



The Journal of Anatomical Sciences

Email: journalofanatomicalsciences@gmail.com

J. Anat Sci 16(1)

Submitted: September 25th, 2024

Revised: January 24th, 2025

Accepted: February 12th, 2025

Dominant Traits of the Cheek and Tongue in North Central Nigeria

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ABSTRACT

Cheek dimples (small indentations on the cheeks) and tongue rolling (the ability to fold the tongue) are dominant genetic traits observed in humans. Investigating these traits provides valuable insights into genetic inheritance patterns and their cultural significance across various populations. This study aimed to assess the prevalence and ecological implications of dominant traits like cheek dimples and tongue rolling in individuals across Kwara, Kogi, and Niger states. A simple random sampling technique was used to select 348 North-Central Nigerians, including 231 males and 117 females aged 16 to 30. Data were collected on the presence or absence of cheek dimples, tongue rolling, and tongue-twisting, and analysed using Statistical Package for Social Science (SPSS). A chi-square test was conducted with a confidence interval of ± 0.5 at a 95% confidence level. Results indicated that 33% of participants had dimples, with 57% having dimples on both cheeks, 15% on the right cheek, and 35% on the left. Additionally, 48.3% of participants had parents with dimples. For tongue rolling, 66.7% of participants could roll their tongues, with 52.6%, 46.6%, 41.4%, and 53.7% able to twist their tongues to the right, left, and both directions and shape them into a U, respectively. These findings offer insights into the prevalence and variability of these traits within the population.

Keywords: cheek dimples, tongue rolling, dominant genetic traits, prevalence, ecological implication.

INTRODUCTION

Studies have shown that no two individuals are precisely the same; human differences could result from selection, migration, and mode of inheritance¹. Inheritance is the mode of transmitting biological traits from parents to offspring through genes². These traits differentiate organisms of the same species and bring about variation. Tongue rolling, widow's peak hairline, the occurrence of cheek dimples and their prevalence, and ear lobe attachment are some of these traits and are considered perfect examples of simple dominant and recessive patterns of inheritance. Therefore, these traits may be expressed or unexpressed in a given individual². Facial dimples are facial muscle deformities; they appear as slight visible indentations on the

skin's surface³. They may appear on various body parts like the abdomen, back, shoulder, or limbs. When they occur on the face, dimples are highly prized because the face is unmistakable and an essential outlet for expressing thoughts and emotions beyond words. Dimples tend to accentuate a smile, thus increasing the perception of attractiveness, sociability, and facial beauty⁴. Dimples could be transient or permanent, depending on the cause or factor responsible for their occurrence. Dimples are caused by a fault in the subcutaneous connective tissue that develops during embryonic development. A variation in the facial muscle structure may also cause dimples³.

Dimples on the face are commonly situated on the cheeks and chin. The latter occurs less frequently. Culturally amongst southwestern Nigerians, it is believed that poking a finger against the cheek of

a newborn helps in, or is responsible for, the creation of dimples. Structurally, cheek dimples occur due to a defect created by facial muscles, while chin dimple results from an underlying bony defect. Cheek dimples occur lateral to the angle of the mouth, and the presence of double or bifid zygomaticus major muscle causes it. Smiling makes the overlying skin draw inwards, and the defect becomes more extensive, making the dimples more visible. Either or both of the cheeks could present with one or more dimples, but it is more common to have dimples occurring on both cheeks (bilateral) than only one cheek (unilateral)⁴.

The tongue is a mobile organ of muscular tissues covered with mucosa membrane; it can assume various shapes and forms⁵. It is involved in the production of sounds, deglutition, and taste. The aptness to roll the lateral edge of the tongue in an upward manner into a tube is tongue rolling. The tongue muscles allow some individuals to fold their tongues into specific shapes and roll them into a tube. The rolling and folding of the tongue are often described as a dominant trait with simple Mendelian inheritance. The dominant gene is believed to be responsible for the tongue's folding and rolling. In contrast, the inability to roll and fold the tongue is associated with a recessive gene².

A study at the Delta State University showed the frequency distribution of tongue rollers and tongue folders among the Urhobo people of Nigeria. The frequency and incidence showed higher rates in females than in males. These differences, however, did not show any significant statistical difference, $p > 0.01$ ⁷. However, there is yet to be a comprehensive study to show the frequency distribution of tongue rollers and tongue folders among the population resident in the North-central zone of Nigeria to establish the degree of presence and environmental role of possession of the dominant traits of dimple indentation of the cheeks and tongue rolling among individuals absence of the dominant traits of dimple indentations on the cheeks and the rolling up of tongue among inhabitants of Kwara, Kogi and Niger states. Hence, this study is needed.

MATERIALS AND METHODS

A sample survey was selected over a census survey. Probability sampling was utilised as no

individuals were preselected, and the participating parties were selected based on availability. To estimate the sample size, the formula. $\frac{Z\alpha^2 \times Pq}{d^2}$, where

$Z\alpha$ = margin of error of ± 0.5 at a 95% confidence level,

P = estimated proportion derived by adding the difference of the error main with the confidence level and dividing by two numerators $\frac{(1-0.5)+0.95}{2}$
= 0.725~ 0.72⁸.

$q = 1 - p$,

d = response rate of 50%⁹.

so, therefore, $\frac{1.96^2 \times 0.72 \times (1-0.72)}{0.05^2} = 309.7 \sim 310$

taking 10% of the sample size as attrition rate, the sample size will be 310+31=341.

A two-page questionnaire was prepared in paper format. The study was adequately explained to the participants, and consent was obtained orally.

Data collection

About 360 copies of the questionnaire were printed and distributed among the students of the University of Ilorin located via the state student associations of Kwara, Kogi, and niger states. When possible, some were personally interviewed to avoid the misfiling of the questionnaires.

Statistical analysis

The collected data were then turned over to a statistician for accurate calculation, data capture, coding, editing, and data analysis.

RESULTS

Out of the three hundred and sixty copies of questionnaires printed and distributed, three hundred and forty-eight were returned (seven more subjects than the computed sample size). The subjects comprised two hundred and thirty-one males and one hundred and seventeen females; the minimum age was sixteen years, and the maximum was thirty years. The ethnicities encompassed in the study of the subjects were the

Gwari, Ebira, Hausa, Igala, Nupe, Yoruba, etc (Table 1).

Of the three hundred and forty-eight subjects, one hundred and sixteen (117) possessed dimples. In contrast, two hundred and thirty-two (232) did not possess dimples. Out of the one hundred and sixteen possessing dimples, fifty-nine (59) had dimples on both cheeks; seventeen (17) had dimples on their right cheek; forty (40) had dimples on their left cheek.

Table 2 shows the frequency of cheek dimples among the study population, the location of cheek

dimples (unilateral or bilateral), whether they only appear in the event of smiling, and the frequency of disappearing dimples.

Table 1: Socio-demographic variables of respondents

Variables	Frequency n (%)
Age group	
≤ 18	56 (16.1)
19 – 21	140 (40.2)
22 – 24	111 (31.9)
25 – 27	37 (10.6)
28 – 30	4 (1.1)
Sex	
Male	231 (66.4)
Female	117 (33.6)
Ethnicity of father	
Gwari	21 (6.0)
Ebira	28 (8.0)
Hausa	35 (10.1)
Igala	42 (12.1)
Nupe	65 (18.7)
Yoruba	144 (41.4)
Others	13(3.7)
Ethnicity of Mother	
Fulani	7 (2.0)
Igbo	7 (2.0)
Gwari	19 (5.5)
Ebira	26 (7.5)
Igala	31 (8.9)
Hausa	37 (10.6)
Nupe	51 (14.7)
Yoruba	136 (39.1)
Others	34(9.8)

Table 2: Illustration of Respondents who have dimple

Variables	Kwara n (%)	Kogi n (%)	Niger n (%)	Total n (%)
Possession of dimples				
Yes	42 (36.2)	41 (35.3)	33 (28.4)	116 (33.3)
No	74 (63.8)	75 (64.7)	83 (71.6)	232(66.7)
Location (n = 116)				
Both cheek	23 (54.8)	19 (46.3)	17 (51.5)	59 (50.9)
Right cheek	7 (16.7)	4 (9.8)	6 (18.2)	17 (14.7)
Left cheek	12 (28.6)	18 (43.9)	10 (30.3)	40 (34.5)
Appearance when smiling (n = 116)				
Yes	32 (76.2)	31 (75.6)	28 (84.8)	91 (78.4)
No	10 (23.8)	10 (24.4)	5 (15.2)	25 (21.6)
Presence of dimples in the past				
Yes	5 (4.3)	7 (6.0)	2 (1.7)	14 (4.0)
No	111 (95.7)	109 (94.0)	114 (98.3)	334 (96.0)
Age at disappearance				
Mean \pm SD	12.00 \pm 3.74	11.57 \pm 1.99	9.00 \pm 1.41	

One hundred and sixty-eight subjects (48.3%) had parents with dimples, while one hundred and eighty subjects had parents without dimples. From the answers received from the subjects about the relationship between parents and relatives with dimples and possession of dimples, the

probability of inheriting cheek dimples from the father was calculated at 5.836, 12.313 at the mother, and 6.384 from other relatives (Table 3) $p < 0.01$. Data was expressed as mean \pm SEM; if the difference between the mean is <0.05 , it is statistically significant.

Table 3: Relationship between parents and relatives with dimples and possession of dimples

Respondents with dimple	Father with dimple			χ^2	p-value	OR (95%CI)
	Yes n (%)	No n (%)	Total n (%)			
Yes	59 (62.8)	57 (22.4)	116 (33.3)	50.205	<0.001*	5.836 (3.493-9.718)
No	35 (37.2)	197 (77.6)	232 (66.7)			
	Mother with dimple					
Yes	82 (68.3)	34 (14.9)	116 (33.3)	100.966	<0.001*	12.313 (7.249-20.915)
No	38 (31.7)	194 (85.1)	232 (66.7)			
	Relatives with dimple					
Yes	89 (53.0)	27 (15.0)	116 (33.3)	56.395	<0.001*	6.384(3.837-10.621)
No	79 (47.0)	153 (85.0)	232 (66.7)			

With a P-value of < 0.001 , there is a significant relationship between the father, mother, and relative with the offspring with the highest odds

ratio of inheritance belonging to the mother (12.313)

Table 4 shows the result of the personal and socio-cultural perception of people with cheek dimples. It shows a majorly positive attitude towards persons with dimples, with a negative percentage of 1.1 and an indifferent perception of 43.7%. 69.5% of the respondents, who reported an

indifferent cultural perception of cheek dimples. 51.1% reported that they found dimples attractive; 45.1% were indifferent to the question, while 3.7% did not find dimples attractive. When asked if they found dimples a deformity, 10% answered yes, 78.4% answered no, and 45.1% said they did

not. 46.6% of the population without dimples were indifferent to the prospect of having dimples, while 27.6% answered yes and 25.9% answered no.

Table 4: Social effect of possession of dimple

Variable	Frequency n (%)
Attitude towards dimples and those who have them	
Positive	192 (55.2)
Negative	4 (1.1)
Indifferent	152 (43.7)
View of society and culture towards people with dimples	
Positive	103 (29.6)
Negative	3 (9)
Indifferent	242 (69.5)
Do you find the presence of dimples attractive?	
Yes	178 (51.1)
No	13 (3.7)
Indifferent	157 (45.1)
Do you view the presence of a dimple as a deformity?	
Yes	36 (10.3)
No	273 (78.4)
Do not know	39 (11.2)
Do you love to have dimple (in case you do not have one) (n=232)	
Yes	64 (27.6)
No	60 (25.9)
Indifferent	108 (46.6)

Of the three hundred and forty-eight subjects surveyed, 66.7% could roll their tongue, while 33.3% could not. 52.6% could twist their tongues upside down in the right direction, while 47.4% could not. 46.6% could twist their tongue upside

down in the left direction, while 53.4% could not. 41.4% could twist their tongues upside down in both directions, while 58.6% could not. 53.7% could shape their tongue in a U shape, while 46.3% could not.

Table 5: Respondents who can roll or twist their tongue

Variable	Frequency n (%)
Roll tongue	
Yes	232 (66.7)
No	116 (33.3)
Age (years) at discovery (Mean \pm S.D.)	4.49 \pm 0.94
Twist tongue upside down in the right direction.	
Yes	183 (52.6)
No	165 (47.4)
Age at discovery (Mean \pm S.D.)	4.71 \pm 0.97
Twist tongue upside down in the left direction.	
Yes	162 (46.6)
No	186 (53.4)
Age at discovery (Mean \pm S.D.)	4.83 \pm 0.99
Twist your tongue upside down in both directions.	
Yes	144 (41.4)
No	204 (58.6)
Age at discovery (Mean \pm S.D.)	4.90 \pm 0.93
Make your tongue into the shape "U."	
Yes	187 (53.7)
No	161 (46.3)
Age at discovery (Mean \pm SD)	4.65 \pm 0.93

Table 6: Relationship between parents who can roll their tongues and respondents who can

Respondent can roll tongue	Parents can roll their tongue			χ^2	p-value	OR (95%CI)
	Yes n (%)	No n (%)	Total n (%)			
Yes	110 (93.2)	122 (53.0)	232 (66.7)	56.649	<0.001*	12.172(5.675-26.105)
No	8 (6.8)	108 (47.0)	116 (33.3)			

P-value = 0.001, the odds ratio (chance) of inheriting the tongue-rolling traits is 12.172.

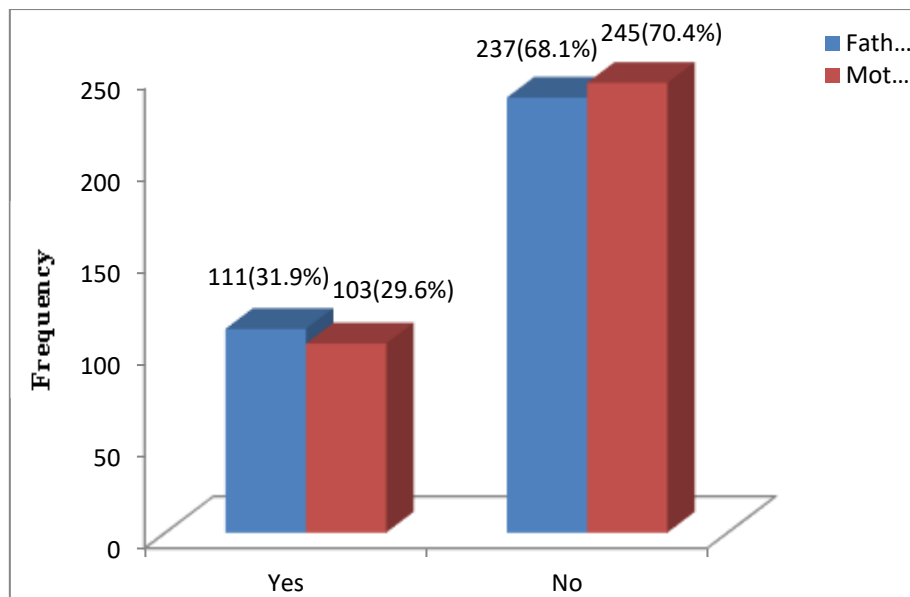


Figure 1: Bar chart comparing the frequency and percentage of Parents who can roll or twist their tongue and those who cannot.

DISCUSSION

This study shows the incidence rate of cheek dimples in north central Nigeria as 33.3% compared to the 29.4% recorded in south-west Nigeria¹⁰. 37% recorded in the south-south and 37.7% recorded in the south-east, respectively, in similar studies¹¹. The dominant genes responsible for the inheritance of cheek dimples have been suggested to be located on chromosome 5. The incidence of cheek dimples in the subjects appeared to depend on the possession of cheek dimples from the maternal side. Both dominant genes reside in people who express these dominant traits. Most respondents (55.2%) reported a positive attitude toward cheek dimples compared to 43.7% and 1.1% who reported indifferent and hostile attitudes, respectively. 69.5% of the respondents reported indifferent socio-cultural views, while 0.9% and 29.6% reported negative and positive socio-cultural views. 4% of the total population of the test subject reported having cheek dimples in childhood that disappeared at the mean ages of 12.00 ± 3.74 , 11.57 ± 1.99 , and 9.00 ± 1.41 for Kwara, Kogi, and Niger states, respectively. At the same time, studies carried out by Wiedemann¹² reported that cheek dimples disappear at the ages of 13 and 14, which seemed to be inherited from the maternal side. 51.1% of the subjects found the presence of cheek dimples in people attractive. 46.6% of the subjects without cheek dimples were indifferent to the prospect of having them, while

27.6% answered in the affirmative, and 25.9% replied in the negative. 78.4% of the subjects answered that they did not view cheek dimples as a deformity, 10.3% answered that they did, and 11.2% were undecided.

Bilateral and unilateral cheek dimples occurred more frequently in females than males. A male is more likely to have a unilateral right cheek dimple than a left cheek dimple, while a female is more likely to have a unilateral right cheek dimple than a left dimple⁴. However, this could not be ascertained by this study. The current study shows the relationship between respondents with dimples vis-a-vis their parents and relatives. With a p-value of < 0.001 , there is a significant relationship between the father, mother, and relative with the offspring with the highest odds ratio of inheritance belonging to the mother (12.313)

A similar study concerning tongue rolling and folding traits in south-south Nigeria observed a higher incidence of tongue rollers in females⁷. It showed that the ability to roll the tongue in males was 63.1% and 66.84% in females; this is not different from previous studies reported by Nayak *et al.*¹³. This study could not determine these; however, 66.7% of the subjects could roll their tongue, while 33.3% could not. The mean age of the first discovery for this was 4.49 ± 0.94 . The probability of inheriting the tongue rolling trait from parents by the respondents was calculated as 12.17 at a 95% confidence interval $p < 0.01$.

This study shows the relationship between the respondents who can roll their tongues and their parents. With a p-value of 0.001, a significant relationship exists between the odds ratio (chance) of inheriting the tongue-rolling traits and the p-value of 12.172.

CONCLUSION

The study highlights the significant genetic influence on the expression of cheek dimples and tongue rolling, with inheritance playing a critical role, particularly in the case of cheek dimples where maternal transmission appears dominant. Attitudes towards cheek dimples were predominantly positive, while socio-cultural perceptions tended to reflect general indifference, and tongue rolling showed a substantial likelihood of inheritance from parents.

Funding: This study received no funding

Conflict of interest disclosure: The authors declare that they have no conflict of interest

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