Prevalence of Dental Anomalies in Patients with Wolf-Hirschhorn Syndrome: A Case-Control Study

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BACKGROUND

- Wolf–Hirschhorn syndrome (WHS, OMIM:194190) is a congenital syndrome with a prevalence of 1:60000 births
- Characterized by pre- and post-natal growth delays and characteristic craniofacial features
- About 300 published cases of WHS
- No studies comprehensively evaluate craniofacial and oral findings in WHS
- This retrospective case-control study aimed to evaluate developmental dental anomalies and pathologies (DDAPs) in pediatric patients with WHS compared to healthy controls

METHODS

- Electronic medical-dental records of 1.5 million patients (1-18 years) at the Children's Hospital screened and identified 26 children with WHS
- Medical-dental findings from the WHS cohort were compared with age- and sex-matched healthy controls
- Two calibrated study personnel reviewed medical-dental findings and radiographs
- Clinical-radiographic findings were assessed for DDAPs and ODAP
- Statistical analysis done using Wilcoxon and chi-squared or Fisher's exact tests

RESULTS

Table 1: Demographic variables of the subjects in each study cohort

Variable	WHS* (N=26)	Control (N=26)	P-value**
Age Median (Q1, Q3)*	13.0 (6.00, 16.0)	13.0 (6.00, 16.0)	1
Sex			
Female	18 (69.2%)	18 (69.2%)	1
Male	8 (30.8%)	8 (30.8%)	
Race			
African American	1 (3.8%)	1 (3.8%)	1
Asian	1 (3.8%)	0 (0%)	
Caucasian	24 (92.3%)	25 (96.2%)	
Ethnicity			
Hispanic	5 (19.2%)	4 (15.4%)	1
Non-Hispanic	21 (80.8%)	22 (84.6%)	
Status			
Deceased	4 (15.4%)	0 (0%)	0.11
Live	22 (84.6%)	26 (100%)	
Under 5th percentile weight	21 (80.8%)	0 (0%)	**<0.001**
Under 5th percentile height	24 (92.3%)	0 (0%)	**<0.001**
Under 5th percentile body mass index	21 (80.8%)	0 (0%)	**<0.001**
Systemic Findings			
CVS	14 (53.8%)	0 (0%)	**<0.001**
Respiratory	16 (61.5%)	0 (0%)	**<0.001**
Musculoskeletal	19 (73.1%)	0 (0%)	**<0.001**
Immunological	2 (7.7%)	0 (0%)	0.49
Genitourinary	18 (69.2%)	0 (0%)	**<0.001**
CNS	21 (80.8%)	0 (0%)	**<0.001**
PNS	22 (84.6%)	0 (0%)	**<0.001**
Gastrointestinal	22 (84.6%)	0 (0%)	**<0.001**
Behavioral	24 (92.3%)	0 (0%)	**<0.001**
ENT	18 (69.2%)	0 (0%)	**<0.001**
Hematological	6 (23.1%)	0 (0%)	**0.022**
Ophthalmological	7 (26.9%)	0 (0%)	**0.009**
Non-verbal	25 (96.1%)	0 (0%)	**<0.001**
Allergies to medications	16 (61.5%)	0 (0%)	**<0.001**

Table 2: Craniofacial findings, parafunctional habits, and developmental dental anomalies and pathologies in subjects within each study cohort

Variable	WHS* (N=12)	Control (N=12)	P-value**
Craniofacial findings			
Microcephaly	12 (100%)	0 (0%)	**<0.001**
Dysmorphic facial features (Greek warrior helmet)	12 (100%)	0 (0%)	**<0.001**
Maxillary prognathism	8 (66.7%)	0 (0%)	**0.001**
Mandibular prognathism	1 (8.3%)	0 (0%)	1
Lip incompetence	8 (66.7%)	0 (0%)	**0.001**
Facial asymmetry	3 (25.0%)	0 (0%)	0.217
Shape Anomalies			
Taurodontism	6 (50.0%)	1 (8.3%)	0.0686
Pyramidal molars	4 (33.3%)	0 (0%)	0.0932
Dilacerated roots	4 (33.3%)	0 (0%)	0.0932
Microdontia	2 (16.7%)	0 (0%)	0.478
Dens invaginatus	2 (16.7%)	0 (0%)	0.478
Pulp stones	2 (16.7%)	0 (0%)	0.478
Localized short root anomalies	1 (8.3%)	1 (8.3%)	1
Radiculomegaly	1 (8.3%)	0 (0%)	1
Number Anomalies			
Hypodontia	6 (50.0%)	0 (0%)	**0.013**
Oligodontia	4 (33.3%)	0 (0%)	0.09
Hyperdontia	1 (8.3%)	0 (0%)	1
Positional Anomalies			
Rotation	3 (25.0%)	1 (8.3%)	0.59
Ectopic eruption	2 (16.7%)	1 (8.3%)	1
Crowding	2 (16.7%)	0 (0%)	0.47
Infra-occlusion	1 (8.3%)	0 (0%)	1
Distally displaced premolars	1 (8.3%)	0 (0%)	1
Impacted canine	1 (8.3%)	0 (0%)	1
Structural Anomalies			
Hypoplastic teeth	7 (58.3%)	0 (0%)	**0.004**
Other Developmental Anomalies and Pathologies			
Bifid mandibular canal	1 (8.3%)	1 (8.3%)	1
Delayed eruption	9 (75.0%)	0 (0%)	**<0.001**
Parafunctional habits			
Nocturnal or diurnal bruxism	8 (66.7%)	0 (0%)	**0.001**
Pica	5 (41.7%)	0 (0%)	**0.03**

*Abbreviations used in the table- WHS: Wolf Hirschhorn Syndrome, (Q1, Q3): first and third quartile, ** **Bold** *P*-values: statistically significant

CONCLUSIONS

- WHS demonstrated a significantly higher prevalence of complex medical findings ($P<0.05$) and lower weight, height, and body mass index (5th percentile, $P<0.001$)
- Higher prevalence of hypodontia, delayed tooth eruption, hypoplasia, and parafunctional habits in the WHS cohort as compared to the controls ($P<0.05$)
- Bruxism and pica were common in WHS and can contribute to tooth wear, trauma, and secondary oral pathology
- Dental anomalies in WHS reflect global craniofacial and neurodevelopmental disruption, requiring interdisciplinary care

IMPLICATIONS

- Study highlights the need for interdisciplinary consultation and care among dental-medical professionals to address the systemic problems and orodental anomalies to improve health outcomes for children with WHS
- Identification of oral habits that compromise overall health, such as pica, is important for disease prevention

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