

## PSYCHOSOCIAL ASPECT OF ANTERIOR TOOTH DISCOLORATION AMONG ADOLESCENTS IN IGBO-ORA, SOUTHWESTERN NIGERIA

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### ABSTRACT

**Background:** Aesthetic problems in adolescence can have a significant effect on their psychosocial development. Abnormalities in tooth color can lead to such problem especially if it affects anterior teeth.

**Objective:** This study therefore assessed the effects of anterior tooth discoloration on the psychosocial well being of adolescents with a view to providing information that will aid the prevention and treatment of this dental problem.

**Materials and methods:** This study was a cross-sectional study involving 384 adolescents aged between 10 and 20 years in Igbo-ora southwestern Nigeria. Twenty-six item semi-structured questionnaire comprising variables on demographics and psychosocial effects were researcher-administered. Oral examination of the labial surfaces of the anterior permanent teeth was carried by two examiners. Frequencies and mean were generated. Chi-square and Fischer's exact tests were used to test associations between categorical variables at ( $P \leq 0.05$ ).

**Results:** The mean age of participants was  $14.7 \pm 2.3$  years. Ninety four (24.5%) participants perceived that their anterior teeth were discolored, 65 (69.1%) of these did not like the discoloration. Sixty two (65.9%), 47 (50.0%) and 38 (40.4%) respectively reported that it prevented them from freely answering questions, smiling and interacting. After oral examination, 120 (31.2%) subjects had one form of anterior tooth discoloration. The cause of tooth discoloration in the majority 64 (16.7%) of the participants was due to extrinsic stains from compounds incorporated into plaque and calculus. Age group, sex, class of participants and presence of tetracycline stained teeth were significantly related with reported psychosocial problems ( $p \leq 0.05$ ).

**Conclusion:** About one third of adolescents had anterior tooth discoloration and the majority reported one form of psychosocial problem.

**Keywords:** Psychosocial, Anterior tooth discolouration, Adolescents

### INTRODUCTION

Teeth form an important part of the body that aids chewing, speech as well as contributing to appearance. Robinson<sup>1</sup> mentioned that the colour of the teeth is an important feature in determining the attractiveness of the face. The colour of teeth varies from white to creamish yellow. It is lighter in children and becomes darker as age increases. The tooth can be discoloured by deposition of pigments in its internal structure and on its surface. Tooth discoloration varies in etiology, presentation and severity. It could be intrinsic, extrinsic and a combination of both<sup>2</sup>. Intrinsic or endogenous discoloration is caused by incorporation of chromatogenic material into dentine and enamel during odontogenesis or after eruption either locally or systemically. Exposure to high levels of fluoride,

tetracycline or some other drugs, inherited developmental disorders and trauma to developing tooth may result in pre-eruptive discoloration<sup>3</sup>. After eruption of the tooth, aging, pulp necrosis and iatrogenic causes account for most intrinsic discoloration. Tooth discoloration is said to be extrinsic or exogenous when compounds from substances such as tobacco, coffee, tea, herbs, red wine, carrots, oranges are incorporated into the acquired pellicle on the surface of the tooth.<sup>2,4</sup>

Tooth discoloration can cause significant cosmetic problem especially when it affects the anterior teeth, which is usually exposed when a patient smiles. Anterior tooth discoloration is one of the most frequent reasons for seeking dental treatment.<sup>5</sup> In most societies the

concern about appearance is increasing. The appearance of the dentition is of concern to a large number of people seeking dental treatment and the colour of the teeth is of particular cosmetic importance.<sup>4</sup> Patients now demand not only a healthy mouth but also a perfect smile<sup>6</sup>. It has been reported that 34% of an adult population in the USA were dissatisfied with their tooth colour<sup>7</sup> and 28% of adults in the UK were dissatisfied with the appearance of their teeth<sup>8</sup>. There has been a recent increase in interest in the treatment of tooth staining and discolouration as shown by the large number of tooth whitening agents appearing on the market.

A smile has a great impact in our beauty-conscious society and when it is diminished by dental disease, it often results in loss of self-esteem and damage to physical and mental health.<sup>9,10</sup> Tooth discolouration produces profound embarrassment and more psychological distress than can only be imagined<sup>11</sup>. Negative emotions such as fear, anxiety, depression and timidity are sometimes exhibited in cases of anterior tooth discolouration. This can affect the general health and ability of an individual to participate fully in society, fulfilling roles as family members, friends, co-workers and other roles requiring interaction with others. The psychosocial consequences of tooth discolouration could be considerable.<sup>12,13</sup> Bryan and Welbury<sup>14</sup> reported that aesthetic problems in childhood and adolescence can have a significant effect on psychosocial development and interaction with peers. They further mentioned that abnormalities of shape, size, colour and structure of the whole or part of the anterior dentition of children can lead to such problems. During this developmental stage, emphasis is placed on aesthetics and attractiveness and this can have great psychosocial effect on their general wellbeing. There is dearth of literature on the psychosocial effects of anterior tooth discolouration among adolescents in Nigeria. Therefore, this study assessed the effects of anterior tooth discolouration on the psychological and social aspects of the general well-being of adolescents in Igbo-ora, a rural community southwestern Nigeria with a view to providing evidence to strengthen the case to provide standard facilities for the prevention and treatment for dental cases even in rural settings.

## MATERIALS AND METHODS

This study was a cross-sectional study carried out among adolescents aged 10 to 20 years who have been living in Igbo-ora community for 5 consecutive years preceding the time of study. Igbo-ora, a rural community and the headquarters of Ibarapa Central Local Government Area of Oyo State is inhabited by about 60,000 people whose main occupations are

farming and trading<sup>15</sup>. It is situated about 80 km south of Ibadan, the capital city of Oyo State, Southwestern Nigeria and the largest city in West Africa.<sup>15</sup>

A sample size of 384 study participants who had only permanent teeth was determined using the Kish and Leslie formula for cross-sectional studies at a prevalence of 50.0%. Four public and four private secondary schools were randomly selected from a list of government approved public and private secondary schools obtained from the Local Education Authority. A list of all junior and senior secondary school classes were obtained from the principals of the selected schools. Permission to conduct the study was obtained from the Local Government Education Authority and the school authorities. Written informed consent was obtained from the study subjects and their parents/guardians before the commencement of the study. The study was carried out in strict compliance with Helsinki Declaration on studies involving human subjects in which all participants were treated equally and no harm was inflicted.

The 384 participants were chosen by simple random sampling using ballot papers. The junior secondary school classes were twice the number of senior secondary school classes. A 26-item semi-structured questionnaire comprising two sections was administered. Section A covered socio-demographic data and section B sought participant's perception on the appearance of anterior teeth and the attendant psychosocial problems in cases of discolouration. The study attempted to determine presence of psychosocial effect through probing questions on negative emotions, on inhibitions and restricted participation in normal social activities. The content validity of the instrument was established before using it in this study.

All examinations were conducted outdoors in a well-lit space. Oral examination of the labial surface of the anterior permanent teeth was carried out with gloved hands and wooden spatulas to establish presence of tooth discolouration and their types under natural light by two examiners between 9 am and 11. This was done by comparing the colour of the tooth with Vita Shade Guide (C-101), a tooth shade guide. Prior to the oral examination, a one day training on the diagnostic criteria for the types of tooth discolouration was carried out among the examiners. The Dean Index criteria for fluorosis and the World Health Organization criteria for recording enamel disorders as outlined in its basic methods for oral health surveys<sup>16</sup> were used for this study. Other enamel disorders, such as tetracycline stain, opacities and hypoplasia were recorded if present. Extrinsic stains due to

incorporation of metallic and non-metallic compounds into plaque and calculus were also recorded.

In order to monitor the inter- and intra-examiner reproducibility in assessing type of tooth discolouration throughout the study, 15 duplicate examinations were carried out during the study. The reliability was assessed by using the unweighted kappa statistic which gave a value of 0.88 for inter-examiner reproducibility and values of 0.89 and 0.91 for the intra-examiner agreement of examiners 1 and 2 respectively.

Data were checked for completion, coded and entered into Statistical Package for Social Science version 15<sup>17</sup>. Frequencies, percentages and means were generated. Chi-square test was used to test associations between categorical variables at 5% level of significance.

## RESULTS

The age range of study participants was 10 to 20 years, with a mean age of  $14.7 \pm 2.3$  years. Table 1 shows the demographic characteristics of study subjects.

<b>Demographic characteristics</b>	<b>No</b>	<b>%</b>
Age group (years)		
12 – 15	192	50.0
16–20	192	50.0
Sex		
Male	157	41.0
Female	227	59.0
Class		
JSS	242	63.1
SSS	142	36.9

JSS – Junior Secondary School

SSS – Senior Secondary School

**Table 1:** Demographic characteristics of study participants (n=384)

Ninety four (24.5%) of the participants perceived that their anterior teeth were discoloured, out of these, 65 (69.1%) did not like the discolouration and would want the discolouration to be removed. Among those who did not like the discolouration, 43 (66.1%) mentioned that people talked about their discoloured teeth quite

often, 12 (18.5%) stated that people talked about it occasionally and 10 (15.4%) stated that people did not talk about it at all.

Table 2 shows the distribution of types of anterior tooth discolouration among study participants. One hundred and twenty (31.2%) participants had one form of anterior tooth discolouration. The discolouration in the majority 64 (16.7%) was from the incorporation of compounds into plaque and calculus that were accumulated. Fifty six (14.5%) participants had various kinds of intrinsic stains.

Table 3 shows reported psychosocial effects of anterior tooth discolouration among the study participants. Sixty two (65.9%), 47 (50.0%) and 38 (40.4%) respectively reported hindrance from freely answering questions, smiling and interacting with people.

In Table 4, age group, sex and class of study participants were significantly associated with reported psychosocial problems ( $p \leq 0.05$ ).

In Table 5, there was a statistically significant association between participants with tetracycline stained teeth and reported psychosocial problems ( $p \leq 0.05$ ).

<b>Anterior tooth discoloration</b>	<b>No</b>	<b>(%)</b>
None	264	68.8
Compounds in plaque and calculus	64	16.7
Dental fluorosis	27	7.0
Tetracycline stain	14	3.6
Enamel hypoplasia	7	1.8
Pulp necrosis	8	2.1
Total	384	100.0

**Table 2:** Types of anterior tooth discoloration among study participants (n = 384)

<b>Psychosocial effects</b>	<b>Yes</b>		<b>No</b>	
	<b>No</b>	<b>%</b>	<b>No</b>	<b>%</b>
Prevent you from answering questions freely	62	65.9	32	34.1
Prevent you from smiling freely	47	50.0	47	50.0
Affect the way you freely interact with people	38	40.4	56	59.6
Makes you unhappy	12	12.8	82	87.2

*Multiple responses*

**Table 3:** Reported psychosocial effects among participants who perceived that they had anterior tooth discolouration (n=94)

Socio-demographic characteristics	Psychosocial problems		Total	P
	Yes No (%)	No (%)	No (%)	
<i>Age group (years)</i>				
12 – 15	48 (88.9)	6 (11.1)	54 (100.0)	0.00
16–20	14 (35.0)	26 (65.0)	40 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	
<i>Sex</i>				
Male	15 (50.0)	15 (50.0)	30 (100.0)	0.03
Female	47 (73.4)	17 (26.6)	64 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	
<i>Class</i>				
JSS	38 (82.6)	8 (17.4)	46 (100.0)	0.00
SSS	24 (50.0)	24 (50.0)	48 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	

JSS – Junior Secondary School

SSS – Senior Secondary School

**Table 4:** Relationship between demographic characteristics and reported psychosocial problems among study participants who perceived that they had anterior tooth discoloration

Anterior tooth discoloration types	Psychosocial problems		Total	P value
	Yes No (%)	No (%)	No (%)	
<i>Compounds in plaque and calculus</i>				
Present	33 (66.0)	17 (34.0)	50 (100.0)	0.99
Absent	29 (65.9)	15 (34.1)	44 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	
<i>Dental fluorosis</i>				
Present	11 (64.7)	6 (35.3)	17 (100.0)	0.90
Absent	51 (66.2)	26 (33.8)	77 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	
<i>Tetracycline stain</i>				
Present	13 (92.8)	1 (7.2)	14 (100.0)	0.03*
Absent	49 (61.2)	31 (38.8)	80 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	
<i>Enamel hypoplasia</i>				
Present	5 (83.3)	1 (27.7)	6 (100.0)	0.66*
Absent	57 (64.8)	31 (35.2)	88 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	
<i>Pulp necrosis</i>				
Present	5 (71.4)	2 (28.6)	7 (100.0)	1.00*
Absent	57 (65.5)	30 (34.5)	87 (100.0)	
Total	62 (66.0)	32 (34.0)	94 (100.0)	

P\* - Fisher's exact test

**Table 5:** Relationship between anterior tooth discoloration types and reported psychological problems among study participants who perceived that they had tooth discolouration

## DISCUSSION

The first evidence of variation from normal in human dentition is an observable difference in the color.<sup>2</sup> A beautiful set of teeth gives the owner immense confidence and could be a good selling point for certain career paths. Tooth discolouration especially on the anterior teeth is a frequent dental finding, associated with clinical and esthetic problems. Tooth whitening

has become a popular treatment regime however it presents a major challenge to dentists. Tooth color distribution was part of aesthetic characters that is related to the satisfaction degrees of patients.<sup>18</sup> Alkhatib *et al.*<sup>19</sup> in their study on prevalence of self-assessed tooth discolouration in the United Kingdom reported the general public is dissatisfied with the color of their teeth and would want them changed. They further

stated that the emphasis made on changing the colour of their teeth and level of perceived dissatisfaction need to be taken into account in planning dental services.

In this study the majority of the adolescents who perceived that their anterior teeth were discoloured reported that they did not like the condition. They therefore wanted the discolouration to be removed especially as people persistently pointed their attention to it. This may have translated into many reporting one form of psychosocial effects or the other since a previous study<sup>20</sup> reported that an adolescent is more likely to express dissatisfaction with colour of the anterior teeth if people have pointed his or her attention to it. Previous studies<sup>19,21</sup> reported that members of the public are concerned about dental appearance in terms of tooth colour as indicated by their dissatisfaction with relatively mildly discoloured teeth. Many in this study who reported that their anterior teeth were discoloured mentioned that it prevented them from freely answering questions and it affected the way they freely interacted with people. This is in agreement with the conclusion made by Robinson in his study<sup>1</sup> on the influence of tooth colour on the perceptions of personal characteristics among female dental patients. He noted that physical appearance such as tooth colour plays a key role in human social interaction. Aesthetic dentistry is characterized primarily by the smile which serves as the primary means of emotional expression.<sup>22</sup> In this study, the majority stated that it prevented them from smiling freely and about sixteen percent stated that it makes them unhappy. The inability of adolescents with anterior tooth discolouration in this study to smile was also observed in a previous study conducted among Malaysian adolescents.<sup>20</sup>

After thorough clinical examination, more subjects had their anterior teeth discoloured than was self reported, this is because the aesthetic aspect of tooth colour are difficult to quantify and colour perception is highly subjective and prone to individual variation<sup>4</sup>. Another reason may be that many study subjects did not know that compounds incorporated into plaque and calculus could be a form of tooth discolouration. In this study as in a previous study<sup>23</sup>, the discolourations were mainly due to extrinsic stains from substances incorporated into plaque and calculus which have accumulated due to poor oral hygiene practices. Other types of anterior tooth discolouration such as tetracycline stain, pulp necrosis, hypoplasia and dental fluorosis were seen. Thirteen percent of the study subjects who had anterior tooth discolouration had one form of dental fluorosis or the other which is probably due to the kind of water they drank. However, a study is required to assess

the various sources of excessive consumption of fluoride in this rural environment. Therefore, anterior tooth discolouration seen in this study were those usually associated with poor oral hygiene, trauma, childhood malnutrition, preventable childhood diseases and irrational use of drugs such as tetracyclines and excessive consumption of fluoride. There is a need to intensify health education and promotion activities geared toward proper oral hygiene and nutrition, child immunization efforts and the rational use of drugs and optimal consumption of fluoride in this community. This can be accomplished through the establishment of a school oral health care programme. In this study, females and younger age group reported more psychosocial problems than their counterparts and this might be due to the great concern that they have for the appearance of their teeth. Alkhattib *et al.*<sup>19</sup> also concluded that more females and younger age group reported tooth discolouration than their counterparts. Vallitu and colleagues<sup>24</sup>, in their dental aesthetics survey of 254 subjects reported that the appearance of their teeth was found to be more important to women than men and significantly more important to the young than the old. These reasons might also explain why younger age group and females with anterior tooth discolouration had more psychosocial problems than their counterparts in this study. Mathes and Kahn,<sup>25</sup> reported that physical attractiveness was found to correlate positively with happiness and self-esteem for women and not for men, making women psychological healthy and proud of themselves than men.

In this study, adolescents in lower classes with anterior tooth discolouration reported more psychosocial problems than their counter parts. This may be a reflection of the larger number of study subjects in the lower classes than in the upper classes. Mountouris *et al.*<sup>26</sup> stated that tetracycline stained teeth is the most severe anterior tooth discolouration. This might be the reason why it is significantly associated with the reported psychosocial problems in this study since a previous study<sup>19</sup> stated that satisfaction with tooth colour decreased with increased discolouration.

In conclusion, an appreciable number of adolescents had their anterior teeth discoloured, and most consequently reported one form of psychosocial problem or the other. Psychological and psychosocial consequences of physical attractiveness in general and the teeth in particular seem to influence intellectual and emotional development and the social relations of an individual<sup>27</sup>. Oral health care practitioners and the government have roles to play in the prevention and treatment of anterior tooth discolouration among adolescents who form a major population group

through oral health education and promotion, and the provision of tooth whitening services. Oral health education on efficient oral hygiene maintenance should be given to parents and adolescents so as to prevent tooth discoloration resulting from the accumulation of plaque and calculus and the subsequent incorporation of compounds into them.

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### Declaration of interest

The authors declare that there are no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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