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ORIGINAL ARTICLE

Dentofacial and Cranial Changes in Down Syndrome

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Abstract
Objectives: This study aimed to determine the prevalence of certain oral characteristics usually associated with Down syndrome and to determine the oral health status of these patients.
Methods: The cross-sectional study was conducted among patients attending a special education program at Faculty of Dentistry, Jamia Millia Islamia, Delhi, India. The study design consisted of closed-ended questions on demographic characteristics (age, sex, and education and income of parents), dietary habits, and oral hygiene habits. Clinical examination included assessment of oral hygiene according to Simplified Oral Hygiene Index (OHI-S), dental caries according to decayed, missing, and filled teeth (DMFT) index, periodontal status according to the Community Periodontal Index of Treatment Needs (CPITN), and malocclusion according to Angles classification of malocclusion. Examinations were carried out using a using a CPI probe and a mouth mirror in accordance with World Health Organization criteria and methods. Craniometric measurements, including maximum head length and head breadth were measured for each participant using Martin spreading calipers centered on standard anthropological methods.
Results: The majority of the patients were males ($n = 63$; 82%) with age ranging from 6–40 years. The Intelligence Quotient (IQ) score of the patients indicated that 31% had moderate mental disability and 52% had mild mental disability. 22% exhibited hearing and speech problems.12% had missing teeth and 15% had retained deciduous teeth in adult population. The overall prevalence of dental caries in the study population was 78%. DMFT, CPITN and OHI scores of the study group were 3.8 ± 2.52, 2.10 ± 1.14 and 1.92 ± 0.63 respectively. The vast majority of patients required treatment (90%), primarily of scaling, root planing, and oral hygiene education. 16% of patients reported CPITN scores of 4 (deep pockets) requiring complex periodontal care. The prevalence of malocclusion

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was 97% predominantly of Class III malocclusions. Further 14% presented with fractured anterior teeth primarily central incisor. The percentage means of cephalic index was 84.6% in the study population. The brachycephalic and hyperbrachycephalic type of head shape was dominant in the Down syndrome individuals (90%).
Conclusion: The most common dentofacial anomaly seen in these individuals was fissured tongue followed by macroglossia.

1. Introduction

Down syndrome (DS) is a genetic disorder produced by the (complete or partial) presence of three copies of chromosome 21 [1−4]. The syndrome is characterized by a distinctive and immediately recognizable craniofacial phenotype [5,6]. The peculiar aspect of these subjects is partly a result of developmental anomalies of the craniofacial skeleton [4,6]. Many published studies have reported relatively poor dental health practices, relatively poor oral hygiene, and high levels of periodontal disease in children with Down syndrome than in normal children [7−9]. It has been reported that individuals with Down syndrome consistently show higher prevalence of periodontitis compared with that of other patients with mental retardation [10,11].

A search of the literature reveals that a large number of studies indicate that certain oral findings are concomitant with Down syndrome. Some of these findings are centered on clinical observations and some are on studies with a small number of patients. Some of the studies contradict and some support previous findings. Therefore, the purpose of this study was to determine the prevalence of certain oral characteristics usually associated with Down syndrome and to determine the oral health status of these patients.

2. Material and methods

The cross-sectional study was conducted among patients attending a special education program at Faculty of Dentistry, Jamia Millia Islamia, Delhi, India. The study protocol was approved by the Institutional Review Board prior to the start of the study**.** Patients were included in the study if they had parental consent/proxy consent, were present on the day of examination, and were willing to participate. Children were excluded from the study if they were uncooperative or had medical conditions, which contraindicated an oral examination without appropriate modifications, such as infective endocarditis, coagulopathy, abscess, etc. Informed consent was obtained from their guardian by whom they were accompanied. The intelligence quotient (IQ) of these children in these schools ranged between 20−80. This IQ had been determined prior to placing the children in schools by educational diagnosticians involved in the assessment of mentally handicapped children.

The study design consisted of closed-ended questions on demographic characteristics (age, sex, and education and income of parents), dietary habits, and oral hygiene habits. Clinical examination included assessment of oral hygiene according to Simplified Oral Hygiene Index (OHI-S) [12], dental caries according to decayed, missing, and filled teeth (DMFT) index [13], periodontal status according to the Community Periodontal Index of Treatment Needs (CPITN) [14], and malocclusion according to Angles classification of malocclusion [15]. Examinations were carried out using a using a Community Periodontal Index (CPI) probe and a mouth mirror in accordance with World Health Organization criteria and methods [16]. Craniometric measurements, including maximum head length and head breadth were measured for each participant using Martin spreading calipers centered on standard anthropological methods. The craniometric measurements were taken according to the technique defined by Kalia et al [11]. The head length was measured as the straight distance from the opisthocranion to the glabella and the head width was measured as the distance between the two most lateral points of the skull above the level of the supramastoid crest at right angles to the median sagittal plane. Subsequently, the cephalic index was calculated using the formula: head breadth/head length $\times$ 100. All the examinations were carried out by two dentists; however, throughout the examinations, every 10^{th} child was reexamined independently by each examiner to test for possible intra- and interexaminer variation, which was $< 5\%$ for each of the studied variables. Recording procedures were carried out according to the criteria described by WHO [13].

2.1. Statistical analysis

The Chi-square test was used to compare between categorical variables. Independent sample t tests and Z-tests were performed for comparison of means between two groups for quantitative variables, with $p < 0.05$ indicating statistical significance. Statistical analysis of the data was done using SPSS version 11 (SPSS Inc., Chicago, IL, USA).

3. Results

Of 94 individuals selected for the study, 77 patients could be examined. The rest of the patients did not cooperate for an oral examination, which gave a response rate of 82%. The demographic profile of the study