshi,¹ Ashwini Mane Patil² and Suraj B. Pawar[#]

*Department of Oral Pathology and Microbiology, Vasantdada Patil Dental College and Hospital, Sangli, ²Department of Pathology, *Kolhapur Cancer Center, Gokul Shirgaon, Maharashtra, ³Karnataka Cancer Therapy and Research Institute, Hubballi and ⁴Department of Oral Pathology and Microbiology, Maratha Mandal's Nathajirao G. Halgekar Institute of Dental Sciences, Belgavi, Karnataka, India*

Received September 26, 2025; Accepted December 4, 2025; Published May 16, 2026

Background and objectives: Malignant cells reprogram their metabolism. Glutamine is a major biosynthetic precursor apart from glucose in various cancers. Glutaminase 1 (kidney type) is the rate limiting enzyme in glutamine metabolism, which is increased in cancers of prostate, breast, colorectum, ovary and oral squamous cell. We aimed to evaluate the intensity and extent of immunohistochemical expression of glutaminase1 in various grades of oral squamous cell carcinoma (OSCC) and investigate whether any association exists between the glutaminase 1 expression with staging, grading and tumour infiltrating lymphocytes.

Methods: This retrospective analysis included 98 formalin-fixed, paraffin-embedded tissue blocks of clinically and histopathologically confirmed cases of OSCC. One section was stained with haematoxylin and eosin and the other, immunohistochemically for glutaminase 1 (GLS1). Staging, grading, tumour infiltrating lymphocytes were evaluated for their relation with GLS1 immunoscore.

Results: Statistically significant association was noted between GLS1 immunointensity ($P<0.001$) immunoextent ($P<0.001$) and the immunoscore ($P=0.007$) with the worsening grades of OSCC. There was no significant association between TNM staging ($P<0.61$) and tumour infiltrating lymphocytes with GLS1 immunoscore ($P=0.30$).

Interpretation and conclusions: Glutaminase 1 expression increases with worsening grade of OSCC signifying an altered metabolic phenotype as the cancer cells lose differentiation.

Keywords Cancer metabolism; Glutaminase 1 expression; Oral squamous cell carcinoma; TNM staging; Tumour grade; Tumour infiltrating lymphocytes