



SMART DENTAL UPDATES

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you “**SMART DENTAL UPDATES**” which contains latest and interesting news in the field of Dentistry.

This issue contains

- Salivary factors related to caries in pregnancy: A systematic review and meta-analysis
- CYFRA 21-1 and MMP-9 as salivary biomarkers for the detection of oral squamous cell carcinoma: A systematic review of diagnostic test accuracy
- Effect of rapid high-intensity light-curing on polymerization shrinkage properties of conventional and bulk-fill composites

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Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited

Salivary factors related to caries in pregnancy: A systematic review and meta-analysis

Studies have reported a higher incidence of caries during pregnancy. However, caries onset and activity are complex; saliva is a primary modifying factor and alterations in saliva property during pregnancy might explain the increased incidence of caries. These alterations might be related to estrogen effects, dietary changes, oral hygiene habits, and taste changes in pregnancy. The authors of this meta-analysis aimed to assess saliva-related caries risk factors, including calcium and phosphate, hydrogen ion concentration, buffer capacity, *Streptococcus mutans* and *Lactobacillus* counts, flow rate, and decayed, missing and filled teeth index in each trimester during pregnancy.

Interventions and screening for caries prevention in pregnancy should start in the first or second trimesters

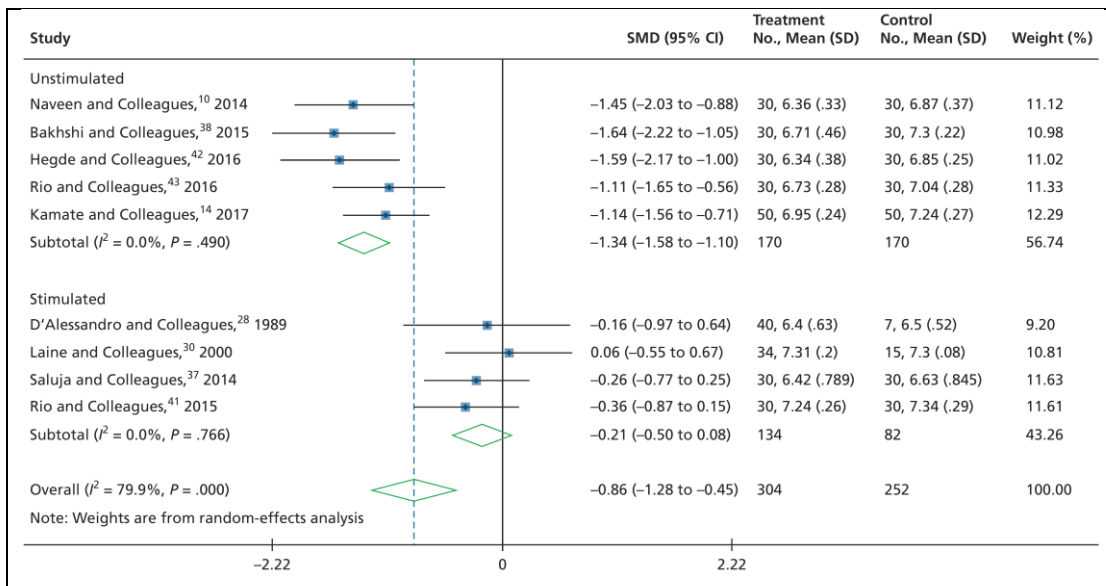
The authors searched electronic databases up to July 1, 2019. Eligible observational studies were included. The authors assessed the quality of the included studies by using the Joanna Briggs Institute scale. To estimate the effects of pregnancy, standardized mean differences with 95% confidence intervals were pooled using the random-effects model. Subgroup analysis and meta-regression were used to explore heterogeneity. Publication bias was assessed using Begg and Egger tests.

Twenty-nine studies were included in the meta-analysis, representing 1,230 pregnant women in the case groups and 715 in the control groups (nonpregnant women). The results showed that salivary calcium concentration decreased in the third trimester, salivary phosphate decreased in the second and third trimesters, saliva hydrogen ion concentration decreased in the first and third trimesters, stimulated saliva flow rate increased in the third trimester, and salivary *S. mutans* count increased in the second and third trimesters. In addition, the results showed that saliva calcium, phosphate, *S. mutans*, and buffer capacity amounts had changed from the first trimester to the third.

Meta-analysis results of salivary biomarkers of caries during pregnancy, the first trimester compared with the third trimester

VARIABLE	NO.	TOTAL SAMPLE, NO.	CASE, NO.	CONTROL, NO.	SMD* (95% CI) [†]	P VALUE FOR SMD = 0	Cochran Q	I ² , %	P VALUE FOR EGGER TEST
Calcium	5	290	145	145	-0.82 (-1.53 to -0.10)	.025	31.69	87.40	.41
Phosphorus, Phosphate	3	130	65	65	-0.82 (-1.64 to 0.01)	.052	9.66	79.30	.26
Hydrogen Ion Concentration	8	528	271	257	-0.27 (-0.84 to 0.30)	.352	70.00	90.00	.47
Buffer Capacity	2	92	46	46	-0.67 (-1.09 to -0.24)	.002	0.81	0.00	NA [‡]
<i>Streptococcus mutans</i> Count	2	120	60	60	1.29 (0.45 to 2.13)	.003	2.85	64.90	NA
Stimulated Flow Rate	4	252	126	126	0.13 (-0.22 to 0.48)	.471	5.44	44.90	.72
Unstimulated Flow Rate	4	300	150	150	0.06 (-0.24 to 0.36)	.690	5.06	40.70	.55
Decayed, Missing, and Filled Teeth Index	3	260	130	130	0.24 (-0.19 to 0.68)	.274	6.20	67.80	.52

* SMD: Standardized mean difference. † CI: Confidence interval. ‡ NA: Not applicable.



Subgroup analysis for salivary pH via saliva collection method in the third trimester compared with control group.

CI: Confidence interval. SD: Standard deviation. SMD: Standardized mean difference.

In the third trimester, most salivary factors related to caries change and can increase the risk of developing caries in the future. Interventions and screening for caries prevention in pregnancy should start in the first or second trimesters.

Source: Yousefi M et al. J Am Dent Assoc. 2020 Aug;151(8):576-588.e4. doi: 10.1016/j.jaime.2020.04.021.

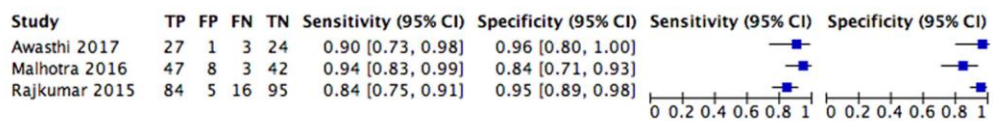
CYFRA 21-1 and MMP-9 as salivary biomarkers for the detection of oral squamous cell carcinoma: A systematic review of diagnostic test accuracy

Many different techniques and tests delivered in a variety of settings are available for the detection of oral squamous cell carcinoma (OSCC). Conventional oral examination performed by a general dental practitioner has traditionally been recommended by various health and medical/dental organizations as a part of oral cancer screening programmes.

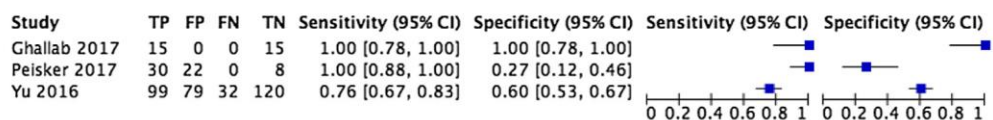
Salivary biomarkers in general may have great potential in the early detection of OSCC and other diseases as well.

Tissue biopsy with histopathological examination is still considered the gold standard to diagnose oral squamous cell carcinoma (OSCC). This systematic review explored the diagnostic test accuracy of two salivary biomarkers in adults suspected of OSCC. The Cochrane Library, MEDLINE, and Embase databases were searched for clinical studies evaluating the diagnostic accuracy of salivary biomarkers in detecting OSCC. Studies were eligible for inclusion if only singular salivary biomarkers were evaluated in three or more studies. Studies investigating combined salivary biomarkers or assessing patients with oral potentially malignant disorders only were excluded.

The reporting of the review follows the PRISMA checklist. Six studies, recruiting 775 participants, were included in this review for only two salivary biomarkers, cytokeratin 19 fragment (CYFRA 21-1) and matrix metalloproteinase 9 (MMP-9). The sensitivity and specificity (with 95% confidence intervals) for CYFRA 21-1 studies ranged from 0.84 (0.75–0.91) to 0.94 (0.83–0.99) and from 0.84 (0.71–0.93) to 0.96 (0.80–1.00), respectively. In MMP-9 studies, sensitivity (with 95% confidence intervals) ranged from 0.76 (0.67–0.83) to 1.00 (0.78–1.00) and specificity from 0.27 (0.12–0.46) to 1.00 (0.78–1.00). The overall quality of the included studies was poor. Due to a lack of strong and high-quality evidence, considerable uncertainty remains surrounding the use of singular salivary biomarkers for the detection of OSCC.



Forest plot showing the sensitivity and specificity of CYFRA 21-1 studies.



Forest plot showing the sensitivity and specificity of MMP-9 studies.

Salivary biomarkers in general may have great potential in the early detection of OSCC and other diseases as well. However, due to the presence of biases and other limitations in the studies reviewed, there is no conclusive evidence of the value of singular salivary CYFRA 21-1 or MMP-9 analyses as screening tools for OSCC at the present time. Therefore, further standardized diagnostic test accuracy studies that minimize potential sources of bias through rigorous design, conduct, and reporting are needed. Reporting guidelines for primary diagnostic studies should be followed strictly, and studies should address all potential sources of bias and applicability concerns as indicated in the QUADAS-2 tool. Future research should focus on the accuracy of the current potential salivary biomarkers in the detection of OSCC with clear and robust methodology. Future studies in oral cancer could be informed by studies of the diagnostic accuracy of combined salivary biomarker panels in other diseases, which could have similar altered expression of singular biomarkers.

Source: AlAli AM, et al. Int J Oral Maxillofac Surg. 2020 August. 49(8): 973-983

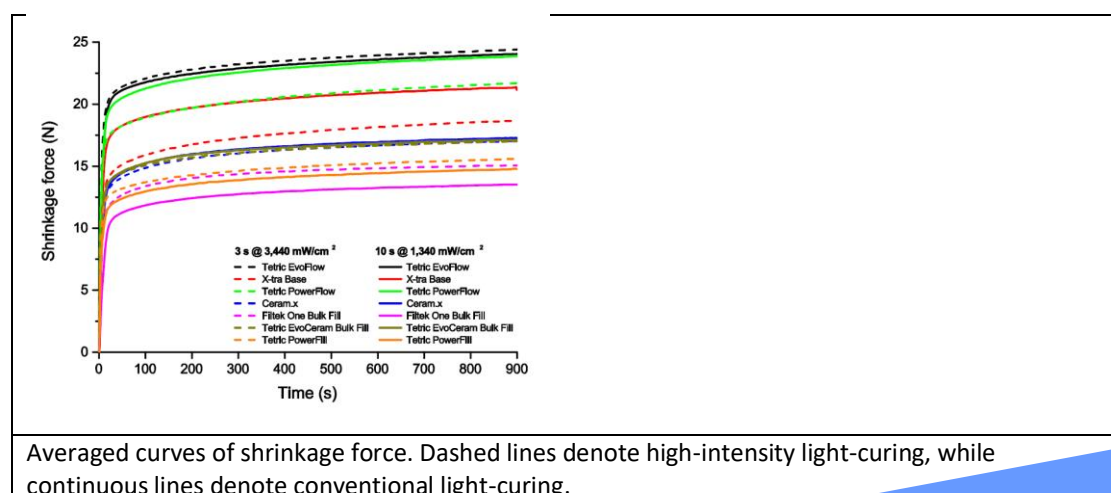
Effect of rapid high-intensity light-curing on polymerization shrinkage properties of conventional and bulk-fill composites

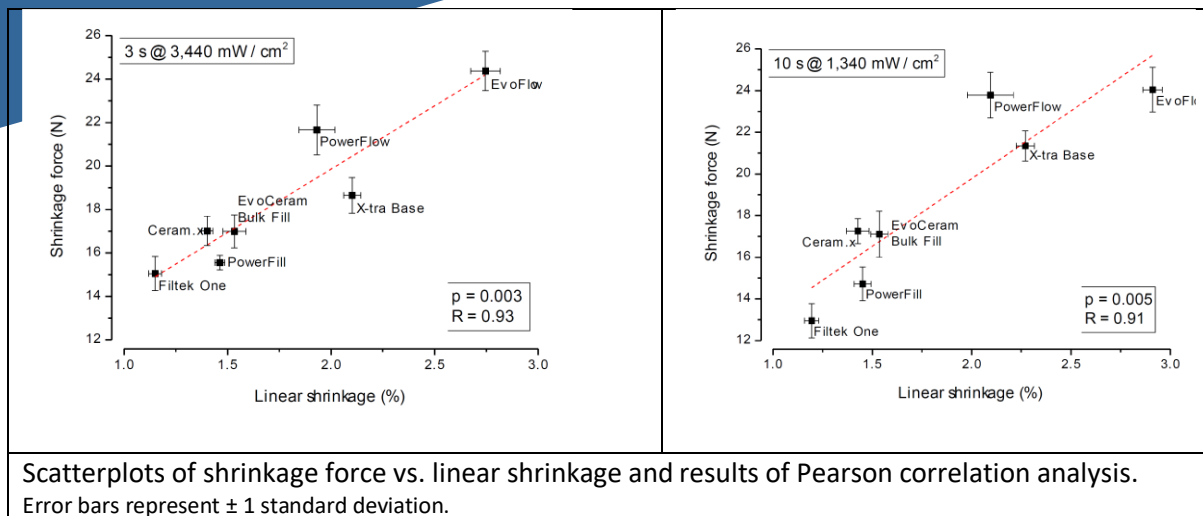
Since the inception of resin composites as dental restorative materials, polymerization shrinkage and the associated stress have been persistent issues. Polymerization shrinkage stress exerts a detrimental effect on marginal integrity and may be related to postoperative sensitivity, enamel cracking, marginal staining, and eventually secondary caries. Recognizing shrinkage stress as a significant disadvantage of all resin composites, various solutions for its reduction

have been investigated, including adjustments of material compositions and changes in light-curing protocols. To compare the effect of high-intensity (3 s with 3440 mW/cm²) and conventional (10 s with 1340 mW/cm²) light-curing on shrinkage properties and degree of conversion of conventional and bulk-fill resin composites, including two composites specifically designed for high-intensity curing.

Composites specifically designed for high-intensity curing showed shrinkage parameters comparable to other investigated composites.

Real-time linear shrinkage and shrinkage force of 1.5 mm thick composite specimens were measured for 15 min after the start of light-curing using custom-made devices. From the shrinkage force data, maximum shrinkage force rate and time to achieve maximum shrinkage force rate were determined. Degree of conversion was measured using Fourier transform infrared spectrometry. Flowable composites showed significantly higher linear shrinkage compared to sculptable composites (1.93–2.91 % vs. 1.15–1.54 %), as well as significantly higher shrinkage forces (18.7–24.4 N vs. 13.5–17.0 N). Degree of conversion amounted to 45.8–60.1 %. For high-intensity curing, degree of conversion was significantly lower in three out of seven composites, whereas shrinkage forces were either increased, decreased, or unchanged compared to conventional curing. For high-intensity curing, maximum shrinkage rates were 6–61 % higher, whereas times to achieve maximum shrinkage force rate were 15–53 % shorter compared to conventional curing.





Composites specifically designed for high-intensity curing showed shrinkage parameters comparable to other investigated composites. Shrinkage behavior under conditions of high-intensity light-curing was material-dependent. Shrinkage force kinetics were more strongly affected by high-intensity curing than absolute values of linear shrinkage and shrinkage force. Despite being attractive for its convenience, high-intensity curing can lead to considerably faster development of shrinkage forces in the early stage of polymerization.

Source: Par M et al. J Dentistry. 2020 October. 101:103448



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