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Original Article

Awareness of Oral Health and Dental Care Practices among Children with Endocrine Disorders and their Caregivers at Lagos University Teaching Hospital, Nigeria

Abimbola Yomi Adeloye,[1] Elizabeth Eberechi Oyenusi,[2] Omolade Ademiposi Osibogun,[3] Ifeoma Linda Utomi,[4] Mariam Oluwadamilola Alayo,[1] Veronica Nneoma Ibenye[1]

[1]Orthodontic unit, Department of Child Dental Health, Faculty of Dental Sciences, Lagos University Teaching Hospital (LUTH), Lagos, Nigeria, [2]Endocrinology and Metabolism Unit, Department of Paediatrics, College of Medicine, University of Lagos (CMUL)/Lagos University Teaching Hospital (LUTH), Lagos, Nigeria/ Paediatric Endocrinology Training Centre for West Africa, Lagos, Nigeria, [3]Paediatric Dentistry Unit, Department of Child Dental Health, Lagos University Teaching Hospital (LUTH), Lagos, Nigeria. [4]Orthodontic Unit, Department of Child Dental Health, College of Medicine, University of Lagos (CMUL)/ Lagos University Teaching Hospital (LUTH), Lagos, Nigeria

Abstract

Background: Endocrine disorders in children can present with various oral manifestations that may impact overall health and quality of life. Despite this, awareness of these oral implications among patients and caregivers is often limited. Understanding this gap is essential for improving multidisciplinary care and oral health outcomes. This study aims to assess the awareness of oral health and dental care practices of children and caregivers with endocrine disorders.

Methodology: A cross-sectional study was conducted at the Paediatric Endocrinology Clinic of Lagos University Teaching Hospital (LUTH), Lagos, Nigeria. Ethical approval, informed consent, and assent were obtained. Fifty children aged 7–18 years with confirmed endocrine disorders and their caregivers were recruited. Data collection involved structured questionnaires and intraoral examinations. Statistical analysis was done with a level of significance set at $p< 0.05$.

Results: The mean age of patients was 11.52 ± 4.9 years, with females representing 54% of the participants. Type I Diabetes Mellitus was the most frequent endocrine condition (54%). Awareness of the oral implications of endocrine disorders was very low (12%). The majority of patients (70%) had never visited a dentist. Similarly, most caregivers (66.0%) had never visited a dentist. The presence of oral manifestations showed no statistically significant association with age group, sex, or caregiver educational level.

Conclusion: Oral abnormalities are frequent among paediatric patients with endocrine conditions, yet both patients and caregivers demonstrate low awareness of these complications. Greater collaboration between endocrinologists and dental professionals, alongside promoting oral health education, is crucial to improving oral health outcomes in this population.

Keywords: Oral health, Awareness, Endocrine disorders, Children, Caregivers.

***Correspondence:** Osibogun Omolade Ademiposi, **Email:** moladeosibogun@gmail.com

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Introduction

The relationship between systemic health and oral manifestations has been established in medical and dental literature. Endocrine disorders in particular have been shown to exert significant influence on the oral cavity, affecting both hard and soft tissues through hormonal and metabolic pathways. [1,2]

Endocrine disorders are a group of systemic conditions characterized by hormonal imbalances that affect multiple organs and physiological processes. [3,4] Beyond their systemic manifestations, these conditions often present with distinct oral features that may serve as early diagnostic indicators or complicating factors in disease management. For instance, diabetes mellitus is strongly associated with periodontal disease, xerostomia, oral candidiasis, and delayed wound healing. Similarly, thyroid dysfunctions may lead to altered taste sensation, burning mouth syndrome, and macroglossia, while adrenal disorders can manifest as hyperpigmentation of the oral mucosa or increased susceptibility to infections. [5,6] Patients living with endocrine disorders and their caregivers are often confronted with health challenges that extend beyond the primary hormonal imbalances. Despite the strong evidence linking endocrine conditions to oral health, the awareness among patients and caregivers often remains inadequate, thereby potentially limiting early recognition and effective management of these complications.[7,8]

Awareness of these oral manifestations is essential not only for patients but also for caregivers who play a central role in supporting daily health needs. [9,10] Caregivers are often the first to observe changes in their children's oral health, but many lack the necessary knowledge to associate these changes with underlying endocrine dysfunctions. [11,12] Previous research on caregiver awareness has primarily concentrated on chronic illnesses such as neurodegenerative or cardiovascular conditions, with emphasis on the physical and psychological stressors associated with caregiving. However, little attention has been given to the awareness of caregivers of patients with endocrine conditions, despite the fact that the oral manifestations of these disorders can significantly affect quality of life and treatment outcomes. This creates a significant knowledge gap as unrecognized oral complications can progress to more severe conditions, in so doing impairing both systemic health outcomes and quality of life.[13,14] Furthermore, age and caregiving burden may influence awareness levels as older caregivers or patients may attribute oral changes to aging rather than the underlying endocrine dysfunction.[15,16] This underscores the need to assess how well patients and caregivers understand the link between endocrine disorders and oral health in order to determine whether gaps in awareness contribute to delayed or inadequate dental care.[17,18]

In addition, both patients and caregivers may attribute oral changes to medication side effects or poor oral hygiene rather than to endocrine dysfunctions. This misattribution can delay appropriate dental consultation and compromise holistic disease management. For example, untreated periodontal disease in patients with diabetes has been shown to worsen glycemic control, thus creating a vicious cycle that complicates both medical and dental outcomes. [19,20] This interplay between systemic and oral health highlights the importance of strengthening awareness among both patients and caregivers. [21,22]

Moreover, global health authorities such as the World Health Organization (WHO) and the American Dental Association (ADA) emphasize integrated approaches to health and advocating for improved education on the systemic oral health link. [23,24] Despite these recommendations, the awareness programs on endocrine disorders rarely address oral manifestations, and oral health promotion campaigns often neglect systemic disease connections. This lack of integration represents a missed opportunity for early detection and prevention. [25]

Consequently, exploring the level of awareness among patients and caregivers regarding the relationship between endocrine conditions and oral health is both timely and necessary. [26,27,28] Such investigations will not only highlight gaps in knowledge but also inform educational interventions, promote integrated care models and policy frameworks aimed at improving holistic health outcomes. Given that oral features may serve as early indicators of endocrine disturbances, the need to improve awareness can promote preventive dental visits.[29] By bridging this gap, healthcare providers can foster greater collaboration between endocrinologists, dentists, and caregivers, ultimately reducing disease burden and improving patient quality of life.

This study, therefore, sought to assess the level of awareness among patients with endocrine disorders and their caregivers regarding the relationship between endocrine health and oral manifestations. The dental care practices of both patients and caregivers were also determined.

Methods

Study Design
The study used a cross-sectional research design to assess the awareness of patients and caregivers on the relationship between their endocrine conditions and their oral features. The cross-sectional nature of the study allowed for the collection of data, thereby providing a picture of the prevalence and patterns of oral manifestations within this population.

Study Location
This research was carried out at the Lagos University Teaching Hospital (LUTH), Idi-Araba, Lagos State, in South-West Nigeria. LUTH is a premier tertiary health institution that serves as a referral center for patients across Lagos State and beyond. The hospital houses a specialized Paediatric Endocrinology Clinic, which provides diagnostic, therapeutic, and follow-up care for children with various endocrine disorders. The clinic offered an appropriate setting for this study as it provided access to a diverse pool of paediatric patients who fit the study criteria.

Study Population
The study population consisted of children aged 7–18 years attending the Paediatric Endocrinology Clinic at LUTH. These patients were undergoing evaluation for different endocrine conditions.

Inclusion Criteria
Eligible participants included paediatric patients 7–18 years with clinically diagnosed endocrine conditions who were willing to participate in the study. Participation required written informed consent obtained from their parents or legal guardians, with assent also obtained from children who were old enough to provide it.

Exclusion Criteria
Children with endocrine conditions who also presented with significant co-morbidities such as cancer, chronic heart disease, mental health disorders, or other systemic illnesses known to affect oral health were excluded. This exclusion was necessary to minimize confounding factors and to ensure that any observed oral features are attributable primarily to the underlying endocrine conditions.

Sampling Technique
A convenience sampling technique was employed for this study. The Paediatric Endocrinology Unit of Lagos University Teaching Hospital (LUTH) operates two weekly clinics: on Thursdays, the clinic caters to children diagnosed with diabetes mellitus, while on Fridays, it attends to patients with other endocrine conditions. Study participants were recruited consecutively from both clinics during the study period.

Recruitment was carried out when written informed consent had been obtained from parents or caregivers. In addition, assent was sought from children aged six years and above in line with ethical requirements for paediatric research. Both newly diagnosed and previously diagnosed patients were eligible, and the recruitment process proceeded consecutively as patients presented at the outpatient clinic. The study covered a period of three months in order to ensure adequate sample representation and allowance for systematic data collection within the given timeframe.

Sample Size Determination
The required sample size was calculated using the formula for cross-sectional studies as described by Leslie Kish (1965):

$n=z2pq/d2$

Based on the assumption that the researcher desires a 95% confidence interval. [z value of 1.96, where:
n = the estimate of the population size
z =critical value at the level of the chosen confidence level [z=1.96]
d2 =the precision level set at 0.05
p = estimated proportion of an attribute that is present in the population =%
95% confidence level,10% margin of error, population proportion
p = 3% (0.03) based on a previous study on the proportion of children with posterior cross bite suffering from thyroid disorders.
1.96 2 x 0.03 x (1 – 0.03) / 0.05 2
= (3.84 x 0.03 x 0.97) / 0.0025
= 0.111744/0.0025
= 44.7 (approx. 45)
Addition of 10% for non-response: 45 + 4.5 = 49.5 (approx. 50)
Thus, the final sample size for this study was 50 paediatric participants.

Data Collection

Both clinical and demographic data were obtained for each participant enrolled in the study. Caregivers were interviewed to capture socio-demographic information, medical history, and awareness of oral conditions related to their child's endocrine disorder. Clinical data such as age at diagnosis, sex, presenting features, drug history, and other relevant health details were retrieved from medical records and recorded in a predesigned research proforma.

Each child underwent a thorough physical examination, including both extraoral and intraoral assessment. The oral examination was conducted under natural light using standard dental examination instruments (e.g., mouth mirrors, probes, and tongue depressors) while observing strict infection control protocols, including the use of gloves and sterilized equipment. The assessment focused on identifying oral lesions (such as candidiasis, gingival changes, or mucosal alterations) commonly associated with endocrine conditions.

Furthermore, questions were asked to evaluate both the patients' and caregivers' awareness of oral health issues specifically linked to endocrine disorders as it helped in understanding the level of knowledge and possible gaps in awareness that could influence preventive and therapeutic practices.

Data Processing and Analysis

All data collected from the questionnaires, clinical examinations, and medical records were systematically entered into a database and analyzed using the Statistical Package for Social Sciences (SPSS) software version 21.

Descriptive statistics were used to summarize the data, such as frequencies, percentages, means, and standard deviations, which were used to describe the socio-demographic characteristics of participants, levels of awareness among patients and caregivers, and the distribution of oral manifestations associated with different endocrine conditions.

Ethical Consideration

Ethical approval for this research was obtained from the Health Research and Ethics Committee of Lagos University Teaching Hospital (LUTH), prior to the commencement of the study; HREC number (HREC number ADM/DSCST/HREC/APP/7375). Written informed consent was obtained from parents or legal caregivers. Additionally, assent was sought from children aged six years and above, provided they were capable of understanding the study.

The privacy and confidentiality of all participants were strictly safeguarded. Importantly, the research did not impose a financial burden on the participants.

Results

Table 1 details the socio-demographic characteristics of the 50 participants. The mean age of the participants was 11.52 ± 4.9 years. Regarding sex, a larger proportion of participants were female (54.0%) compared to male (46.0%), giving a male-to-female ratio of 1:1.2. For the educational level of the informants, the majority had secondary (52.0%) or tertiary (46.0%) education, with only a small minority (2.0%) having primary education.

Table 1: Socio-demographic characteristics of participants

Variable	Frequency (N=50)	Percentage %
Age (mean±SD)	11.52±4.9	
Sex of patients		
Male	23	46.0
Female	27	54.0
Educational level of informant		
Primary		
Secondary	1	2.0
Tertiary	26	52.0
	23	46.0

Table 2 provides insights into the awareness levels of patients and caregivers regarding the link between endocrine conditions and oral features, as well as their dental visit history, among the 50 participants. A low level of awareness was observed, with only six (12.0%) of both caregivers and patients acknowledging that endocrine disorders can affect the mouth. The majority of caregivers (48.0%) responded with "no," while 20 (40.0%) responded, "don't know." A significant portion of patients (58.0%) explicitly stated "no," and 15 (30.0%) responded, "don't know." Furthermore, dental visit rates were low, with 35 (70.0%) of the children having never visited a dentist. For the 15 children who had, the reasons for their visits included scaling and polishing (46.7%), tooth extraction (40.0%), and routine check-ups (33.3%). Similarly, most caregivers (66.0%) had not visited a dentist, and among the 17 who had, tooth extraction was the most common reason (76.5%), followed by scaling and polishing (41.2%), with routine check-ups and fillings being rare (5.9%) each.

Table 2: Awareness of patients and caregivers on the relationship of their endocrine conditions and their oral features

Variable	Frequency (N=50)	Percentage
Awareness of disorder can affect the mouth among caregiver		
Yes	6	12.0
No	24	48.0
Don’t know	20	40.0

Awareness of disorder can affect the mouth among patients		
Yes	6	12.0
No	29	58.0
Don’t know	15	30.0
Child has visited dentist before		
Yes	15	30.0
No	35	70.0
***Reason for visiting (n=15)**		
Routine check up	5	
Scaling and polishing	7	
Tooth extraction	6	
Caregiver visited dentist before		
Yes	17	34.0
No	33	66.0
***Reason for visiting (n=17)**		
Routine check up	1	
Scaling and polishing	7	
Tooth extraction	13	
Filling	1	

*Reason for visiting

Table 3 shows the association between sociodemographic characteristics and Awareness among caregivers/patients that endocrine disorders can affect the mouth. The table revealed no significant association between the awareness of disorders affecting the mouth among caregivers or patients and any of the investigated socio-demographic characteristics, including the patient's age, sex, or the informant's educational level. Specifically, caregiver awareness, while generally low, did not significantly vary by patient’s age (p=0.123), sex (p=0.124), or informant educational level (p=0.720). Though not statistically significant, caregiver awareness was observed to be relatively higher for patients aged <10 years (21.1%) compared to ≥10 years (6.5%), among caregivers of female patients (18.5% vs. 4.3% for male patients), and particularly with secondary education (15.4%). Similarly, patient awareness showed no significant association with their age (p=0.519) or sex (p=0.834), nor with the informant's educational level (p=0.259), remaining consistently low across these demographic categories, for example, ranging from 9.7% to 15.8% for age and 11.1% to 13.0% for sex, indicating that these socio-demographic factors did not significantly influence either caregiver or patient awareness.

Table 3: Association between knowledge of caregivers/patients and socio-demographic characteristics

Variable	Awareness among caregivers that endocrine disorders can affect the mouth			Awareness among patients that endocrine disorders can affect the mouth		
	Yes	No	p-value	Yes	No	p-value
Age of patients					Tu	
<10	4(21.1)	15(78.9)	0.123	3(15.8)	16(84.2)	0.519
≥10	2(6.5)	29(95.5)		3(9.7)	28(90.3)	
Sex of patients						
Male	1(4.3)	22(95.7)	0.124	3(13.0)	20(87.0)	0.834
Female	5(18.5)	22(81.5)		3(11.1)	24(88.9)	
Educational level of informant						
Primary	0(0.0)	1(100.0)	0.720	0(0.0)	1(100.0)	0.259
Secondary	4(15.4)	22(84.6)		5(19.2)	21(80.8)	
Tertiary	2(8.7)	21(91.3)		1(4.3)	22(95.7)	

Discussion

This study assessed the awareness levels of both patients and caregivers regarding the association between endocrine conditions and oral health. Awareness of the relationship between endocrine disorders and oral health was generally low. This finding is consistent with the study of Lin et al .,[30] and Carlos et al.,[31]. The socio-demographic profile showed that some caregivers had relatively high educational attainment, most had at least secondary or higher education, but this did not translate into higher awareness of the oral implications of endocrine disorders, thereby underscoring a gap in health literacy.[32] This suggests that while formal education provides a foundation, it may not necessarily equip caregivers with knowledge of specialized health interactions, thereby pointing to the need for tailored oral systemic health education programs.[33] It might be expected that higher educational attainment would correlate with greater health literacy,[34] however, the lack of a significant association in this study may reflect limitations in the health education curricula or public health messaging, where the intersection between oral and systemic health is rarely highlighted. Moreover, tertiary education in non-health-related fields may not necessarily confer a better understanding of medical-dental interrelationships, suggesting that health knowledge may mediate outcomes beyond mere formal education.[35] Also, the absence of sex or age-related differences in awareness could point to the role of structural barriers in health communication, such as limited access to interdisciplinary care, inadequate provider-patient communication, or cultural norms that do not prioritize oral health in chronic disease contexts. In particular, caregivers of younger children (<10 years) may be more focused on immediate disease management rather than long-term or secondary complications, which could partially explain the low awareness in this subgroup.[36]

The dental attendance rates were also noted to be poor. More than half of the children and caregivers had never visited a dentist, and when dental visits occurred, they were mostly symptom-driven. This reflects a reactive rather than proactive orientation towards oral health care, which is a common challenge in many developing contexts. [37]

Furthermore, the uniformly low levels of awareness across demographic subgroups suggest a systemic gap in health education that transcends individual characteristics. This may indicate that oral health is not adequately integrated into the broader framework of chronic disease management, particularly within endocrinology and pediatric care settings. Health promotion efforts may be disproportionately focused on more commonly recognized complications, leaving oral manifestations underemphasized.

The implications of these findings are two-fold. Clinically, they highlight the necessity for routine oral screening as part of the comprehensive management of paediatric endocrine patients.[38] Given the high prevalence of both soft and hard tissue abnormalities, warrants the collaboration between endocrinologists, paediatricians, and dental professionals is essential. From a public health perspective, the low awareness levels underscore the need for targeted health education programs for both patients and caregivers, thereby emphasizing the oral systemic health connection.[39] Integrating oral health education into endocrine clinics could improve preventive practices, encourage regular dental check-ups, and potentially reduce the burden of oral complications in this vulnerable group.[40,41,42] Moreover, tailoring these educational interventions to account for socio-demographic contexts such as caregiver educational levels and child age groups may enhance effectiveness and bridge the identified gaps in awareness.

The low level of dental service utilization observed in this study is consistent with reports from low- and middle-income countries, where access to dental care remains limited and largely inequitable. Previous studies have shown that less than one-third of children in such settings utilize dental services regularly, with most visits prompted by pain or advanced disease rather than preventive needs. [43,44] This pattern is reflected in the present study, where routine dental visits were uncommon among both children and caregivers. The low rate of caregiver dental attendance further underscores the influence of parental health-seeking behavior on children's utilization of oral health services, as established in earlier studies.[43]

Poor awareness of the oral manifestations of endocrine disorders appears to be a major contributing factor to this underutilization. In this study, nearly half of the caregivers and more than half of the patients were unaware that endocrine disorders could affect the oral cavity. This lack of knowledge likely contributes to delayed care-seeking and reinforces the prevailing symptom-driven pattern of dental attendance. Similar findings have been reported in other studies, where low oral health literacy was strongly associated with reduced use of preventive dental services.[45]

The implications of these findings are particularly significant for children with endocrine disorders, who are at increased risk of oral health complications. Endocrine conditions such as diabetes mellitus, hypothyroidism, and growth disorders have been associated with a range of oral manifestations, including delayed tooth eruption, enamel defects, xerostomia, increased caries risk, and periodontal disease. [46] In the absence of regular dental visits, these conditions may go undetected and untreated, leading to a higher burden of oral disease. Studies have shown that children with special health care needs experience significantly greater unmet dental needs and poorer oral health outcomes compared to their healthy counterparts.[47]

In addition to the increased risk of oral disease, poor utilization of dental services may negatively impact the systemic health of children with endocrine disorders. The relationship between oral health and systemic conditions is well established, particularly in the context of diabetes, where periodontal disease can adversely affect glycemic control through chronic inflammation.[48] Failure to recognize and manage oral health problems may therefore contribute to poorer overall disease management and increased risk of complications.

Another important implication of low dental attendance is the missed opportunity for early diagnosis of oral manifestations that may aid in the identification or monitoring of endocrine disorders. Oral signs such as

delayed eruption patterns, craniofacial abnormalities, and soft tissue changes can serve as early indicators of underlying systemic conditions. Regular dental visits facilitate early detection and timely referral, promoting a multidisciplinary approach to patient care. The low utilization observed in this study suggests that such opportunities are frequently missed.

Furthermore, the predominance of problem-driven dental visits, particularly for extractions, indicates late presentation with advanced disease. This not only increases the need for invasive procedures but also contributes to higher treatment costs and greater psychological distress for the child. Preventive dental care, including routine check-ups and oral hygiene interventions, has been shown to reduce the incidence and severity of oral diseases, thereby improving quality of life and reducing healthcare burden.[49]

The findings of this study underscore the need for targeted interventions to improve both awareness and utilization of dental services among children with endocrine disorders and their caregivers. Strengthening collaboration between medical and dental professionals is essential for comprehensive care in this population.

Limitations: The findings of this study may not be generalisable to other populations, but we consider this work exploratory as it has provided important preliminary data on oral health awareness and dental care practices in this understudied group, which can serve as a basis for larger multicentre studies. We also recognize that the use of convenience sampling may introduce selection bias. Future studies using randomized or stratified sampling techniques across multiple centres would enhance representativeness. Lastly, the relatively short study duration of the study may not fully capture temporal or seasonal variations in oral health practices and healthcare-seeking behaviour. Therefore, future longitudinal studies, conducted over extended periods, are recommended to better assess trends over time.

Conclusion

Awareness among patients and caregivers regarding the oral manifestations of endocrine disorders is low, and dental attendance is poor despite these conditions being present in children with endocrine disorders. These findings call for integrated, multidisciplinary care approaches and tailored educational interventions to bridge the knowledge gap and improve oral health outcomes in children with endocrine conditions.

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