Breathodontics - A side view for POSA

A systematic review and meta-analysis of cephalometry as an aid in pediatric obstructive sleep apnoea

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Background

- Pediatric Obstructive Sleep Apnoea (POSA) represents a segment within the spectrum of sleep disorders in children, manifesting through symptoms like snoring, gasping, and choking during sleep.
- It can contribute to behavioral challenges, hyperactivity, and academic underperformance.
- The timely detection and effective management of OSA in children play a pivotal role in averting potential long-term health complications.
- While overnight in-lab polysomnography (PSG) remains the diagnostic gold standard, challenges such as limited accessibility, high costs, and the requirement for hospitalization necessitate the exploration of alternative diagnostic modalities.
- Cephalometry emerges as a non-invasive and cost-effective diagnostic tool that holds promise in providing valuable insights for the assessment of OSA.

Aim

To evaluate the various cephalometric parameters associated with diagnosing OSA in children.

Methods

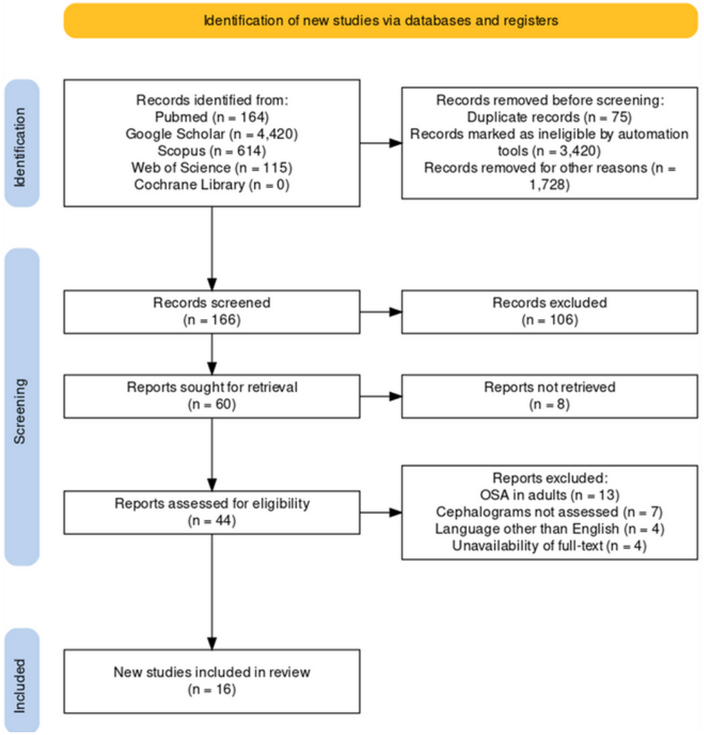
- Registration: The present review has been registered in PROSPERO (CRD number: CRD42022330353) and was executed following the guidelines as per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.

Participants	**Children diagnosed with OSA.**
Index	**Any study that analysed, from an accuracy analysis perspective, a minimum of one or more objectively quantifiable parameters to identify OSA using a lateral cephalogram.**
Comparison	**Children without a diagnosis of OSA.**
Outcome	**Measurements of the cephalometric parameters identified in participants and controls**

Statistical analysis

- JBI SUMARI (in collaboration with the Joanna Briggs Institute)
- Heterogeneity test and Chi-squared test
- Overall test for significance (z-test) was performed and weighted mean difference was calculated for all the cephalometric parameters.
- Random effect method (REM)
- Risk of Bias - The Quality Index

Results



The quality assessment of inter-reviewer reliability as per Cohen's kappa was 0.94. As none of the articles were of low quality of evidence, all the included articles were involved in the meta-analysis. Of the 16, 10 studies had a low-risk and 6 had a moderate risk of bias.

Meta-Analysis

Cephalometric variable	Weighted mean difference (OSA-control)	95% CI	Heterogeneity (I^2; P (significant <0.05)	Statistical significance for overall effect (P)
Tongue Length	1.65	-0.36 – 3.67	16; 0.26	0.108
Soft Palate				
Length	0.15	-1.76 – 2.06	49; 0.15	0.879
Thickness	-0.32	-2.04 – 1.41	80; 0.02	
Pharyngeal Airway				
Ba-S-PNS	1.12	-2.08 – 4.32	89; 0	0.494
Linder-Aronson	-3.86	-5.04 – -2.67	17; 0.33	**0.000***
AD	-2.40	-4.32 – -0.49	84; 0	**0.014***
PTV-AD	-3.12	-4.64 – -1.61	59; 0.05	**0.000***
McNamara's Analysis	-3.10	-4.42 – -1.79	69, 0.008	**0.000***
PAS	-1.15	-3.28 – 0.19	71; 0.02	0.080
Hyoid bone				
C3H	1.24	-0.05 – 2.99	58; 0.009	0.163
H-MP	3.60	2.60 – 4.59	0; 0.901	**0.000***
H-posterior pharynx	1.41	0.22 – 2.60	54; 0.11	**0.020***
H-palatal plane	-0.23	-.8.87 – 8.42	97; 0	0.959
Cranial Base parameters				
SN	0.48	-3.42 – 4.39	89; 0	0.808
S-Ba	-0.47	-1.85 – 0.90	47, 0.71	0.501
Na-S-Ba	-1.59	-2.68 – -0.49	32, 0.12	**0.005***
Facial Height				
N-Me	2.61	-1.38 – 6.59	76, 0.01	
Upper anterior facial height	-0.12	-1.44 – 1.19	19, 0.11	0.852
Lower anterior facial height	2.23	-2.10 – 6.57	90, 0	0.313
Posterior facial height	1.16	0.07 – 2.25	0, 0.83	**0.038***
Gonial angles	2.32	0.79 – 5.43	81, 0.001	0.143
Upper gonial angles	4.70	-0.10 – 9.50	91, 0	0.055
Lower gonial angles	2.37	-0.59 – 5.33	66, 0.04	0.116
Facial axes	-1.25	-2.66 – 0.17	0, 0.82	0.084
Facial taper	0.46	-5.12 – 6.05	92; 0.001	0.870
SNA	0.09	-1.21 – 1.38	71, 0.001	0.896
SNB	-1.09	-2.13 – -0.04	57, 0.021	**0.041***
ANB	1.17	0.55 – 1.80	52, 0.05	**0***
ANS-PNS	-1.62	-2.66 – -0.58	0, 0.58	**0.002***
Mandibular plane	0.05	-2.72 – 2.83	69, 0.02	0.97
Sn-Go-Gn	2.01	-0.02 – 4.03	70, 0.005	0.052
Sn-Go-Me	2.44	-2.00 – 6.89	68, 0.07	0.28
Mandibular arc	-0.04	-1.84 – 1.75	27, 0.262	0.962

Conclusion

- Although there are certain parameters identified which have been of significance, an overall assumption that craniofacial parameters as measured via lateral cephalometry will provide a reliable diagnosis for sleep-disordered breathing cannot be made.
- There is a need for further research in this field in order to justify the same.
- Limitations: Only English language publications included, no grey literature included.
- Recommendations: To conduct more clinical trials in order to discover more accurate parameters with an improved level of evidence.

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