

What dietitians need to know about salivary biomarkers as an assessment of growth of healthy children: A scoping review

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Background

- **Child growth** is a critical indicator of overall health¹, and biomarkers have been studied to assess growth-related factors in children.
- While **serum biomarkers** are considered the gold standard for growth evaluation, they have **limitations** such as invasiveness, biological risks, variation, and higher costs.
- **Saliva**, on the other hand, contains numerous biochemical constituents similar to blood, including hormones, enzymes, and antibodies, making it a potential source for biomarkers in growth assessment².
- Saliva assays offer **non-invasive** collection methods, simple procedures that do not require specialized training, cost less than blood collection, and pose no biological risk³.
- However, the effectiveness of **salivary biomarkers** for this purpose lacks consensus.

Purpose

- To provide a comprehensive understanding of the role of **salivary biomarkers** in evaluating **growth** and identifying knowledge gaps in the current literature through a comprehensive scoping review.

Methods

Study selection

To identify relevant studies, we conducted searches in:

- Ovid MEDLINE
- EMBASE
- CINAHL
- Web of Science (Web of Knowledge)
- Cochrane Library
- Global Health

Inclusion criteria

We included original studies of any design if they provided useful information on salivary biomarkers of growth in children. Table 1 presents the inclusion criteria.

Characteristic	Source of Inclusion Criteria
Date Published	Articles published up until January 1, 2023
Publication Status	Excluded review style articles such as systematic reviews, meta-analyses, or scoping reviews
Language	Published in English
Study Population	Children aged birth to 16 years
Research Context	Reports providing information on growth measurements
Access	Available in full-text online

Table 1. Inclusion Criteria.

Results

Study Identification:

Figure 1 displays the **PRISMA** flow diagram for the process of the systematic search and study screening decision process.⁴

Synthesis of results

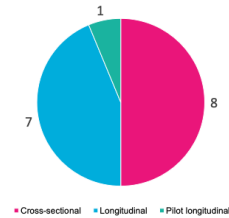


Figure 2. The study design of the eligible studies.

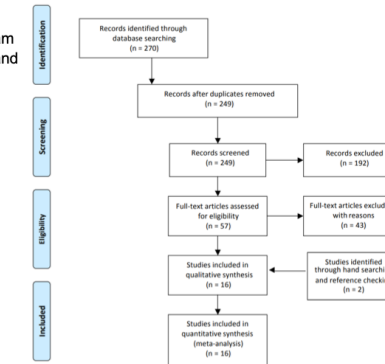


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting flow diagram showing four-stage article selection process used to identify eligible articles.

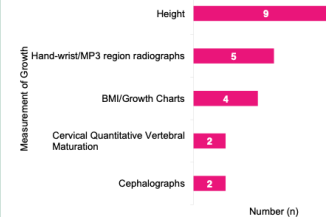


Figure 3. Measurements of Growth Used in Each Study.



Figure 4. Biomarkers measured across all studies.

Discussion

Insulin-like growth factor-1 (IGF-1)	• IGF-1 showed positive correlations with skeletal maturity in several studies
Dehydroepiandrosterone sulfate (DHEA-S)	• DHEA(S) showed mixed results and no conclusions can be drawn
Testosterone	• Testosterone was found to be correlated with height in males
Leptin	• Leptin was positively correlated with BMI, but no conclusions can be drawn
Insulin	• Insulin was positively correlated with BMI, but no conclusions can be drawn
Estradiol	• The relationship of estradiol and height is mixed in females
Ghrelin	• Ghrelin has an uncertain role in growth assessment

Conclusions

- The findings of this review indicate that **salivary biomarkers**, particularly **IGF-1**, show promise as a reliable measure of **growth** in children, as the evidence consistently supports this association across studies.
- Recent studies suggest a potential correlation between salivary **DHEAS** and **growth**, although this effect appears to be more prevalent in male groups.
- The utilization of **salivary biomarkers** has the potential to enhance the assessment of healthy **growth** in children and could serve as a valuable complement to conventional methods.
- To establish the effectiveness and clinical relevance of **salivary biomarkers**, further research, particularly employing **longitudinal** designs, is required.

Relevance to Practice

- Dietitians commonly utilize **growth** measurement tools in their practice.
- The review underscores the promising emergence of **salivary biomarkers**, which require further research to be developed and validated for implementation in dietetic research and clinical assessment.
- Significant potential for further research:
 - Granting community dietitians access to straightforward and non-invasive **growth** measurement tools.
 - Allowing outpatient practitioners to collect biomarker samples directly in the clinic setting.

References

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Acknowledgements

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