



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - Manuscript ID MJMHS-2023-1307

1 message

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Tue, Oct 31, 2023 at 6:25 PM

Reply-To: sploh@upm.edu.my

To: indrani@trisakti.ac.id

31-Oct-2023

Dear Dr. Sulistyowati:

Your manuscript entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" has been successfully submitted online and is presently being given full consideration for publication in the Malaysian Journal of Medicine & Health Sciences.

Your manuscript ID is MJMHS-2023-1307.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/mjmhs> and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to <https://mc.manuscriptcentral.com/mjmhs>.

Thank you for submitting your manuscript to the Malaysian Journal of Medicine & Health Sciences.

Sincerely,
Malaysian Journal of Medicine & Health Sciences Editorial Office



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - MJMHS-2023-1307 has been unsubmitted

2 messages

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Thu, Nov 23, 2023 at 7:01 AM

Reply-To: mjmhs@upm.edu.my

To: indrani@trisakti.ac.id

Cc: sploh@upm.edu.my, mjmhs@upm.edu.my, eic_mjmhs@upm.edu.my

23-Nov-2023

Dear Dr. Sulistyowati:

Your manuscript, MJMHS-2023-1307, entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" has been unsubmitted to the Malaysian Journal of Medicine & Health Sciences. It may either have been unsubmitted at your request or because you did not complete all necessary parts of the submission.

1) The Originality Report for the above-referenced manuscript is now available. When the need for academic integrity is paramount, editorial members at Malaysian Journal of Medicine and Health Sciences read the Originality Report sentence-by-sentence for improper citations and make recommendations accordingly. Please revise and edit your manuscript with reference to the Originality Report. In it, you will notice a few portions, in terms of poor quoting, paraphrasing, and summarizing, were highlighted in different colors to indicate primary sources (e.g., please see the Abstract). All sources must be credited.

Please read through the Originality Report for citation errors and make all necessary changes. Please visit <https://libguides.murdoch.edu.au/Vancouver/text>, http://aacc.tums.ac.ir/public/Vancouver_style_guide.pdf, and <https://guides.lib.monash.edu/citing-referencing/vancouver-intext> on how to make quotations. For direct quotations, authors must use double quotation marks to enclose the direct text and also must provide the page number that the direct text was taken from.

For example:

"The increasing availability and growth rate of biomedical information, also known as 'big data', provides an opportunity for future personalized medicine programs that will significantly improve patient care" (1 p. 433).

as one author has put it "the darkest days were still ahead" (1 p. 23).

"...has been proven demonstrably false" (4 p. 23).

It is helpful if authors disclose a summary statement in the Acknowledgement that confirms that portions of the study were submitted for a degree at a university or institute of learning. That way our editorial staff will know in advance that they will encounter a highly matched abstract.

See below examples of disclosures:

This paper is based on a dissertation submitted in partial fulfillment of the requirements for the PhD degree at McMaster University.

Based on a portion of a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at The University of Michigan, under the direction of Dr. John M. Allen.

This study is based on portions of a doctoral dissertation submitted by the first author to the State University of New York at Stony Brook.

This paper is based on portions of a dissertation submitted by the senior author to the Graduate School of Ohio State University, in partial fulfillment of the requirements for the degree, Doctor of Philosophy.


This paper is based upon portions of a dissertation submitted by the first author in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology at the State University of New York at Stony Brook.

This study is based on portions of a doctoral dissertation submitted by the first author, under the direction of the second author, to the Psychology Department, Michigan State University.

PLEASE RESUBMIT YOUR MANUSCRIPT USING THIS ARTICLE ID.

Please visit the instructions to authors to complete your submission and re-submit the manuscript for consideration of publication. You may contact the Editorial Office if you have further questions.


Sincerely,
Malaysian Journal of Medicine & Health Sciences Editorial Office

 **MJMHS-2023-1307.pdf**
2212K

Indrani Sulistyowati <indrani@trisakti.ac.id>
To: annisaa.ariyani@trisakti.ac.id

Thu, Dec 7, 2023 at 6:27 AM

[Quoted text hidden]

 **MJMHS-2023-1307.pdf**
2212K

GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR

Abstract

Introduction: A person's smile, can improve the first impression in interpersonal interactions, which is known as one of the ways to get positive feedback from society. In dental aesthetics, smile analysis helps dentists arrange a patient's appropriate dental treatment plan, which is influenced by balancing and harmonizing the maxillary incisor display and the buccal corridor. This present study was intended to determine the differences between the maxillary incisor display and the buccal corridor based on the social smiles exhibited by males and females. **Materials and Methods:** This analytical observational study was conducted using a cross-sectional design. A total of 110 profile photographs, consisting of 55 males and 55 females who met the inclusion criteria, were taken when the subjects made a social smile. It was then measured using CorelDraw Graphic Suite 2022 and analyzed using the Chi-Square Test. **Results:** A significant difference was found in the buccal corridor between males and females, with a significance value of 0.022 ($p < 0.05$). However, no significant difference was found in the maxillary incisor display on both, with a significance value of 0.979 ($p < 0.05$). **Conclusion:** A difference in a social smile was found based on the component of the buccal corridor in males and females. However, no differences in the maxillary incisor display were observed.

Keyword: smile, social smile, maxillary incisor display, buccal corridor

INTRODUCTION

Smiling is a behavior that conveys positive emotions, such as happiness, pleasure, friendliness, and appreciation, and may contribute to facial attractiveness. This expression was supported by a dynamic and complex movement that involves the simultaneous interaction of several facial muscles.(1,2) An attractive and pleasant smile may improve interpersonal relationships and often determine how well a person mingles with society.

A smile is anatomically defined as a facial expression resulting from the contraction of the facial muscles around the mouth. This contraction stretches the midline of the lips laterally, elevates the mouth corners, and highlights the *sulcus nasolabialis*. Furthermore, it has been observed that the act of smiling results in the narrowing of the eye slits and the development of fine lines on the outer corners of the eyes. The mouth usually slightly opens, revealing the maxillary anterior teeth.(3) The *musculus zygomaticus major* is the primary muscle involved in creating a smile. This muscle elevates the mouth corners upward and outward, leading the lips to form a smile.(4) Other facial muscles such as *musculus risorius*, *musculus levator anguli oris*, *musculus zygomaticus minor*, and *musculus buccinator* also contribute to creating a smile.(3)

Smiles can be categorised into two types: a controlled smile (social or *non-Duchenne* smile) and an uncontrolled smile (genuine or *Duchenne* smile). A social smile, or *non-Duchenne*, occurs when *musculus zygomaticus major* and *musculus levator labii superioris* contract and raise the upper lip forming *sulcus nasolabialis*. *musculus levator labii superioris* contraction results in the superiorly raising of the upper lip in the region of the anterior teeth. Whereas, *musculus zygomaticus major* contraction attracts the mouth corner superiorly and laterally until it meets the resistance area of the adipose tissue of the cheek. The *musculus*

buccinator then helped in further elevating the lips.(5–9) Contrary to a social smile, a genuine smile, known as *Duchenne*, is characterized by squinting while smiling. It occurs when the *musculus orbicularis oculi* and *musculus zygomaticus major* coordinate to support the maximum elevation of the upper lip.(6)

An aesthetic smile may have an impact on a person's attractiveness. Thus, it becomes one of the important factors that may affect a person's psychosocial health. A person with an aesthetically pleasing smile is often perceived as smarter and more valued due to their display of preferred behaviours in social interactions.(10,11) In accordance with this statement, Pithon et al., (12) asserted that a person with an aesthetically pleasing smile has a higher chance of getting a job because they appear more intelligent. As more people realize the benefits of an aesthetic smile, more people are looking to improve the attractiveness of their smile through various cosmetic treatments such as plastic surgery and dental treatments such as orthodontics, periodontal surgery(13), and orthognathic surgery.(14)

Dentists need to evaluate a patient's smile when arranging a dental treatment plan to ensure that the treatment won't harm its appearance. This evaluation includes analyzing the harmony and balance of the patient's smile components.(15) The components of smile include the lip line, the smile arch, the upper lip curvature, the buccal corridor, the smile symmetry, the occlusal frontal plane, the dental components, and the gingival components.(3) One important dental component to be considered is the maxillary incisor display.(16,17) The maxillary incisor display plays a crucial role in achieving an aesthetically pleasing smile, particularly in prosthodontic treatments that involve replacing anterior teeth.(18) Excessive display of the maxillary incisor can negatively affect the appearance and attractiveness of a person's smile.(19) The buccal corridor is another component that should also be considered, as it contributes to a more natural-looking smile.(20)

The maxillary incisor display is the vertical length of the central incisors that are visible during mouth rest or function.(18) According to Jeelani et al.,(21) the maxillary incisor display in females is generally greater than that of males. This might be caused by the different vertical length of the upper lips among genders.(21,22) However, Bahirrah et al.,(23) did not find a significant difference in maxillary incisor display between genders. The aging process may affect the maxillary incisor display due to the loss of elasticity in the lip muscles.(24)

Another key aspect to consider when assessing smile aesthetics is the buccal corridor.(8) It refers to the black or dark area visible between the buccal surface of posterior teeth and the lip corner during smiling. Its appearance may give the illusion of a natural-looking smile.(25) Smiles with minimal buccal corridor (0%-10% buccal corridor) are considered the most attractive smile, whereas smiles with an extensive buccal corridor (15%-25% buccal corridor) are considered less attractive.(25,26) Research by Ira(27) suggested a significant difference in the buccal corridor between males and females due to the different shape of the jaw forming the buccal corridor. However, Analia et al.,(22) stated that gender has no impact on the variation in the width of the buccal corridor and does not interfere with the assessment of the buccal corridor.

Based on the background mentioned above, including the contradictory findings from previous studies, the present study aims to determine if there is a difference in the maxillary incisor display and buccal corridor between males and females based on their type of social smile.

MATERIALS AND METHODS

Our present study conducted analytical observational research using a cross-sectional design in the Laboratory of the Faculty of Dentistry, Universitas Trisakti, from October until December 2022. The Research Ethics Commission at the Faculty of Dentistry, Universitas

Trisakti, approved all procedures for this study. with the assigned number 021/S3/KEPK/FKG/6/2022. From a total of 289 participants, only 110 participants (50 males and 50 females) ranging in age from 17 to 24 years had complete upper teeth distributed uniformly on both the right and left sides, with healthy periodontal tissue. Participant who have had dental treatments on the anterior teeth such as orthodontic, conservative, and prosthodontic treatment; had facial trauma that may interfere with the movement of facial expression muscles; had experienced a damage to the anterior teeth, dental trauma, disease, or steroid drug intake that may lead to changes in facial appearance; had no facial aesthetic treatment such as lip fillers or *botox*; and for men, had no moustache due to blocking the point measurement on the lip corners was excluded. Furthermore, we explained the research procedure to the subject, who confirmed their agreement with the signing of the informed consent form.

Photograph Capture

The same operator captured all photographs in the laboratory under natural sunlight using a Canon EOS-600D with an 18-megapixel resolution, ISO 100–6400, and an 18–135 mm lens. The camera is mounted on a tripod and placed in front of the subject at a distance of 30 cm. The points of interest included the top of the forehead, the lower edge of the chin, and both earlobes. Makeup should be removed. To obtain head photographs in neutral head position (NHP), the subject was instructed to sit upright and stare straight ahead at the spot at eye level on the wall in front of them. A waterpass attached to the glasses was worn by the subject to maintain his or her head's position at NHP. Moreover, an elbow ruler was also equipped with waterpass to confirm their position parallel to the floor. This technique was introduced by Maniyar, et al.(28)

Afterwards, the subject was instructed to say "cheese" to produce a social smile and pose a bigger smile to obtain the height of the cervicoincisal of the maxillary central incisor. A

20 x 30 cm elbow ruler was used as a benchmark for further measurement and placed on the right side aligned with the subject's head while capturing photographs (Figure 1).

Photograph Assessment

Photographs were assessed using *parallel dimension tools* in CorelDraw Graphic Suite 2022 by two calibrated examiners who were both healthy and stable emotionally. The smile components that would be evaluated were:

- Maxillary Incisor Display: the comparison of the central incisor length from the top of the cervical line to the incisal edge while smiling with the exact tooth. The score was presented in percentage, then described in terms of three types of smiles: low, average, and high.(23,29) A low smile is defined when less than 75% of the maxillary incisor is seen while smiling. An average smile is defined as 75–100% of the maxillary incisor and inter dental papilla being seen while smiling. Whereas, when a complete cervicoincisal maxillary incisor (100%) with some amount of gingival margin is seen, it is called a high smile.
- The buccal corridor: was known as the dark space that appears between the buccal surface of the last teeth of the maxillary posterior displayed during smiling and the inner commissure. It was calculated by dividing the difference between the width of the inner commissure and the width of the visible maxillary teeth by the width of the inner commissure, and then it was presented as percentages and categorized into six types of smiles: extra broad (0% buccal corridor), broad (5% buccal corridor), medium-broad (10% buccal corridor), medium (15% buccal corridor), medium-narrow (20% buccal corridor), and narrow (25% buccal corridor)(30).

Statistical Analysis

A Chi-square test was performed to determine if there was a significant difference in the appearance of smile components (the maxillary incisors and buccal corridor) and gender (male and female). Significant level was set at 0.05.

RESULT

A total of 110 participants, consisting of 55 males and 55 females, were recruited for the present study. Profile photographs were captured while these subjects were socially smiling. An elbow ruler, 20 x 30 cm, was employed as a reference for measurement.

Interrater Reability

To determine the reliability of two calibrated assessors measuring the maxillary incisor display and buccal corridor, Cohen's Kappa was performed and showed the *kappa* coefficient values for the maxillary incisor display and buccal corridor were 0,831 and 0,812, respectively (Table 1). These indicated that the agreement degree between two assessors was almost perfect.

The Maxillary Incisor Display

Low smile was frequently observed among the genders in both males (50,9%) and females (52,7%) followed by average smile (male 36,4% and female 34,5%) and high smile (male 12,7% and female 12,7%) (Figure 2 – 4). There was no statistically significant difference in the maxillary incisor display based on gender ($p > 0,05$).

The Buccal Corridors

The buccal corridor-based smile frequency pattern was differently distributed between genders (Figure 5 – 7); medium-broad (10% buccal corridor) was the most observed among participants in both males (40%) and females (34,5%), followed by broad (male 18,2% and female 27,3%), extra broad (male 7,3% and female 18,2%), medium (male 16,4% and female 9,1%), medium-narrow (male 12,7% and female 3,6%) and narrow (male 5,5% and female 7,3%). The least observed in males and females were narrow (25% buccal corridor) and medium-narrow (20% buccal corridor), respectively. Due to the fact that the chi-square test revealed that the value did not meet the requirement and more than 20% of the cells had less than the expected value, Mann-Whitney was performed as the alternative method, and it showed that the buccal corridor among genders was significantly different.

DISCUSSION

The smile components must be considered by dentists as a reference in planning patient dental treatment in order to achieve an aesthetic smile. The maxillary incisor display and buccal corridor are two components which have a considerable impact on a person's smile's beauty. As a result, the present study aimed to observe differences in maxillary incisor display and buccal corridor between males and females when performing social smiles.

A total of 110 photographs from 55 male and 55 female participants were collected for the present study. Two calibrated assessors used Corel Draw Graphic Suite 2022 to measure the maxillary incisor display and buccal corridor. The Cohen's Kappa test was first performed to determine the strength of agreement in measuring between them. The Kappa coefficient values on the maxillary incisor display and buccal corridor were 0.831 and 0.812, respectively (Table 1). These indicated that the strength of the measurement agreement between the two assessors was almost perfect, meaning that the data can be trusted.

No significant difference between genders in maxillary incisor display was found in this study. Most participants were classified as having a low smile, males (50.9%) and females (52.7%), followed by an average smile (males 36.4%, females 34.5%) and a high smile (males and females 12.7%). This finding is consistent with a previous study(23) which found that low smile was the second most common smile among the gender. However, it was in contrast to previous study(18). They reported that the maxillary incisor crown visible during smiling was longer in women than in men. The contrast might be due to a difference in measurement techniques and ethnicity between the participant population.

The appearance of maxillary incisor display when smiling depends on the contribution of *musculus zygomaticus major* and *musculus levator labii superioris*, depending on which muscle contracts more dominantly. Iwanaga et al,(6) explained in their research, when *musculus zygomaticus major* is dominant, the mouth corners are lifted superiorly and laterally then *musculus levator labii superioris* raises the upper lip and exposes the maxillary teeth. In other hand, when *musculus levator labii superioris* is dominant and firstly contracts, the maxillary incisor teeth are revealed up to the canines. The simultaneous contraction of *musculus depressor labii inferioris* also contributes to the smile pattern, revealing the entirety of the upper and lower teeth.

The maxillary central incisor display during smiling may decrease with age in both males and females from 20 years of age.(18,24) Facial muscle exercises could help to create an aesthetic smile and prevent muscle sagging.(18) The dentoalveolar height of the anterior maxilla has also been shown to have a relationship with the excess of maxillary incisors display. Excessive anterior maxillary height is likely to result in gummy smile exposure(21) and reduce the aesthetic value of the smile.(31)

The assessment of smile aesthetics includes the evaluation of the buccal corridor(32) which is now known as the dark space between the buccal surface of the last of the maxillary posterior

teeth displayed during smiling and the inner commissure.(16,25) Its presence was important for a natural-looking smile. The excessive buccal corridor, more than 15% (narrow smile), was considered as less attractive by orthodontists and dental students.(33)

Most participants were classified as having a medium-broad smile, males (40%) and females (34,5%). The results also show that males tend to have a medium to a narrow smile, while women tend to have a broad to a very broad smile. This finding was in agreement with previous study(22) which found that the buccal corridor in females was mostly classified as medium-broad smile (32.9%) whereas in males, most of buccal corridor was categorised as a medium smile (58,3%). This indicated that females have a wider smile than males. This study found a significant difference in buccal corridor among genders. Hadi et al.,(34) also found a significant difference in buccal corridor among the genders, but stated that males tended to have an extra broad smiles than females. The difference might be due to differences in the technique used to measure the buccal corridor.

Its appearance is affected by various factors, such as the width of the maxillary arch, the facial muscles, the labial surface of the maxillary premolars, and the prominence of the canines, particularly at the distal marginal ridge.(22,25,35) The maxillary arch has a direct impact on the buccal corridor. A broad arch that forms a U shape is considered an ideal arch. However, a narrow arch is considered an unattractive arch because it has a wide buccal corridor.(36) The facial type also contributes to the appearance of the buccal corridor. A medium smile was seen in the dolichofacial facial type. A medium-broad smile was seen in those with mesofacial. Whereas, the brachyfacial tends to have a broad smile.(22) Furthermore, as people age, changes occur in the facial muscles that result in a loss of muscle elasticity and tone.(17)

The lack of age group variation, such as young adulthood, adulthood, and the elderly, is a limitation of our study because the maxillary incisor display(17,18) and buccal corridor(17)

may change with age. Further research is needed with more focus on the type of smile, upper lip contraction, dental appearance, and gingival tissue in different age groups. This study shows that the use of individual profile photos during social smiling can be used for evaluation in the preparation of dental treatment plans. Clinicians should remember that a small change in the maxillary incisor and buccal corridor may significantly affect the perceived aesthetics of the smile.

CONCLUSION

The study found significant differences in the buccal corridor between male and female social smile types, but no significant differences in maxillary incisor display.

ACKNOWLEDGMENT

The authors were grateful for the assistance provided by the technical and support staff at the Anatomy Subsection, Department of Oral Biology, Faculty of Dentistry, Universitas Trisakti.

REFERENCE

1. Sapkota B, Srivastava S, Koju S, Srii R. Evaluation of Smile Line in Natural and Forced Smile Position An Institution-based Study. *Orthodontic Journal of Nepal*. 2017;7:27–32.
2. Machado AW. 10 commandments of smile esthetics. *Dental Press J Orthod*. 2014 Jul 1;19(4):136–57.
3. Abdurachman. *Anatomi Senyum Kajian Kinesiologi*. Vol. 1. Airlangga University Press; 2018.
4. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. Perspektif anatomi dan antropometri pada senyum. Vol. 2. 2020.
5. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. Perspektif anatomi dan antropometri pada senyum. Vol. 2. 2020.
6. Iwanaga J, Hur MS, Kikuta S, Ibaragi S, Watanabe K, Tubbs RS. Anatomical contribution of the orbicularis oculi to the zygomaticus major: An improved

- understanding of the smile with consideration for facial cosmetic procedures. *PLoS One*. 2022 Jul 1;17(7 July).
7. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
 8. Sabri Roy. The eight components of a balanced smile. *J Clin Orthod*. 2005;39(3):155–67.
 9. Rubin LR; MYLG. Anatomy of the Nasolabial Fold: The Keystone of the Smiling Mechanism. *Plastic and Reconstructive Surgery*. 1989 Apr 9;
 10. Vandeventer J, Patterson E. Differentiating Duchenne from non-Duchenne smiles using active appearance models. In: 2012 IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems (BTAS). 2012. p. 319–24.
 11. Alexandra S, Anggraini W, Sulistyowati I, Putri Ariyani A. Lengkung Senyum dan Tampilan Gingiva Pada Senyum. *Jurnal Kedokteran Gigi Terpadu* [Internet]. 2023 Jul 4;5(1). Available from: <https://e-journal.trisakti.ac.id/index.php/jkgt/article/view/16885>
 12. Pithon MM, Nascimento CC, Barbosa GCG, Coqueiro RDS. Do dental esthetics have any influence on finding a job? *American Journal of Orthodontics and Dentofacial Orthopedics*. 2014 Oct 1;146(4):423–9.
 13. Effendi Nasution E, Octavia Nasution R. Penatalaksanaan Aesthetic Crown Lengthening untuk Perawatan Gummy Smile Berhubungan dengan Altered Passive Eruption. *Clinical Dental Journal* UGM. 2020;6(2).
 14. Wang C, Hu WJ, Liang LZ, Zhang YL, Chung KH. Esthetics and smile-related characteristics assessed by laypersons. *Journal of Esthetic and Restorative Dentistry*. 2018 Mar 1;30(2):136–45.
 15. Batwa W, Grewal B, Gill D. Smile analysis: what to measure. *Dent Update* [Internet]. 2014;41(6):483–9. Available from: <https://doi.org/10.12968/denu.2014.41.6.483>
 16. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
 17. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
 18. Zaini NA, Rikmasari R, Damayanti L. Difference in clinical crown length of maxillary central incisors and gingival display at rest and during smiling based on gender. *Padjadjaran Journal of Dentistry*. 2013;25(1):48–56.
 19. Pausch NC, Katsoulis D. Gender-specific evaluation of variation of maxillary exposure when smiling. *Journal of Cranio-Maxillofacial Surgery*. 2017 Jun 1;45(6):913–20.
 20. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
 21. Jeelani W, Fida M, Shaikh A. The maxillary incisor display at rest: Analysis of the underlying components. *Dental Press J Orthod*. 2018;23(6):48–55.

22. Analia Y, Ismaniati NA, Purbiati M. Gambaran Komponen Senyum Pasien Sebelum Perawatan Ortodonti (Kajian Foto Frontal di Klinik Ortodonti RSGMP FKG UI). Indonesia Indonesian Journal of Dentistry [Internet]. 2008;15(1):23–8. Available from: <http://www.fkg.ui.edu>
23. Bahirrah S, Sitorus O. Gambaran Tipe Senyum Berdasarkan Fotometri Pada Mahasiswa India Tamil Malaysia Fkg Usu (Smile Analysis With Photometric Methods Of Malaysian Indian Tamil Dentistry Students At University Of Sumatera Utara). Vol. 18, dentika Dental Journal. 2015.
24. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
25. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
26. Tikku T KRMARAN. Role of buccal corridor in smile esthetics and its correlation with underlying skeletal and dental structures. *Indian J Dent Res Mar-Apr;23(2):187-94* . 2012;23(2):187–94.
27. Ira Latifatul Mufidah. Perbedaan Komponen Senyum Berdasarkan Jenis Kelamin Pada Mahasiswa Fakultas Kedokteran Gigi Universitas Jember Angkatan 2008. [Jember]: Faculty of Dentistry, Jember University; 2012.
28. Maniyar M, Kalia A, Mirdehghan N, Nene S, Bhagwagar P. Evaluation of the Influence of Gingival Display on Smile Esthetics in Indian Females-A Computer-Aided Photographic Analysis. *Journal of Indian Orthodontic Society*. 2018 Apr;52(2):100–5.
29. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
30. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
31. Al-Hazmi BA. A conservative approach for treating excessive gingival display: a clinical report. *J Dent Health Oral Disord Ther*. 2018 Mar 22;9(2).
32. Yang IH, Nahm DS, Baek SH. Which hard and soft tissue factors relate with the amount of buccal corridor space during smiling? *Angle Orthodontist*. 2008 Jan;78(1):5–11.
33. Ioi H, Nakata S, Counts AL. Effects of buccal corridors on smile esthetics in Japanese. *Angle Orthodontist*. 2009 Jul;79(4):628–33.
34. Hadi L, Sembiring MB, Muttaqin Z. The Comparison of Smile Aesthetic of Males and Females Based on Buccal Corridor and Smile Arc. *Dentika Dental Journal*. 2020;23(1):23–7.
35. Sachdeva K, Singla A, Mahajan V, Jaj HS, Negi A. Esthetic and Smile Characteristics at Rest and during Smiling. *J Indian Orthod Soc*. 46(1):17–25.
36. Bhuvaneshwaran M. Principles of smile design. *Journal of Conservative Dentistry*. 2010;13(4):225.

Table Legend:

Table 1: Cohen's Kappa Test Result.

Figure Legend:

Figure 1: Procedure for Participant's Profile Photography Captured. (A) A social smile pose of the participant with a right-angled 20 x 30 cm ruler placed to their right. (B) The participant's widest smile pose, with perfect visibility of their maxillary incisor teeth. A 20 x 30 cm angled ruler was placed on the participant's right side.

Figure 2: Frequency Distribution of Maxillary Incisor Display Based on Social Smiles.

Figure 3: Result of The Maxillary Incisor Display of Males During a Social Smile. A) Low smile exposes 75% of the maxillary incisor. B) Average smile exposes 75–100% of the maxillary incisor and inter dental papilla. C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

Figure 4: Result of The Maxillary Incisor Display of Females During a Social Smile. A) Low smile exposes 75% of the maxillary incisor; B) Average smile exposes 75–100% of the maxillary incisor and inter dental papilla; C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

Figure 5: Frequency Distribution of Buccal Corridors Based on Social Smiles.

Figure 6: Result and Calculation of The Buccal Corridors of Males During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).

Figure 7: Result and Calculation of The Buccal Corridors of Females During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).

GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR

ORIGINALITY REPORT

7%

SIMILARITY INDEX

3%

INTERNET SOURCES

5%

PUBLICATIONS

1%

STUDENT PAPERS

PRIMARY SOURCES

- 1** pinnacle.allenpress.com 1%

Internet Source
- 2** J. Wittmann, K. Sinko, G. Millesi. "Aesthetic aspects in orthognathic surgery: the smile", International Journal of Oral and Maxillofacial Surgery, 2017 1%

Publication
- 3** coek.info 1%

Internet Source
- 4** Theodore Moore, Karin A. Southard, John S. Casco, Fang Qian, Thomas E. Southard. "Buccal corridors and smile esthetics", American Journal of Orthodontics and Dentofacial Orthopedics, 2005 1%

Publication
- 5** Joanna Nadia Sumaji, Esa Bella, Rosalina Tjandrawinata. "Effects of Chili Sauce on the Absorbency and Diametral Tensile Strength of Nanocomposite", 2021 IEEE International Conference on Health, Instrumentation & 1%



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - Manuscript ID MJMHS-2024-0192

1 message

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>Sun, Jan 28, 2024 at
10:46 PM

Reply-To: sploh@upm.edu.my

To: indrani@trisakti.ac.id

29-Jan-2024

Dear Dr. Sulistyowati:

Your manuscript entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" has been successfully submitted online and is presently being given full consideration for publication in the Malaysian Journal of Medicine & Health Sciences.

Your manuscript ID is MJMHS-2024-0192.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/mjmhs> and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to <https://mc.manuscriptcentral.com/mjmhs>.

Thank you for submitting your manuscript to the Malaysian Journal of Medicine & Health Sciences.

Sincerely,
Malaysian Journal of Medicine & Health Sciences Editorial Office



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - Decision on Manuscript ID MJMHS-2024-0192

2 messages

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Mon, Feb 26, 2024 at 2:02 PM

Reply-To: eic_mjmhs@upm.edu.my

To: indrani@trisakti.ac.id

26-Feb-2024

Dear Dr. Sulistyowati: Manuscript ID MJMHS-2024-0192 entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" which you submitted to the Malaysian Journal of Medicine & Health Sciences, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

The reviewer(s) have recommended publication, but also suggest some minor revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript.

To revise your manuscript, log into <https://mc.manuscriptcentral.com/mjmhs> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

You may also click the below link to start the revision process (or continue the process if you have already started your revision) for your manuscript. If you use the below link you will not be required to login to ScholarOne Manuscripts.

*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm. ***

https://mc.manuscriptcentral.com/mjmhs?URL_MASK=c25ece71f19e434fac40a214311a9e82

You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript using a word processing program and save it on your computer. Please also highlight the changes to your manuscript within the document by using the track changes mode in MS Word or by using bold or coloured text.

Once the revised manuscript is prepared, you can upload it and submit it through your Author Center.

When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to the Malaysian Journal of Medicine & Health Sciences, your revised manuscript should be submitted by 12-Mar-2024. If it is not possible for you to submit your revision by this date, please write to us for an extension.

In case you have missed the deadline for resubmission, please write to us to reopen the system for you. MJMHS strictly prohibits the submission of a revised manuscript as a new manuscript. Any authors submitting a revised manuscript as a new one will be subjected to a penalty of RM200.

Once again, thank you for submitting your manuscript to the Malaysian Journal of Medicine & Health Sciences and I look forward to receiving your revision.

Sincerely,
Prof. Dr. Rukman Awang Hamat
Editor-in-Chief, Malaysian Journal of Medicine & Health Sciences
eic_mjmhs@upm.edu.my

Associate Editor Comments to Author:

Associate Editor
Comments to the Author:
(There are no comments.)

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author
Photo displays with eyes must be closed, in accordance with publication ethics.

Reviewer: 2

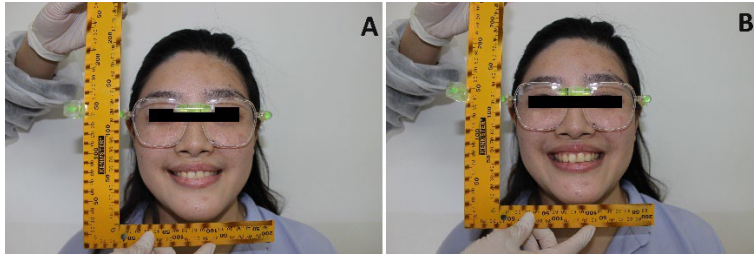
Comments to the Author
(There are no comments.)

Indrani Sulistyowati <indrani@trisakti.ac.id>
To: annisaa.ariyani@trisakti.ac.id

Tue, Feb 27, 2024 at 9:41 AM

[Quoted text hidden]

1.





Indrani Sulistyowati <indrani@trisakti.ac.id>

Reminder: Malaysian Journal of Medicine & Health Sciences

1 message

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Tue, Feb 27, 2024 at 1:02 PM

Reply-To: sploh@upm.edu.my

To: indrani@trisakti.ac.id

27-Feb-2024

Dear Dr. Sulistyowati:

Recently, you received a decision on Manuscript ID MJMHS-2024-0192, entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR." The manuscript and decision letter are located in your Author Center at <https://mc.manuscriptcentral.com/mjmhs>.

This e-mail is simply a reminder that your revision is due in two weeks. If it is not possible for you to submit your revision within two weeks, we will consider your paper as a new submission.

You may also click the below link to start the revision process (or continue the process if you have already started your revision) for your manuscript. If you use the below link you will not be required to login to ScholarOne Manuscripts.

*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm. ***

https://mc.manuscriptcentral.com/mjmhs?URL_MASK=0bc5363c63dc4d95872abc2b0355e248

Sincerely,
Loh Su Peng
Malaysian Journal of Medicine & Health Sciences Editorial Office
sploh@upm.edu.my, mjmhs@upm.edu.my

GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR

Abstract

Introduction: A person's smile, can improve the first impression in interpersonal interactions, which is known as one of the ways to get positive feedback from society. In dental aesthetics, smile analysis helps dentists arrange a patient's appropriate dental treatment plan, which is influenced by balancing and harmonizing the maxillary incisor display and the buccal corridor. This present study was intended to determine the differences between the maxillary incisor display and the buccal corridor based on the social smiles exhibited by males and females. **Materials and Methods:** This analytical observational study was conducted using a cross-sectional design. A total of 110 profile photographs, consisting of 55 males and 55 females who met the inclusion criteria, were taken when the subjects made a social smile. It was then measured using CorelDraw Graphic Suite 2022 and analyzed using the Chi-Square Test. **Results:** A significant difference was found in the buccal corridor between males and females, with a significance value of 0.022 ($p < 0.05$). However, no significant difference was found in the maxillary incisor display on both, with a significance value of 0.979 ($p < 0.05$). **Conclusion:** A difference in a social smile was found based on the component of the buccal corridor in males and females. However, no differences in the maxillary incisor display were observed.

Keyword: smile, social smile, maxillary incisor display, buccal corridor

INTRODUCTION

Smiling is a behavior that conveys positive emotions, such as happiness, pleasure, friendliness, and appreciation, and may contribute to facial attractiveness. This expression was supported by a dynamic and complex movement that involves the simultaneous interaction of several facial muscles.(1,2) An attractive and pleasant smile may improve interpersonal relationships and often determine how well a person mingles with society.

A smile is anatomically defined as a facial expression resulting from the contraction of the facial muscles around the mouth. This contraction stretches the midline of the lips laterally, elevates the mouth corners, and highlights the *sulcus nasolabialis*. Furthermore, it has been observed that the act of smiling results in the narrowing of the eye slits and the development of fine lines on the outer corners of the eyes. The mouth usually slightly opens, revealing the maxillary anterior teeth.(3) The *musculus zygomaticus major* is the primary muscle involved in creating a smile. This muscle elevates the mouth corners upward and outward, leading the lips to form a smile.(4) Other facial muscles such as *musculus risorius*, *musculus levator anguli oris*, *musculus zygomaticus minor*, and *musculus buccinator* also contribute to creating a smile.(3)

Smiles can be categorised into two types: a controlled smile (social or *non-Duchenne* smile) and an uncontrolled smile (genuine or *Duchenne* smile). A social smile, or *non-Duchenne*, occurs when *musculus zygomaticus major* and *musculus levator labii superioris* contract and raise the upper lip forming *sulcus nasolabialis*. *musculus levator labii superioris* contraction results in the superiorly raising of the upper lip in the region of the anterior teeth. Whereas, *musculus zygomaticus major* contraction attracts the mouth corner superiorly and laterally until it meets the resistance area of the adipose tissue of the cheek. The *musculus*

buccinator then helped in further elevating the lips.(5–9) Contrary to a social smile, a genuine smile, known as *Duchenne*, is characterized by squinting while smiling. It occurs when the *musculus orbicularis oculi* and *musculus zygomaticus major* coordinate to support the maximum elevation of the upper lip.(6)

An aesthetic smile may have an impact on a person's attractiveness. Thus, it becomes one of the important factors that may affect a person's psychosocial health. A person with an aesthetically pleasing smile is often perceived as smarter and more valued due to their display of preferred behaviours in social interactions.(10,11) In accordance with this statement, Pithon et al., (12) asserted that a person with an aesthetically pleasing smile has a higher chance of getting a job because they appear more intelligent. As more people realize the benefits of an aesthetic smile, more people are looking to improve the attractiveness of their smile through various cosmetic treatments such as plastic surgery and dental treatments such as orthodontics, periodontal surgery(13), and orthognathic surgery.(14)

Dentists need to evaluate a patient's smile when arranging a dental treatment plan to ensure that the treatment won't harm its appearance. This evaluation includes analyzing the harmony and balance of the patient's smile components.(15) The components of smile include the lip line, the smile arch, the upper lip curvature, the buccal corridor, the smile symmetry, the occlusal frontal plane, the dental components, and the gingival components.(3) One important dental component to be considered is the maxillary incisor display.(16,17) The maxillary incisor display plays a crucial role in achieving an aesthetically pleasing smile, particularly in prosthodontic treatments that involve replacing anterior teeth.(18) Excessive display of the maxillary incisor can negatively affect the appearance and attractiveness of a person's smile.(19) The buccal corridor is another component that should also be considered, as it contributes to a more natural-looking smile.(20)

The maxillary incisor display is the vertical length of the central incisors that are visible during mouth rest or function.(18) According to Jeelani et al.,(21) the maxillary incisor display in females is generally greater than that of males. This might be caused by the different vertical length of the upper lips among genders.(21,22) However, Bahirrah et al.,(23) did not find a significant difference in maxillary incisor display between genders. The aging process may affect the maxillary incisor display due to the loss of elasticity in the lip muscles.(24)

Another key aspect to consider when assessing smile aesthetics is the buccal corridor.(8) It refers to the black or dark area visible between the buccal surface of posterior teeth and the lip corner during smiling. Its appearance may give the illusion of a natural-looking smile.(25) Smiles with minimal buccal corridor (0%-10% buccal corridor) are considered the most attractive smile, whereas smiles with an extensive buccal corridor (15%-25% buccal corridor) are considered less attractive.(25,26) Research by Ira(27) suggested a significant difference in the buccal corridor between males and females due to the different shape of the jaw forming the buccal corridor. However, Analia et al.,(22) stated that gender has no impact on the variation in the width of the buccal corridor and does not interfere with the assessment of the buccal corridor.

Based on the background mentioned above, including the contradictory findings from previous studies, the present study aimed to determine if there was a difference in the maxillary incisor display and buccal corridor between males and females based on their type of social smile.

MATERIALS AND METHODS

Our present study conducted analytical observational research using a cross-sectional design in the Laboratory of the Faculty of Dentistry, Universitas Trisakti, from October until December 2022. The Research Ethics Commission at the Faculty of Dentistry, Universitas

Trisakti, approved all procedures for this study. with the assigned number 021/S3/KEPK/FKG/6/2022. From a total of 289 participants, only 110 participants (50 males and 50 females) ranging in age from 17 to 24 years had complete upper teeth distributed uniformly on both the right and left sides, with healthy periodontal tissue. Participant who have had dental treatments on the anterior teeth such as orthodontic, conservative, and prosthodontic treatment; had facial trauma that may interfere with the movement of facial expression muscles; had experienced a damage to the anterior teeth, dental trauma, disease, or steroid drug intake that may lead to changes in facial appearance; **had** facial aesthetic treatment such as lip fillers or *botox*; and for men; **had** moustache due to blocking the point measurement on the lip corners **were** excluded. Furthermore, we explained the research procedure to the subject, who confirmed their agreement with the signing of the informed consent form.

Photograph Capture

The same operator captured all photographs in the laboratory under natural sunlight using a Canon EOS-600D with an 18-megapixel resolution, ISO 100–6400, and an 18–135 mm lens. The camera is mounted on a tripod and placed in front of the subject at a distance of 30 cm. The points of interest included the top of the forehead, the lower edge of the chin, and both earlobes. Makeup should be removed. To obtain head photographs in neutral head position (NHP), the **participant** was instructed to sit upright and stare straight ahead at the spot at eye level on the wall in front of them. A waterpass attached to the glasses was worn by the **participant** to maintain his or her head's position at NHP. Moreover, an elbow ruler was also equipped with waterpass to confirm their position parallel to the floor. This technique was **introduced** by Maniyar, et al.(28)

Afterwards, the **participant** was instructed to say "cheese" to produce a social smile and pose a bigger smile to obtain the height of the cervicoincisal of the maxillary central incisor. A

20 x 30 cm elbow ruler was used as a benchmark for further measurement and placed on the right side aligned with the subject's head while capturing photographs (Figure 1).

Photograph Assessment

Photographs were assessed using *parallel dimension tools* in CorelDraw Graphic Suite 2022 by two calibrated examiners who were both healthy and stable emotionally. The smile components that would be evaluated were:

- Maxillary Incisor Display: was calculated by dividing the visible length of the maxillary central incisor (from the incisal edge to the inferior line of the upper lip) while smiling with the length of the actual tooth (from the incisal edge to the cervical crest). The score was presented in percentage, then described in terms of three types of smiles: low, average, and high.(23,29) A low smile is defined when less than 75% of the maxillary incisor is seen while smiling. An average smile is defined as 75–100% of the maxillary incisor and inter dental papilla being seen while smiling. Whereas, when a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin is seen, it is called a high smile.
- The buccal corridor: was known as the dark space that appears between the buccal surface of the last teeth of the maxillary posterior displayed during smiling and the inner commissure. It was calculated by dividing the difference between the width of the inner commissure and the width of the visible maxillary teeth (from right to left) by the width of the inner commissure (also from right to left), and then it was presented as percentages and categorized into six types of smiles: extra broad (0% buccal corridor), broad (5% buccal corridor), medium-broad (10% buccal corridor), medium (15% buccal corridor), medium-narrow (20% buccal corridor), and narrow (25% buccal corridor)(30).

Statistical Analysis

A Chi-square test was performed to determine if there was a significant difference in the appearance of smile components (the maxillary incisors and buccal corridor) and gender (male and female). Significant level was set at 0.05.

RESULT

A total of 110 participants, consisting of 55 males and 55 females, were recruited for the present study. Profile photographs were captured while these subjects were socially smiling. An elbow ruler, 20 x 30 cm, was employed as a reference for measurement.

Interrater Reliability

To determine the reliability of two calibrated assessors measuring the maxillary incisor display and buccal corridor, Cohen's Kappa was performed and showed the *kappa* coefficient values for the maxillary incisor display and buccal corridor were 0,831 and 0,812, respectively. (Table 1) These indicated that the agreement degree between two assessors was almost perfect.

The Maxillary Incisor Display

Low smile was frequently observed among the genders in both males (50,9%) and females (52,7%) followed by average smile (male 36,4% and female 34,5%) and high smile (male 12,7% and female 12,7%) (Figure 2 – 4). There was no statistically significant difference in the maxillary incisor display based on gender, with a significant value of 0,979 ($p < 0,05$).

The Buccal Corridors

The buccal corridor-based smile frequency pattern was differently distributed between genders (Figure 5 – 7); medium-broad (10% buccal corridor) was the most observed among

participants in both males (40%) and females (34,5%), followed by broad (male 18,2% and female 27,3%), extra broad (male 7,3% and female 18,2%), medium (male 16,4% and female 9,1%), medium-narrow (male 12,7% and female 3,6%) and narrow (male 5,5% and female 7,3%). The least observed in males and females were narrow (25% buccal corridor) and medium-narrow (20% buccal corridor), respectively. Due to the fact that the chi-square test revealed that the value did not meet the requirement and more than 20% of the cells had less than the expected value, Mann-Whitney was performed as the alternative method, and it showed that the buccal corridor among genders was significantly different, with a significant value of 0,022 ($p < 0,05$).

DISCUSSION

The smile components must be considered by dentists as a reference in planning patient dental treatment in order to achieve an aesthetic smile. The maxillary incisor display and buccal corridor are two components which have a considerable impact on a person's smile's beauty. As a result, the present study aimed to observe differences in maxillary incisor display and buccal corridor between males and females when performing social smiles.

A total of 110 photographs from 55 male and 55 female participants were collected for the present study. Two calibrated assessors used Corel Draw Graphic Suite 2022 to measure the maxillary incisor display and buccal corridor. The Cohen's Kappa test was first performed to determine the strength of agreement in measuring between them. The Kappa coefficient values on the maxillary incisor display and buccal corridor were 0.831 and 0.812, respectively (Table 1). These indicated that the strength of the measurement agreement between the two assessors was almost perfect, meaning that the data can be trusted.

No significant difference between genders in maxillary incisor display was found in this study. Most participants were classified as having a low smile, males (50.9%) and females

(52.7%), followed by an average smile (males 36,4%, females 34,5%) and a high smile (males and females 12,7%). This finding is consistent with a previous study(23) which found that low smile was the second most common smile among the gender. However, it was in contrast to previous study(18). They reported that the maxillary incisor crown visible during smiling was longer in women than in men. The contrast might be due to a difference in measurement techniques and ethnicity between the participant population.

The appearance of maxillary incisor display when smiling depends on the contribution of *musculus zygomaticus major* and *musculus levator labii superioris*, depending on which muscle contracts more dominantly. Iwanaga et al,(6) explained in their research, when *musculus zygomaticus major* is dominant, the mouth corners are lifted superiorly and laterally then *musculus levators labii superioris* raises the upper lip and exposes the maxillary teeth. In other hand, when *musculus levator labii superioris* is dominant and firstly contracts, the maxillary incisor teeth are revealed up to the canines. The simultaneous contraction of *musculus depressor labii inferioris* also contributes to the smile pattern, revealing the entirety of the upper and lower teeth.

The maxillary central incisor display during smiling may decrease with age in both males and females from 20 years of age.(18,24) Facial muscle exercises could help to create an aesthetic smile and prevent muscle sagging.(18) The dentoalveolar height of the anterior maxilla has also been shown to have a relationship with the excess of maxillary incisors display. Excessive anterior maxillary height is likely to result in gummy smile exposure(21) and reduce the aesthetic value of the smile.(31)

The assessment of smile aesthetics includes the evaluation of the buccal corridor(32) which is **known** as the dark space between the buccal surface of the last of the maxillary posterior teeth displayed during smiling and the inner commissure.(16,25) Its presence was

important for a natural-looking smile. The excessive buccal corridor, more than 15% (narrow smile), was considered as less attractive by orthodontists and dental students.(33)

Most participants were classified as having a medium-broad smile, males (40%) and females (34,5%). The results also show that males tend to have a medium to a narrow smile, while women tend to have a broad to a very broad smile. This finding was in agreement with previous study(22) which found that the buccal corridor in females was mostly classified as medium-broad smile (32.9%) whereas in males, most of buccal corridor was categorised as a medium smile (58,3%). This indicated that females have a wider smile than males. This study found a significant difference in buccal corridor among genders. Hadi et al.,(34) also found a significant difference in buccal corridor among the genders, but stated that males tended to have an extra broad smiles than females. The difference might be due to differences in the technique used to measure the buccal corridor.

Its appearance is affected by various factors, such as the width of the maxillary arch, the facial muscles, the labial surface of the maxillary premolars, and the prominence of the canines, particularly at the distal marginal ridge.(22,25,35) The maxillary arch has a direct impact on the buccal corridor. A broad arch that forms a U shape is considered an ideal arch. However, a narrow arch is considered an unattractive arch because it has a wide buccal corridor.(36) The facial type also contributes to the appearance of the buccal corridor. A medium smile was seen in the dolichofacial facial type. A medium-broad smile was seen in those with mesofacial. Whereas, the brachyfacial tends to have a broad smile.(22) Furthermore, as people age, changes occur in the facial muscles that result in a loss of muscle elasticity and tone.(17)

The lack of age group variation, such as young adulthood, adulthood, and the elderly, is a limitation of our study because the maxillary incisor display(17,18) and buccal corridor(17) may change with age. Further research is needed with more focus on the type of smile, upper

lip contraction, dental appearance, and gingival tissue in different age groups. This study shows that the use of individual profile photos during social smiling can be used for evaluation in the preparation of dental treatment plans. Clinicians should remember that a small change in the maxillary incisor and buccal corridor may significantly affect the perceived aesthetics of the smile.

CONCLUSION

The study found significant differences in the buccal corridor between male and female social smile types, but no significant differences in maxillary incisor display.

ACKNOWLEDGMENT

The authors were grateful for the assistance provided by the technical and support staff at the Anatomy Subsection, Department of Oral Biology, Faculty of Dentistry, Universitas Trisakti.

REFERENCE

1. Sapkota B, Srivastava S, Koju S, Srii R. Evaluation of Smile Line in Natural and Forced Smile Position An Institution-based Study. *Orthodontic Journal of Nepal*. 2017;7:27–32.
2. Machado AW. 10 commandments of smile esthetics. *Dental Press J Orthod*. 2014 Jul 1;19(4):136–57.
3. Abdurachman. *Anatomi Senyum Kajian Kinesiologi*. Vol. 1. Airlangga University Press; 2018.
4. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. Perspektif anatomi dan antropometri pada senyum. Vol. 2. 2020.
5. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. Perspektif anatomi dan antropometri pada senyum. Vol. 2. 2020.
6. Iwanaga J, Hur MS, Kikuta S, Ibaragi S, Watanabe K, Tubbs RS. Anatomical contribution of the orbicularis oculi to the zygomaticus major: An improved understanding of the smile with consideration for facial cosmetic procedures. *PLoS One*. 2022 Jul 1;17(7 July).

7. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
8. Sabri Roy. The eight components of a balanced smile. *J Clin Orthod*. 2005;39(3):155–67.
9. Rubin LR; MYLG. Anatomy of the Nasolabial Fold: The Keystone of the Smiling Mechanism. *Plastic and Reconstructive Surgery*. 1989 Apr 9;
10. Vandeventer J, Patterson E. Differentiating Duchenne from non-Duchenne smiles using active appearance models. In: 2012 IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems (BTAS). 2012. p. 319–24.
11. Alexandra S, Anggraini W, Sulistyowati I, Putri Ariyani A. Lengkung Senyum dan Tampilan Gingiva Pada Senyum. *Jurnal Kedokteran Gigi Terpadu* [Internet]. 2023 Jul 4;5(1). Available from: <https://e-journal.trisakti.ac.id/index.php/jkgt/article/view/16885>
12. Pithon MM, Nascimento CC, Barbosa GCG, Coqueiro RDS. Do dental esthetics have any influence on finding a job? *American Journal of Orthodontics and Dentofacial Orthopedics*. 2014 Oct 1;146(4):423–9.
13. Effendi Nasution E, Octavia Nasution R. Penatalaksanaan Aesthetic Crown Lengthening untuk Perawatan Gummy Smile Berhubungan dengan Altered Passive Eruption. *Clinical Dental Journal* UGM. 2020;6(2).
14. Wang C, Hu WJ, Liang LZ, Zhang YL, Chung KH. Esthetics and smile-related characteristics assessed by laypersons. *Journal of Esthetic and Restorative Dentistry*. 2018 Mar 1;30(2):136–45.
15. Batwa W, Grewal B, Gill D. Smile analysis: what to measure. *Dent Update* [Internet]. 2014;41(6):483–9. Available from: <https://doi.org/10.12968/denu.2014.41.6.483>
16. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
17. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
18. Zaini NA, Rikmasari R, Damayanti L. Difference in clinical crown length of maxillary central incisors and gingival display at rest and during smiling based on gender. *Padjadjaran Journal of Dentistry*. 2013;25(1):48–56.
19. Pausch NC, Katsoulis D. Gender-specific evaluation of variation of maxillary exposure when smiling. *Journal of Cranio-Maxillofacial Surgery*. 2017 Jun 1;45(6):913–20.
20. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
21. Jeelani W, Fida M, Shaikh A. The maxillary incisor display at rest: Analysis of the underlying components. *Dental Press J Orthod*. 2018;23(6):48–55.
22. Analia Y, Ismaniati NA, Purbiati M. Gambaran Komponen Senyum Pasien Sebelum Perawatan Ortodonti (Kajian Foto Frontal di Klinik Ortodonti RSGMP FKG UI).

- Indonesia Indonesian Journal of Dentistry [Internet]. 2008;15(1):23–8. Available from: <http://www.fkg.ui.edu>
23. Bahirrah S, Sitorus O. Gambaran Tipe Senyum Berdasarkan Fotometri Pada Mahasiswa India Tamil Malaysia Fkg Usu (Smile Analysis With Photometric Methods Of Malaysian Indian Tamil Dentistry Students At University Of Sumatera Utara). Vol. 18, *dentika Dental Journal*. 2015.
 24. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
 25. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
 26. Tikku T KRMARAN. Role of buccal corridor in smile esthetics and its correlation with underlying skeletal and dental structures. *Indian J Dent Res Mar-Apr;23(2):187-94* . 2012;23(2):187–94.
 27. Ira Latifatul Mufidah. Perbedaan Komponen Senyum Berdasarkan Jenis Kelamin Pada Mahasiswa Fakultas Kedokteran Gigi Universitas Jember Angkatan 2008. [Jember]: Faculty of Dentistry, Jember University; 2012.
 28. Maniyar M, Kalia A, Mirdehghan N, Nene S, Bhagwagar P. Evaluation of the Influence of Gingival Display on Smile Esthetics in Indian Females-A Computer-Aided Photographic Analysis. *Journal of Indian Orthodontic Society*. 2018 Apr;52(2):100–5.
 29. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
 30. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
 31. Al-Hazmi BA. A conservative approach for treating excessive gingival display: a clinical report. *J Dent Health Oral Disord Ther*. 2018 Mar 22;9(2).
 32. Yang IH, Nahm DS, Baek SH. Which hard and soft tissue factors relate with the amount of buccal corridor space during smiling? *Angle Orthodontist*. 2008 Jan;78(1):5–11.
 33. Ioi H, Nakata S, Counts AL. Effects of buccal corridors on smile esthetics in Japanese. *Angle Orthodontist*. 2009 Jul;79(4):628–33.
 34. Hadi L, Sembiring MB, Muttaqin Z. The Comparison of Smile Aesthetic of Males and Females Based on Buccal Corridor and Smile Arc. *Dentika Dental Journal*. 2020;23(1):23–7.
 35. Sachdeva K, Singla A, Mahajan V, Jaj HS, Negi A. Esthetic and Smile Characteristics at Rest and during Smiling. *J Indian Orthod Soc*. 46(1):17–25.
 36. Bhuvaneshwaran M. Principles of smile design. *Journal of Conservative Dentistry*. 2010;13(4):225.

Figure Legend:

Figure 1: Procedure for Participant's Profile Photography Captured. (A) A social smile pose of the participant with a right-angled 20 x 30 cm ruler placed to their right. (B) The participant's widest smile pose, with perfect visibility of their maxillary incisor teeth. A 20 x 30 cm angled ruler was placed on the participant's right side.

Figure 2: Result of The Maxillary Incisor Display of Males During a Social Smile. A) Low smile exposes 75% of the maxillary incisor. B) Average smile exposes 75–100% of the maxillary incisor and inter dental papilla. C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

Figure 3: Result of The Maxillary Incisor Display of Females During a Social Smile. A) Low smile exposes 75% of the maxillary incisor; B) Average smile exposes 75–100% of the maxillary incisor and inter dental papilla; C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

Figure 4: Frequency Distribution of Maxillary Incisor Display Based on Social Smiles.

Figure 5: Result and Calculation of The Buccal Corridors of Males During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).

Figure 6: Result and Calculation of The Buccal Corridors of Females During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).

Figure 7: Frequency Distribution of Buccal Corridors Based on Social Smiles.



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - Manuscript ID MJMHS-2024-0192.R1

1 message

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Tue, Feb 27, 2024 at 1:32 PM

Reply-To: sploh@upm.edu.my

To: indrani@trisakti.ac.id

27-Feb-2024

Dear Dr. Sulistyowati:

Your manuscript entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" has been successfully submitted online and is presently being given full consideration for publication in the Malaysian Journal of Medicine & Health Sciences.

Your manuscript ID is MJMHS-2024-0192.R1.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/mjmhs> and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to <https://mc.manuscriptcentral.com/mjmhs>.

Thank you for submitting your manuscript to the Malaysian Journal of Medicine & Health Sciences.

Sincerely,
Malaysian Journal of Medicine & Health Sciences Editorial Office



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - MJMHS-2024-0192.R1 has been unsubmitted

4 messages

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Tue, Mar 5, 2024 at 10:50 AM

Reply-To: mjmhs@upm.edu.my

To: indrani@trisakti.ac.id

Cc: mjmhs@upm.edu.my

05-Mar-2024

Dear Dr. Sulistyowati:

Your manuscript, MJMHS-2024-0192.R1, entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" has been unsubmitted to the Malaysian Journal of Medicine & Health Sciences. It may either have been unsubmitted at your request or because you did not complete all necessary parts of the submission.

1) Figure + table should not exceed 7.

Please visit the instructions to authors to complete your submission and re-submit the manuscript for consideration of publication. You may contact the Editorial Office if you have further questions.

Sincerely,
Malaysian Journal of Medicine & Health Sciences Editorial Office

Indrani Sulistyowati <indrani@trisakti.ac.id>

Tue, Mar 5, 2024 at 12:38 PM

To: mjmhs@upm.edu.my

Dear Chief of Editorial Office of the Malaysian Journal of Medicine & Health Sciences,.

We are sincerely grateful for your response.

We will rearrange the manuscript according to your comment and re-submit the manuscript.

However, do we submit the manuscript as a new submission?

Please advise.

Thank you.

Kindly regards,
Indrani

[Quoted text hidden]

Malaysian Journal of Medicine and Health Sciences <mjmhs@upm.edu.my>

Tue, Mar 5, 2024 at 12:54 PM

To: Indrani Sulistyowati <indrani@trisakti.ac.id>

Dear AUTHOR,

Please submit using the same ID article. Do not make new submissions for the same article.

Kind regards,

AMIRAH FARZANA BINTI JAMALUDIN**Secretariat**

O/b : Editor In Chief

Prof. Dr. Rukman Awang Hamat

Malaysian Journal of Medicine and Health Sciences

Universiti Putra Malaysia

03-97692367

[Quoted text hidden]

[Quoted text hidden]



UNIVERSITAS TRISAKTI

"Is a one stop learning for sustainable development"

Kampus A, Jl. Kyai Tapa No.1, Grogol

Jakarta Barat 11440 - INDONESIA

www.trisakti.ac.id

(t) +62-21.566 3232, (f) +62-21.567 3001

Indrani Sulistyowati <indrani@trisakti.ac.id>

Tue, Mar 5, 2024 at 1:23 PM

To: Malaysian Journal of Medicine and Health Sciences <mjmhs@upm.edu.my>

Dear Ms. Amirah Farzana binti Jamaludin, Secretariat of Editorial Office of the Malaysian Journal of Medicine & Health Sciences.

That's clear. Thank you for the advice.

Kindly regards,

Indrani

[Quoted text hidden]

GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR

Abstract

Introduction: A person's smile, which has been known as one of the ways to obtain favourable feedback from society, may improve one's first impression in interpersonal interactions. In the dental aesthetics field, smile analysis helps a dentist determine the proper dental treatment plan for a patient, which can be influenced by the balance and harmony of the maxillary incisor display and the buccal corridor. This present study was intended to determine the differences between the maxillary incisor display and the buccal corridor based on the social smiles exhibited by males and females. **Materials and Methods:** This type of research was analytic observational, using a cross-sectional design with media photos taken when the subjects made a social smile. There were 110 research subjects, 55 males and 55 females, who met the inclusion criteria. Photo results were measured using CorelDraw Graphic Suite 2022 and then analysed using the Chi-Square Test. **Results:** There was a significant difference in the buccal corridor between males and females with a significance value of 0.022 ($p < 0.05$), but there was no significant difference in the maxillary incisor display on both with a significance value of 0.979 ($p < 0.05$). **Conclusion:** It can be concluded that there were differences in the buccal corridor, but there were no differences in the appearance of the maxillary incisors based on the type of social smile of males and females.

Keyword: smile, social smile, maxillary incisor display, buccal corridor

INTRODUCTION

Smiling is a behaviour that expresses happiness, pleasure, friendliness, appreciation and is one of the expressions that contribute to a person's facial attractiveness with a dynamic and complex movement that involves the simultaneous interaction of several facial muscles.(1,2) An attractive and pleasant smile may improve interpersonal relationships and often determine how well a person mingles with society.

A smile is anatomically defined as a facial expression resulting from the contraction of the facial muscles around the mouth. This contraction stretches the midline of the lips laterally, elevates the mouth corners, and highlights the *sulcus nasolabialis*. Furthermore, it has been observed that the act of smiling results in the narrowing of the eye slits and the development of fine lines on the outer corners of the eyes. The mouth usually slightly opens, revealing the maxillary anterior teeth.(3) The primary muscle involved in creating a smile is *M. zygomaticus major*. This muscle elevates the corners of the mouth upward and outward, resulting in the lips forming a smile.(4) *M. Zygomaticus minor*, *M. Levator anguli oris*, *M. Risorius*, and *M. Buccinator* also contribute to creating a smile.(3)

Smiles can be categorised into two types: a controlled smile (social or *non-Duchenne* smile) and an uncontrolled smile (genuine or *Duchenne* smile). A social smile, or *non-Duchenne*, occurs when *M. Zygomaticus major* and *M. Levator labii superioris* contract and raise the upper lip forming *sulcus nasolabialis*. The contraction of *M. Levator labii superioris* leads the upper lip in the anterior teeth region to raise superiorly. Whereas, *M. Zygomaticus major* contraction attracts the mouth corner superiorly and laterally until it meets the resistance area of the cheek adipose tissue. *M. Buccinator* then assisted in elevating his lips more.(5–9) Contrary to a social smile, a genuine smile, or *Duchenne*, is described by squinting while

smiling. It occurs when *M. Orbicularis oculi* coordinate with *M. Zygomaticus major* in supporting the maximum elevation of the upper lip.(6)

The aesthetics of a smile may have an impact on a person's attractiveness. Thus, it becomes one of the important factors that may affect a person's psychosocial health. A person with an aesthetically pleasing smile is often perceived as smarter and more valued due to their display of preferred behaviours in social interactions.(10,11) In accordance with this statement, Pithon et al., (12) asserted that a person with an aesthetically pleasing smile has a higher chance of getting a job because they appear more intelligent. As more people realize the benefits of an aesthetic smile, more people are looking to improve the attractiveness of their smile through various cosmetic treatments such as plastic surgery and dental treatments such as orthodontics, periodontal surgery(13), and orthognathic surgery.(14)

To establish a diagnosis and treatment plan, dentists must analyse the smile to ensure that the treatment does not compromise its aesthetic value by evaluating the balance and harmony of its components.(15) The smile components consist of the lip line, smile arch, upper lip curvature, buccal corridor, smile symmetry, front occlusal plane, dental, and gingival components.(3) One of the important dental components to consider is the maxillary incisor display.(16,17) The maxillary incisor display plays a crucial role in achieving an aesthetically pleasing smile, particularly in prosthodontic treatments that involve replacing anterior teeth.(18) The excessive of the maxillary incisor display may have a negative impact on a person's facial aesthetics and attractiveness.(19) The buccal corridor is one of the components that should also be considered, as it contributes to a more natural-looking smile.(20)

The maxillary incisor display is the vertical length of the central incisors that are visible during mouth rest or function.(18) According to Jeelani et al.,(21) the maxillary incisor display in females is generally greater than that of males. The difference in the vertical length of the upper lip between males and females explains this phenomenon.(21,22) However, Bahirrah et

al.,(23) reported no significant difference in the maxillary incisor display between males and females. The aging process may affect the maxillary incisor display due to the loss of elasticity in the lip muscles.(24)

Another key aspect to consider when assessing smile aesthetics is the buccal corridor.(8) This refers to the black or dark area visible between the buccal surface of the posterior teeth and the corners of the lips during smiling. Its appearance may give the illusion of a natural-looking smile.(25) Smiles with minimal buccal corridor (0%-10% buccal corridor) are considered the most attractive smile, whereas smiles with an extensive buccal corridor (15%-25% buccal corridor) are considered less attractive.(25,26) Research by Ira(27) suggested that there is a significant difference between the buccal corridor in males and females due to the different shape of the jaw forming the buccal corridor. However, Analia et al.,(22) stated that gender has no impact on the variation in the width of the buccal corridor and does not interfere with the assessment of the buccal corridor.

Based on the background mentioned above, including the contradictory findings from previous studies, the present study aims to determine the difference in the maxillary incisor display and buccal corridor teeth based on the type of social smile exhibited by males and females.

MATERIALS AND METHODS

Our present study, which conducted analytical observational research using a cross-sectional design, was done in the Laboratory of the Faculty of Dentistry, Universitas Trisakti, from October until December 2022. All procedures of the present study were approved by the Research Ethics Commission at the Faculty of Dentistry, Universitas Trisakti, with the assigned number 021/S3/KEPK/FKG/6/2022. From a total of 289 participants, only 110 participants (50 males and 50 females) ranging in age from 17 to 24 years had complete upper teeth distributed

uniformly on both the right and left sides, with healthy periodontal tissue. Participant who had dental treatments on the anterior teeth such as orthodontic, conservative, and prosthodontic treatment; had facial trauma that may interfere with the movement of facial expression muscles; had experienced a damage to the anterior teeth, dental trauma, disease, or steroid drug intake that may lead to changes in facial appearance; had no facial aesthetic treatment such as lip fillers or *botox*; and for men, had no moustache due to blocking the point measurement on the lip corners was excluded. Furthermore, the research procedure was explained to the subject who confirmed their agreement by signing the informed consent.

Photograph Capture

All photographs were captured in the laboratory under natural sunlight by the same operator using a Canon EOS-600D with an 18-megapixel resolution, ISO 100–6400, and an 18–135 mm lens. The camera mounted on a tripod was placed in front of the subject at a distance of 30 cm. The points of interest included the top of the forehead, the lower edge of the chin, and both earlobes. Makeup should be removed. To obtain head photographs in neutral head position (NHP), the subject was instructed to sit upright and stare straight ahead at the spot at eye level on the wall in front of them. A waterpass attached to the glasses was worn by the subject to maintain his or her head's position at NHP. Moreover, an elbow ruler was also equipped with waterpass to confirm their position parallel to the floor. This technique was introduced by Maniyar, et al.(28)

Afterwards, the subject was instructed to say "cheese" to produce a social smile and pose a bigger smile to obtain the cervicoincisal height of the maxillary central incisor. A 20 x 30 cm elbow ruler, used as a benchmark for further measurement, was placed on the right side aligned with the subject's head while capturing photographs (Figure 1).

Photograph Assessment

Photographs were assessed using *parallel dimension tools* in CorelDraw Graphic Suite 2022 by two calibrated examiners who were both healthy and stable emotionally. The components of a smile that will be evaluated include the following:

- Maxillary Incisor Display: the comparison of the length of the central incisor display from the top of the cervical line to the incisal edge while smiling with the exact tooth. The score was presented in percentage, then described in terms of three types of smiles: low, average, and high.(23,29) A low smile is defined when less than 75% of the maxillary incisor is seen while smiling. An average smile is defined as 75–100% of the maxillary incisor and inter dental papilla being seen while smiling. Whereas, when a complete cervicoincisal maxillary incisor (100%) with some amount of gingival margin is seen, it is called a high smile.
- The buccal corridor: was defined as the dark space that appears between the buccal surface of the last of the maxillary posterior teeth displayed during smiling and the inner commissure. It was calculated as the difference between the width of the inner commissure and the width of the visible maxillary teeth, then divided by the width of the inner commissure. The value was presented as percentages, then categorized into six types of smiles: extra broad (0% buccal corridor), broad (5% buccal corridor), medium-broad (10% buccal corridor), medium (15% buccal corridor), medium-narrow (20% buccal corridor), and narrow (25% buccal corridor)(30).

Statistical Analysis

A Chi-square test was performed to check whether the appearance of smile components (the maxillary incisors and buccal corridor) and gender (male and female) differ significantly. Significant level was set at 0.05.

RESULT

A total of 110 participants, consisting of 55 males and 55 females, were recruited for the present study. Profile photographs were captured while these subjects were socially smiling. An elbow ruler, 20 x 30 cm, was employed as a reference for measurement.

Interrater Reability

To determine the reliability of two calibrated assessors measuring the maxillary incisor display and buccal corridor, Cohen's Kappa was performed and showed the *kappa* coefficient values for the maxillary incisor display and buccal corridor were 0,831 and 0,812, respectively (Table 1). These indicated that the agreement degree between two assessors was almost perfect.

The Maxillary Incisor Display

Low smile was frequently observed among the genders in both males (50,9%) and females (52,7%) followed by average smile (male 36,4% and female 34,5%) and high smile (male 12,7% and female 12,7%) (Figure 2 – 4). There was no statistically significant difference in the maxillary incisor display based on gender ($p > 0,05$).

The Buccal Corridors

The buccal corridor-based smile frequency pattern was differently distributed between genders (Figure 5 – 7); medium-broad (10% buccal corridor) was the most observed among

participants in both males (40%) and females (34,5%), followed by broad (male 18,2% and female 27,3%), extra broad (male 7,3% and female 18,2%), medium (male 16,4% and female 9,1%), medium-narrow (male 12,7% and female 3,6%) and narrow (male 5,5% and female 7,3%). The least observed in males and females were narrow (25% buccal corridor) and medium-narrow (20% buccal corridor), respectively. Due to the fact that the chi-square test revealed that the value did not meet the requirement and more than 20% of the cells had less than the expected value, Mann-Whitney was performed as the alternative method, and it showed that the buccal corridor among genders was significantly different.

DISCUSSION

The smile components must be considered by dentists as a reference in planning patient dental treatment in order to achieve an aesthetic smile. The maxillary incisor display and the buccal corridor are two components that have a considerable impact on a person's smile's beauty. As a result, the present study aimed to observe differences in maxillary incisor display and buccal corridor between males and females when performing social smiles.

A total of 110 photographs from 55 male and 55 female participants were collected for the present study. Two calibrated assessors used Corel Draw Graphic Suite 2022 to measure the maxillary incisor display and the buccal corridor. The Cohen's Kappa test was first carried out to determine the value of agreement strength in measuring between those. The Kappa coefficient values on the maxillary incisor display and the buccal corridor were 0.831 and 0.812, respectively (Table 1). These indicated that the strength of the measurement agreement between the two assessors was almost perfect, meaning that the data can be trusted.

No significant difference between males and females in maxillary incisor display was found in this study. Most participants were classified as having a low smile, males (50.9%) and females (52.7%), followed by an average smile (males 36,4%, females 34,5%) and a high smile

(males and females 12,7%). This result is in line with a previous study(23) which found that low smile was the second most common smile among the gender. However, it was in contrast to previous study(18). They reported that the maxillary incisor crown visible during smiling was longer in women than in men. The contrast might be due to a difference in measurement techniques and ethnicity between the participant population.

The appearance of maxillary incisor display when smiling depends on the contribution of *M. Zygomaticus major* and *M. Levator labii superioris*, depending on which muscle contracts more dominantly. Iwanaga et al,(6) explained in their research, when *M. Zygomaticus major* is dominant, the mouth corners are lifted superiorly and laterally then *M. Levator labii superioris* elevates the upper lips exposing the maxillary teeth. In other hand, when *M. Levator labii superioris* is dominant and contracts first, the maxillary incisor teeth are revealed up to the canines. The simultaneous contraction of *M. Depressor labii inferioris* also contributes to the smile pattern, revealing the entirety of the upper and lower teeth.

The maxillary central incisor display during smiling might decreased with age in both males and females from the age of 20.(18,24) Facial muscle exercises could help to create an aesthetic smile and prevent muscle sagging.(18) The dentoalveolar height of the anterior maxilla has also been shown to have a relationship with the excess of maxillary incisors display. Excessive anterior maxillary height is likely to result in gummy smile exposure(21) and reduce the aesthetic value of the smile.(31)

The buccal corridor is one of the assessment points in smile aesthetics(32) and defined as the space between the buccal surface of the last of the maxillary posterior teeth displayed during smiling and the inner commissure, which appears as a black or dark space.(16,25) Its presence was important for a natural-looking smile. The excessive buccal corridor, more than 15% (narrow smile), was considered as less attractive by orthodontists and dental students.(33)

Most participants were classified as having a medium-broad smile, males (40%) and females (34,5%). The results also show that males tend to have a medium to a narrow smile, while women tend to have a broad to a very broad smile. This finding was in agreement with previous study(22) which found that the buccal corridor in females was mostly classified as medium-broad smile (32.9%) whereas in males, most of buccal corridor was categorised as a medium smile (58,3%). This indicated that females have a wider smile than males. This study found a significant difference in the buccal corridor between males and females. Hadi et al.,(34) also found a significant difference in the buccal corridor among the genders, but stated that males tended to have an extra broad smiles than females. The difference might be due to differences in the technique used to measure the buccal corridor.

Its appearance is affected by various factors, such as the width of the maxillary arch, the facial muscles, the position of the labial surface of the maxillary premolars, and the prominence of the canines, particularly at the distal marginal ridge.(22,25,35) The maxillary arch has a direct impact on the buccal corridor. A broad arch that forms a U shape is considered an ideal arch. However, a narrow arch is considered an unattractive arch because it has a wide buccal corridor.(36) The facial type also contributes to the appearance of the buccal corridor. A medium smile was seen in the dolichofacial facial type. A medium-broad smile was seen in those with mesofacial. Whereas, the brachyfacial tends to have a broad smile.(22) Furthermore, increasing age leads to changes in the facial muscles, including a loss of muscle elasticity and tone.(17)

The lack of age variation is a limitation of our study because the maxillary incisor display(17,18) and buccal corridor(17) may change with age. Therefore, further research is needed with more focus on the type of smile, upper lip contraction, dental appearance, and gingival tissue in different age groups. This study shows that the use of individual profile photos during social smiling can be used for evaluation in the preparation of dental treatment

plans. Clinicians should remember that a small change in the maxillary incisor and buccal corridor may significantly affect the perceived aesthetics of the smile.

CONCLUSION

Significant differences were observed in the buccal corridor, but there were no significant differences in the maxillary incisor display, based on male and female social smile types.

ACKNOWLEDGMENT

The authors were grateful for the assistance provided by the technical and support staff at the Anatomy Subsection, Department of Oral Biology, Faculty of Dentistry, Universitas Trisakti.

REFERENCE

1. Sapkota B, Srivastava S, Koju S, Srii R. Evaluation of Smile Line in Natural and Forced Smile Position An Institution-based Study. *Orthodontic Journal of Nepal*. 2017;7:27–32.
2. Machado AW. 10 commandments of smile esthetics. *Dental Press J Orthod*. 2014 Jul 1;19(4):136–57.
3. Abdurachman. *Anatomi Senyum Kajian Kinesiologi*. Vol. 1. Airlangga University Press; 2018.
4. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. Perspektif anatomi dan antropometri pada senyum. Vol. 2. 2020.
5. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. Perspektif anatomi dan antropometri pada senyum. Vol. 2. 2020.
6. Iwanaga J, Hur MS, Kikuta S, Ibaragi S, Watanabe K, Tubbs RS. Anatomical contribution of the orbicularis oculi to the zygomaticus major: An improved understanding of the smile with consideration for facial cosmetic procedures. *PLoS One*. 2022 Jul 1;17(7 July).
7. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.

8. Sabri Roy. The eight components of a balanced smile. *J Clin Orthod*. 2005;39(3):155–67.
9. Rubin LR; MYLG. Anatomy of the Nasolabial Fold: The Keystone of the Smiling Mechanism. *Plastic and Reconstructive Surgery*. 1989 Apr 9;
10. Vandeventer J, Patterson E. Differentiating Duchenne from non-Duchenne smiles using active appearance models. In: 2012 IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems (BTAS). 2012. p. 319–24.
11. Alexandra S, Anggraini W, Sulistyowati I, Putri Ariyani A. Lengkung Senyum dan Tampilan Gingiva Pada Senyum. *Jurnal Kedokteran Gigi Terpadu* [Internet]. 2023 Jul 4;5(1). Available from: <https://e-journal.trisakti.ac.id/index.php/jkgt/article/view/16885>
12. Pithon MM, Nascimento CC, Barbosa GCG, Coqueiro RDS. Do dental esthetics have any influence on finding a job? *American Journal of Orthodontics and Dentofacial Orthopedics*. 2014 Oct 1;146(4):423–9.
13. Effendi Nasution E, Octavia Nasution R. Penatalaksanaan Aesthetic Crown Lengthening untuk Perawatan Gummy Smile Berhubungan dengan Altered Passive Eruption. *Clinical Dental Journal* UGM. 2020;6(2).
14. Wang C, Hu WJ, Liang LZ, Zhang YL, Chung KH. Esthetics and smile-related characteristics assessed by laypersons. *Journal of Esthetic and Restorative Dentistry*. 2018 Mar 1;30(2):136–45.
15. Batwa W, Grewal B, Gill D. Smile analysis: what to measure. *Dent Update* [Internet]. 2014;41(6):483–9. Available from: <https://doi.org/10.12968/denu.2014.41.6.483>
16. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
17. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
18. Zaini NA, Rikmasari R, Damayanti L. Difference in clinical crown length of maxillary central incisors and gingival display at rest and during smiling based on gender. *Padjadjaran Journal of Dentistry*. 2013;25(1):48–56.
19. Pausch NC, Katsoulis D. Gender-specific evaluation of variation of maxillary exposure when smiling. *Journal of Cranio-Maxillofacial Surgery*. 2017 Jun 1;45(6):913–20.
20. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
21. Jeelani W, Fida M, Shaikh A. The maxillary incisor display at rest: Analysis of the underlying components. *Dental Press J Orthod*. 2018;23(6):48–55.
22. Analia Y, Ismaniati NA, Purbiati M. Gambaran Komponen Senyum Pasien Sebelum Perawatan Ortodonti (Kajian Foto Frontal di Klinik Ortodonti RSGMP FKG UI). *Indonesia Indonesian Journal of Dentistry* [Internet]. 2008;15(1):23–8. Available from: <http://www.fkg.ui.edu>

23. Bahirrah S, Sitorus O. Gambaran Tipe Senyum Berdasarkan Fotometri Pada Mahasiswa India Tamil Malaysia Fkg Usu (Smile Analysis With Photometric Methods Of Malaysian Indian Tamil Dentistry Students At University Of Sumatera Utara). Vol. 18, *dentika Dental Journal*. 2015.
24. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
25. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
26. Tikku T KRMARAN. Role of buccal corridor in smile esthetics and its correlation with underlying skeletal and dental structures. *Indian J Dent Res Mar-Apr;23(2):187-94* . 2012;23(2):187–94.
27. Ira Latifatul Mufidah. Perbedaan Komponen Senyum Berdasarkan Jenis Kelamin Pada Mahasiswa Fakultas Kedokteran Gigi Universitas Jember Angkatan 2008. [Jember]: Faculty of Dentistry, Jember University; 2012.
28. Maniyar M, Kalia A, Mirdehghan N, Nene S, Bhagwagar P. Evaluation of the Influence of Gingival Display on Smile Esthetics in Indian Females-A Computer-Aided Photographic Analysis. *Journal of Indian Orthodontic Society*. 2018 Apr;52(2):100–5.
29. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
30. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
31. Al-Hazmi BA. A conservative approach for treating excessive gingival display: a clinical report. *J Dent Health Oral Disord Ther*. 2018 Mar 22;9(2).
32. Yang IH, Nahm DS, Baek SH. Which hard and soft tissue factors relate with the amount of buccal corridor space during smiling? *Angle Orthodontist*. 2008 Jan;78(1):5–11.
33. Ioi H, Nakata S, Counts AL. Effects of buccal corridors on smile esthetics in Japanese. *Angle Orthodontist*. 2009 Jul;79(4):628–33.
34. Hadi L, Sembiring MB, Muttaqin Z. The Comparison of Smile Aesthetic of Males and Females Based on Buccal Corridor and Smile Arc. *Dentika Dental Journal*. 2020;23(1):23–7.
35. Sachdeva K, Singla A, Mahajan V, Jaj HS, Negi A. Esthetic and Smile Characteristics at Rest and during Smiling. *J Indian Orthod Soc*. 46(1):17–25.
36. Bhuvaneshwaran M. Principles of smile design. *Journal of Conservative Dentistry*. 2010;13(4):225.

Table Legend:

Table 1: Cohen's Kappa Test Result.

Figure Legend:

Figure 1: Procedure for Participant's Profile Photography Captured. (A) A social smile pose of the participant with a right-angled 20 x 30 cm ruler placed to their right. (B) The participant's widest smile pose, with perfect visibility of their maxillary incisor teeth. A 20 x 30 cm angled ruler was placed on the participant's right side.

Figure 2: Frequency Distribution of Maxillary Incisor Display Based on Social Smiles.

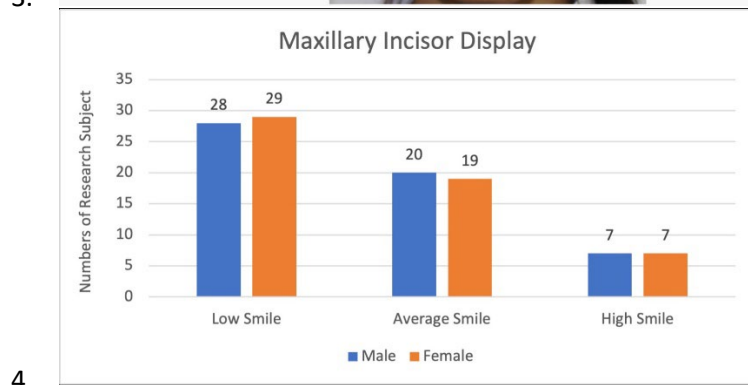
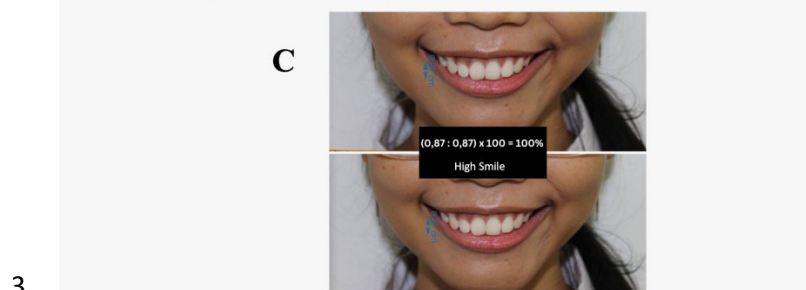
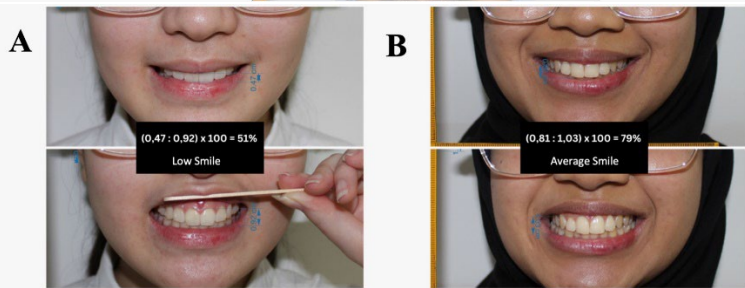
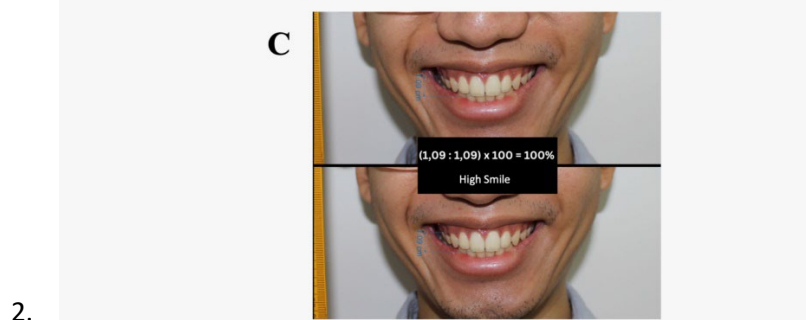
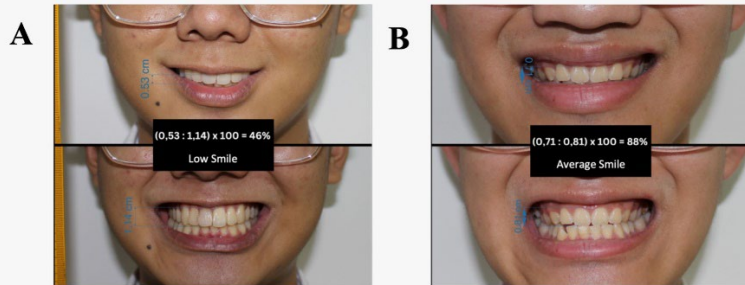
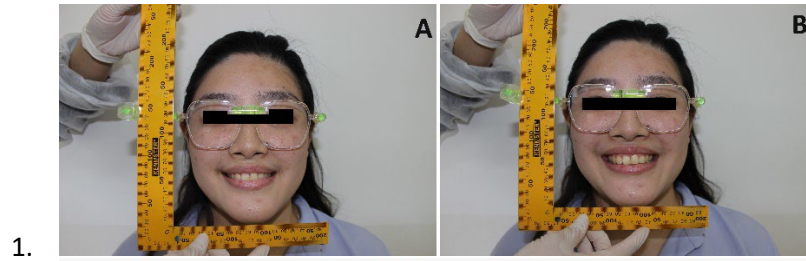
Figure 3: Result of The Maxillary Incisor Display of Males During a Social Smile. A) Low smile exposes 75% of the maxillary incisor. B) Average smile exposes 75–100% of the maxillary incisor and inter dental papilla. C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

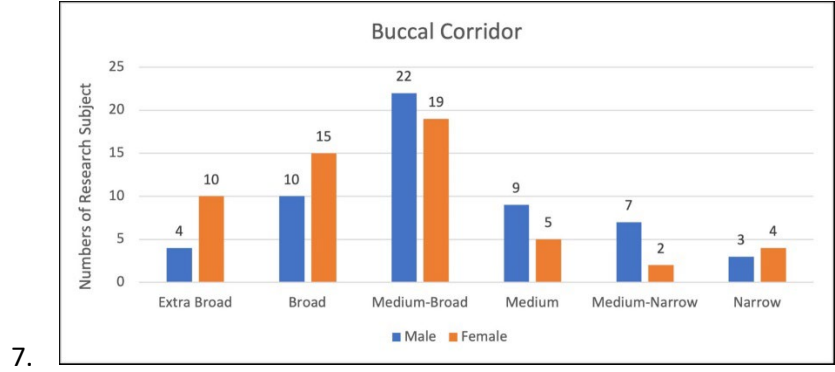
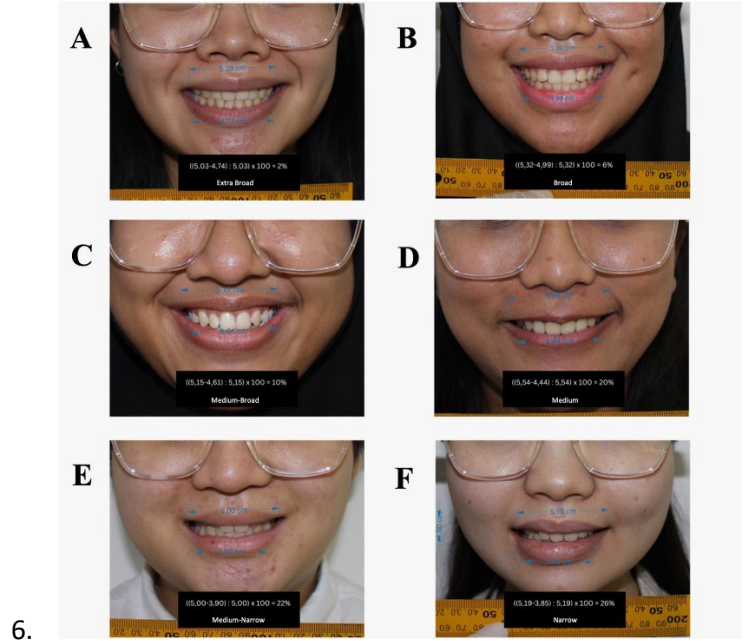
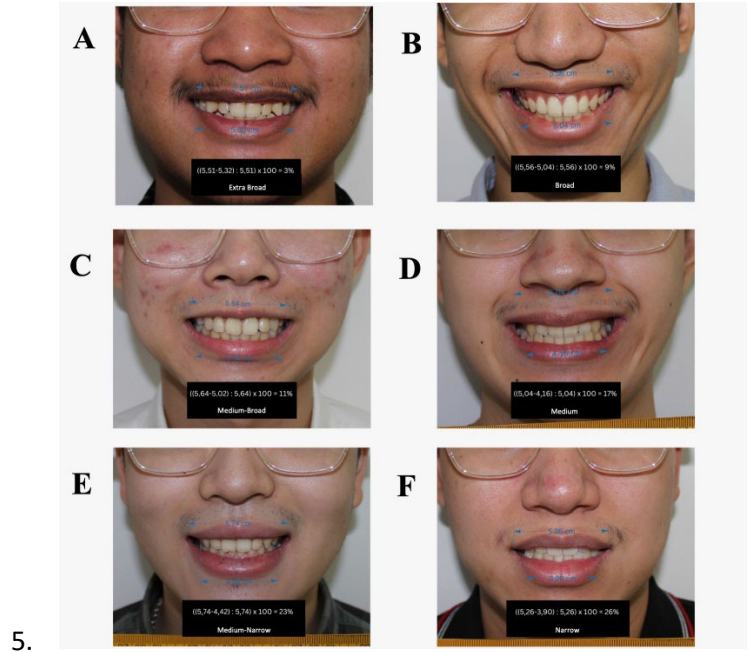
Figure 4: Result of The Maxillary Incisor Display of Females During a Social Smile. A) Low smile exposes 75% of the maxillary incisor; B) Average smile exposes 75–100% of the maxillary incisor and inter dental papilla; C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

Figure 5: Frequency Distribution of Buccal Corridors Based on Social Smiles.

Figure 6: Result and Calculation of The Buccal Corridors of Males During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).

Figure 7: Result and Calculation of The Buccal Corridors of Females During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).





GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR

ORIGINALITY REPORT

12%

SIMILARITY INDEX

6%

INTERNET SOURCES

9%

PUBLICATIONS

1%

STUDENT PAPERS

PRIMARY SOURCES

- 1** repository.trisakti.ac.id 3%
Internet Source
- 2** Gulia, Vandana. "Evaluation of Maxillary Arch Width and Buccal Corridor Changes with Orthodontic Treatment Involving Premolar Extraction and Non Extraction Cases for Assesing the Attractiveness of Frontal Facial Smile", Rajiv Gandhi University of Health Sciences (India), 2023 2%
Publication
- 3** Begum, Fouziya. ""A Comparative Study to Evaluate the Relationship of the Buccal Corridor to the Smile Line, Face Form and Arch Form - An in Vivo Study"", Rajiv Gandhi University of Health Sciences (India), 2023 1%
Publication
- 4** pinnacle.allenpress.com 1%
Internet Source
- 5** J. Wittmann, K. Sinko, G. Millesi. "Aesthetic aspects in orthognathic surgery: the smile", 1%



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - Manuscript ID MJMHS-2024-0192.R1

1 message

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Wed, Mar 6, 2024 at 2:59 AM

Reply-To: sploh@upm.edu.my

To: indrani@trisakti.ac.id

06-Mar-2024

Dear Dr. Sulistyowati:

Your manuscript entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" has been successfully submitted online and is presently being given full consideration for publication in the Malaysian Journal of Medicine & Health Sciences.

Your manuscript ID is MJMHS-2024-0192.R1.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/mjmhs> and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to <https://mc.manuscriptcentral.com/mjmhs>.

Thank you for submitting your manuscript to the Malaysian Journal of Medicine & Health Sciences.

Sincerely,
Malaysian Journal of Medicine & Health Sciences Editorial Office



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences - Decision on Manuscript ID MJMHS-2024-0192.R1

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com>

Fri, Mar 15, 2024 at 8:22 PM

Reply-To: eic_mjmhs@upm.edu.my

To: indrani@trisakti.ac.id

15-Mar-2024

Dear Dr. Sulistyowati:

It is a pleasure to accept your manuscript entitled "GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR" in its current form for publication in the Malaysian Journal of Medicine & Health Sciences. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

Thank you for your fine contribution. On behalf of the Editors of the Malaysian Journal of Medicine & Health Sciences, we look forward to your continued contributions to the Journal.

Sincerely,
Prof. Dr. Rukman Awang Hamat
Editor-in-Chief, Malaysian Journal of Medicine & Health Sciences
eic_mjmhs@upm.edu.my

Associate Editor Comments to Author:

Associate Editor
Comments to the Author:
(There are no comments.)

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author
(There are no comments.)



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences (MJMHS-2024-0192)

Malaysian Journal of Medicine & Health Sciences <onbehalf@manuscriptcentral.com> Thu, May 9, 2024 at 5:22 PM

Reply-To: mjmhs@upm.edu.my

To: indrani@trisakti.ac.id

Cc: mjmhs@upm.edu.my

09-May-2024

MJMHS-2024-0192.R1 - GENDER INFLUENCE IN MAXILLARY INCISOR DISPLAY AND BUCCAL CORRIDOR

Dear Dr. Sulistyowati:

Please advise Table 1 in words file as mentioned in manuscript.

Sincerely,

Ms. Amirah Farzana Jamaludin

Malaysian Journal of Medicine & Health Sciences



Indrani Sulistyowati <indrani@trisakti.ac.id>

Malaysian Journal of Medicine & Health Sciences (MJMHS-2024-0192)

Indrani Sulistyowati <indrani@trisakti.ac.id>
To: mjmhs@upm.edu.my

Sat, May 11, 2024 at 9:47 AM

Dear, Ms. Amirah Farzana Jamaludin

I apologize for the late response.
Here I attach the file you requested
[Quoted text hidden]

 **Table 1. Interrater Reability.docx**
14K

Interrater Reability

To determine the reliability of two calibrated assessors measuring the maxillary incisor display and buccal corridor, Cohen's Kappa was performed and showed the *kappa* coefficient values for the maxillary incisor display and buccal corridor were 0,831 and 0,812, respectively. These indicated that the agreement degree between two assessors was almost perfect.

Table 1. Cohen's Kappa Test Result

No.	Smile Components	Kappa Value	Power of Agreement
1.	Maxillary Incisor Display	0,831	Perfect
2.	Buccal Corridor	0,812	Perfect



Indrani Sulistyowati <indrani@trisakti.ac.id>

Galley proof article for 5th OBSM Issue MJMHS VOL 20 2024

8 messages

NUR HAZIMAH BINTI A.AZIZ / MEDIC <hazimahaziz@upm.edu.my>

Tue, May 21, 2024 at 4:52 PM

To: indrani@trisakti.ac.id

Cc: AMIRAH FARZANA BINTI JAMALUDIN / MJMHS <farzana.jamaludin@upm.edu.my>

Dear Author,

Please find the proof of your article for MJMHS VOL 20 (SUPP XX) XXX 2024. We would appreciate it if you could submit your corrections by indicating on the pdf file itself. If we do not hear anything from your side by 27 May 2024 before 5pm we would assume that this proof is acceptable. Please check carefully for the contents (**we require additional information on places highlighted in red or have question mark signs**). If you have any amendments needed, please do the correction (highlight text with yellow colour in pdf and mention corrected info) and email back to the Editorial team. **Major restructuring of sentences is not allowed.**

1) PLEASE ADVISE ON KEYWORDS

"MALAYSIA MADANI"
"BERILMU BERBAKTI"

Yang menjalankan tugas,

NUR HAZIMAH A.AZIZ**Pegawai Eksekutif 4 (PE 4)**


b/p : Prof. Rukman Awang Hamat

Malaysian Journal of Medicine and Health Sciences (MJMHS)

Universiti Putra Malaysia

mjmhs@upm.edu.my

+603-97692508 / +60 18-958 2110


 **23_0192.pdf**
729K

Indrani Sulistyowati <indrani@trisakti.ac.id>

Wed, May 22, 2024 at 3:45 PM

To: Annisaa Ariyani <annisaa.ariyani@trisakti.ac.id>

[Quoted text hidden]

 **23_0192.pdf**
729K

Indrani Sulistyowati <indrani@trisakti.ac.id>

Sun, May 26, 2024 at 6:31 PM

To: "NUR HAZIMAH BINTI A.AZIZ / MEDIC" <hazimahaziz@upm.edu.my>

Dear Nur Hazimah Binti A.Aziz..

We are grateful to you for taking the time to arrange our manuscript for publication.

Please find the attachment in this email. We attached two PDF files, which are:

1. The author's response to proofreading.

It contains the words that need to be revised, which is highlighted in yellow then, the corrected information will be mentioned in the comment balloons.

2. Our expected final arrangements for the manuscript

In this file, we have only revised for the content but not for the formatting.

Thank you for your assistance and kindness.

Kind regards,

Indrani

[Quoted text hidden]

2 attachments



1. Proof reading_author's response_23_0192.pdf
767K



2. Draft_our expected final arrangement_23_0192.pdf
11449K

NUR HAZIMAH BINTI A.AZIZ / MEDIC <hazimahaziz@upm.edu.my>
To: Indrani Sulistyowati <indrani@trisakti.ac.id>

Mon, May 27, 2024 at 10:30 AM

Dear Author,

Herewith attached is the revised galley proof. Kindly please check thoroughly if there are any corrections needed or I can proceed to the next step?

"MALAYSIA MADANI"
"BERILMU BERBAKTI"

Yang menjalankan tugas,

NUR HAZIMAH A.AZIZ
Pegawai Eksekutif 4 (PE 4)
b/p : Prof. Rukman Awang Hamat
Malaysian Journal of Medicine and Health Sciences (MJMHS)
Universiti Putra Malaysia
mjmhs@upm.edu.my
+603-97692508 / +60 18-958 2110

[Quoted text hidden]

[Quoted text hidden]



UNIVERSITAS TRISAKTI
"Is a one stop learning for sustainable development"
Kampus A, Jl. Kyai Tapa No.1, Grogol
Jakarta Barat 11440 - INDONESIA
www.trisakti.ac.id
(t) +62-21.566 3232, (f) +62-21.567 3001



23_0192.pdf
1053K

Indrani Sulistyowati <indrani@trisakti.ac.id>
To: "NUR HAZIMAH BINTI A.AZIZ / MEDIC" <hazimahaziz@upm.edu.my>

Mon, May 27, 2024 at 1:12 PM

Dear Nur Hazimah Binti A.Aziz..

We are grateful to you for taking the time to arrange our manuscript.
Would you please arrange the size of figure 1 and 2?
Please use the original size for figure 1 and 2.
Thank you very much.

Kind regards,
Indrani
[Quoted text hidden]

 **[Author's response to proof reading] 23_0192.pdf**
1070K

NUR HAZIMAH BINTI A.AZIZ / MEDIC <hazimahaziz@upm.edu.my>
To: Indrani Sulistyowati <indrani@trisakti.ac.id>

Thu, Jun 6, 2024 at 4:43 PM

Dear Author,


Thank you for your response. Herewith I am attached the revised galley proof. Kindly please check thoroughly the article if there are any corrections needed or I can proceed to the next step. Any correction after the article has been published will not be allowed.

**"MALAYSIA MADANI"
"BERILMU BERBAKTI"**

Yang menjalankan tugas,



Nur Hazimah A. Aziz
Pegawai Eksekutif 4

 03-9769 2508


 hazimahaziz@upm.edu.my



**PEJABAT TIMBALAN DEKAN
(PENYELIDIKAN DAN ANTARABANGSA)**
DEPUTY DEAN OFFICE (RESEARCH AND INTERNATIONALIZATION)
مُجَابَات تيمبالتان ديكان (فيلديين دان انتارابangsa)
Fakulti Perubatan dan Sains Kesihatan

mjmhs@upm.edu.my
+6018-9582110


[Quoted text hidden]

 **23_0192.pdf**
726K

Indrani Sulistyowati <indrani@trisakti.ac.id>
To: Annisaa Ariyani <annisaa.ariyani@trisakti.ac.id>

Fri, Jun 7, 2024 at 9:53 AM

[Quoted text hidden]

 **23_0192.pdf**
726K

Indrani Sulistyowati <indrani@trisakti.ac.id>
To: "NUR HAZIMAH BINTI A.AZIZ / MEDIC" <hazimahaziz@upm.edu.my>

Fri, Jun 7, 2024 at 1:28 PM

Dear Ms. Nur Hazimah Binti A. Aziz

We appreciate you taking the time to review our manuscript.
There is no correction for the latest galley proof, and we agree to proceed to the next step.
Thank you very much.

Kind regards,
Indrani

[Quoted text hidden]

ORIGINAL ARTICLE

Gender Influence in Maxillary Incisor Display and Buccal Corridor

Annisaa Putri Ariyani¹, Wita Anggraini², Harris Gadih Pratomo³, Syifa Sistasia⁴, Indrani Sulistyowati⁵

¹ Anatomy Subdivision, Oral Biology Department, Faculty of Dentistry, Universitas Trisakti, Jalan Kyai Tapa No. 260, Grogol, Jakarta Barat, DKI Jakarta 11410, Indonesia

² Anatomy Subdivision, Oral Biology Department, Faculty of Dentistry, Universitas Trisakti, Jalan Kyai Tapa No. 260, Grogol, Jakarta Barat, DKI Jakarta 11410, Indonesia

³ Orthodontic Department, Faculty of Dentistry, Universitas Trisakti, Jalan Kyai Tapa No. 260, Grogol, Jakarta Barat, DKI Jakarta 11410, Indonesia

⁴ Undergraduate Program, Faculty of Dentistry, Universitas Trisakti, Jalan Kyai Tapa No. 260, Grogol, Jakarta Barat, DKI Jakarta 11410, Indonesia

⁵ Anatomy Subdivision, Oral Biology Department, Faculty of Dentistry, Universitas Trisakti, Jalan Kyai Tapa No. 260, Grogol, Jakarta Barat, DKI Jakarta 11410, Indonesia

ABSTRACT

Introduction: A person's smile, can improve the first impression in interpersonal interactions, which is known as one of the ways to get positive feedback from society. In dental aesthetics, smile analysis helps dentists arrange a patient's appropriate dental treatment plan, which is influenced by balancing and harmonizing the maxillary incisor display and the buccal corridor. This present study was intended to determine the differences between the maxillary incisor display and the buccal corridor based on the social smiles exhibited by males and females. **Materials and methods:** This analytical observational study was conducted using a cross-sectional design. A total of 110 profile photographs, consisting of 55 males and 55 females who met the inclusion criteria, were taken when the subjects made a social smile. It was then measured using CorelDraw Graphic Suite 2022 and analyzed using the Chi-Square Test. **Results:** A significant difference was found in the buccal corridor between males and females, with a significance value of 0.022 ($p < 0.05$). However, no significant difference was found in the maxillary incisor display on both, with a significance value of 0.979 ($p < 0.05$). **Conclusion:** A difference in a social smile was found based on the component of the buccal corridor in males and females. However, no differences in the maxillary incisor display were observed.

Keywords: Smile, Social smile, Maxillary incisor display, Buccal corridor, (at least 5 keywords?????????)

Corresponding Author:

Indrani Sulistyowati, DDS., M.Sc.

Email: indrani@trisakti.ac.id

Tel : +62 81113801195

INTRODUCTION

Smiling is a behavior that conveys positive emotions, such as happiness, pleasure, friendliness, and appreciation, and may contribute to facial attractiveness. This expression was supported by a dynamic and complex movement that involves the simultaneous interaction of several facial muscles.(1,2) An attractive and pleasant smile may improve interpersonal relationships and often determine how well a person mingles with society.

A smile is anatomically defined as a facial expression resulting from the contraction of the facial muscles around the mouth. This contraction stretches the midline of the lips laterally, elevates the mouth corners, and highlights the *sulcus nasolabialis*. Furthermore, it has been observed that the act of smiling results in the

narrowing of the eye slits and the development of fine lines on the outer corners of the eyes. The mouth usually slightly opens, revealing the maxillary anterior teeth.(3) The *musculus zygomaticus major* is the primary muscle involved in creating a smile. This muscle elevates the mouth corners upward and outward, leading the lips to form a smile.(4) Other facial muscles such as *musculus risorius*, *musculus levator anguli oris*, *musculus zygomaticus minor*, and *musculus buccinator* also contribute to creating a smile.(3)

Smiles can be categorised into two types: a controlled smile (social or *non-Duchenne* smile) and an uncontrolled smile (genuine or *Duchenne* smile). A social smile, or *non-Duchenne*, occurs when *musculus zygomaticus major* and *musculus levator labii superioris* contract and raise the upper lip forming *sulcus nasolabialis*. *Musculus levator labii superioris* contraction results in the superiorly raising of the upper lip in the region of the anterior teeth. Whereas, *musculus zygomaticus major* contraction attracts the mouth corner superiorly and laterally until it meets the resistance area of the

adipose tissue of the cheek. The *musculus buccinator* then helped in further elevating the lips.(5–9) Contrary to a social smile, a genuine smile, known as *Duchenne*, is characterized by squinting while smiling. It occurs when the *musculus orbicularis oculi* and *musculus zygomaticus major* coordinate to support the maximum elevation of the upper lip.(6)

An aesthetic smile may have an impact on a person's attractiveness. Thus, it becomes one of the important factors that may affect a person's psychosocial health. A person with an aesthetically pleasing smile is often perceived as smarter and more valued due to their display of preferred behaviours in social interactions. (10,11) In accordance with this statement, Pithon et al., (12) asserted that a person with an aesthetically pleasing smile has a higher chance of getting a job because they appear more intelligent. As more people realize the benefits of an aesthetic smile, more people are looking to improve the attractiveness of their smile through various cosmetic treatments such as plastic surgery and dental treatments such as orthodontics, periodontal surgery(13), and orthognathic surgery.(14)

Dentists need to evaluate a patient's smile when arranging a dental treatment plan to ensure that the treatment won't harm its appearance. This evaluation includes analyzing the harmony and balance of the patient's smile components.(15) The components of smile include the lip line, the smile arch, the upper lip curvature, the buccal corridor, the smile symmetry, the occlusal frontal plane, the dental components, and the gingival components.(3) One important dental component to be considered is the maxillary incisor display.(16,17) The maxillary incisor display plays a crucial role in achieving an aesthetically pleasing smile, particularly in prosthodontic treatments that involve replacing anterior teeth.(18) Excessive display of the maxillary incisor can negatively affect the appearance and attractiveness of a person's smile.(19) The buccal corridor is another component that should also be considered, as it contributes to a more natural-looking smile.(20)

The maxillary incisor display is the vertical length of the central incisors that are visible during mouth rest or function.(18) According to Jeelani et al.,(21) the maxillary incisor display in females is generally greater than that of males. This might be caused by the different vertical length of the upper lips among genders.(21,22) However, Bahirrah et al.,(23) did not find a significant difference in maxillary incisor display between genders. The aging process may affect the maxillary incisor display due to the loss of elasticity in the lip muscles. (24)

Another key aspect to consider when assessing smile aesthetics is the buccal corridor.(8) It refers to the black or dark area visible between the buccal surface

of posterior teeth and the lip corner during smiling. Its appearance may give the illusion of a natural-looking smile.(25) Smiles with minimal buccal corridor (0%-10% buccal corridor) are considered the most attractive smile, whereas smiles with an extensive buccal corridor (15%-25% buccal corridor) are considered less attractive.(25,26) Research by Ira(27) suggested a significant difference in the buccal corridor between males and females due to the different shape of the jaw forming the buccal corridor. However, Analia et al.,(22) stated that gender has no impact on the variation in the width of the buccal corridor and does not interfere with the assessment of the buccal corridor.

Based on the background mentioned above, including the contradictory findings from previous studies, the present study aims to determine if there is a difference in the maxillary incisor display and buccal corridor between males and females based on their type of social smile.

MATERIALS AND METHODS

Our present study conducted analytical observational research using a cross-sectional design in the Laboratory of the Faculty of Dentistry, Universitas Trisakti, from October until December 2022. The Research Ethics Commission at the Faculty of Dentistry, Universitas Trisakti, approved all procedures for this study. with the assigned number 021/S3/KEPK/FKG/6/2022. From a total of 289 participants, only 110 participants (50 males and 50 females) ranging in age from 17 to 24 years had complete upper teeth distributed uniformly on both the right and left sides, with healthy periodontal tissue. Participant who have had dental treatments on the anterior teeth such as orthodontic, conservative, and prosthodontic treatment; had facial trauma that may interfere with the movement of facial expression muscles; had experienced a damage to the anterior teeth, dental trauma, disease, or steroid drug intake that may lead to changes in facial appearance; had facial aesthetic treatment such as lip fillers or botox; and for men, had moustache due to blocking the point measurement on the lip corners was excluded. Furthermore, we explained the research procedure to the subject, who confirmed their agreement with the signing of the informed consent form.

Photograph Capture

The same operator captured all photographs in the laboratory under natural sunlight using a Canon EOS-600D with an 18-megapixel resolution, ISO 100–6400, and an 18–135 mm lens. The camera is mounted on a tripod and placed in front of the subject at a distance of 30 cm. The points of interest included the top of the forehead, the lower edge of the chin, and both earlobes. Makeup should be removed. To obtain head photographs in neutral head position (NHP), the subject was instructed to sit upright and stare straight ahead

at the spot at eye level on the wall in front of them. A waterpass attached to the glasses was worn by the subject to maintain his or her head's position at NHP. Moreover, an elbow ruler was also equipped with waterpass to confirm their position parallel to the floor. This technique was introduced by Maniyar, et al.(28)

Afterwards, the subject was instructed to say "cheese" to produce a social smile and pose a bigger smile to obtain the height of the cervico-incisal of the maxillary central incisor. A 20 x 30 cm elbow ruler was used as a benchmark for further measurement and placed on the right side aligned with the subject's head while capturing photographs (Figure 1).

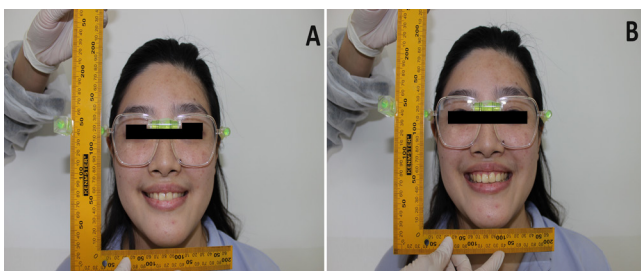


Figure 1: Procedure for Participant's Profile Photography Captured. (A) A social smile pose of the participant with a right-angled 20 x 30 cm ruler placed to their right. (B) The participant's widest smile pose, with perfect visibility of their maxillary incisor teeth. A 20 x 30 cm angled ruler was placed on the participant's right side.

Photograph Assessment

Photographs were assessed using *parallel dimension tools* in CorelDraw Graphic Suite 2022 by two calibrated examiners who were both healthy and stable emotionally. The smile components that would be evaluated were:

-Maxillary Incisor Display: was calculated by dividing the visible length of the maxillary central incisor (from the incisal edge to the inferior line of the upper lip) while smiling with the length of the actual tooth (from the incisal edge to the cervical crest). The score was presented in percentage, then described in terms of three types of smiles: low, average, and high.(23,29) A low smile is defined when less than 75% of the maxillary incisor is seen while smiling. An average smile is defined as 75–100% of the maxillary incisor and interdental papilla being seen while smiling. Whereas, when a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin is seen, it is called a high smile.

-The buccal corridor: was known as the dark space that appears between the buccal surface of the last teeth of the maxillary posterior displayed during smiling and the inner commissure. It was calculated by dividing the difference between the width of the inner commissure and the width of the visible maxillary teeth (from right to left) by the width of the inner commissure (also from right to left), and then it was presented as percentages and categorized into six types of smiles: extra broad (0% buccal corridor), broad (5% buccal corridor), medium-broad (10% buccal corridor), medium (15% buccal corridor), medium-narrow (20% buccal corridor), and

narrow (25% buccal corridor)(30).

Statistical Analysis

A Chi-square test was performed to determine if there was a significant difference in the appearance of smile components (the maxillary incisors and buccal corridor) and gender (male and female). Significant level was set at 0.05.

RESULTS

A total of 110 participants, consisting of 55 males and 55 females, were recruited for the present study. Profile photographs were captured while these subjects were socially smiling. An elbow ruler, 20 x 30 cm, was employed as a reference for measurement.

Interrater Reliability

To determine the reliability of two calibrated assessors measuring the maxillary incisor display and buccal corridor, Cohen's Kappa was performed and showed the kappa coefficient values for the maxillary incisor display and buccal corridor were 0,831 and 0,812, respectively. These indicated that the agreement degree between two assessors was almost perfect.

The Maxillary Incisor Display

Low smile was frequently observed among the genders in both males (50,9%) and females (52,7%) followed by average smile (male 36,4% and female 34,5%) and high smile (male 12,7% and female 12,7%) (Figure 2 – 4).

There was no statistically significant difference in the maxillary incisor display based on gender ($p > 0,05$).

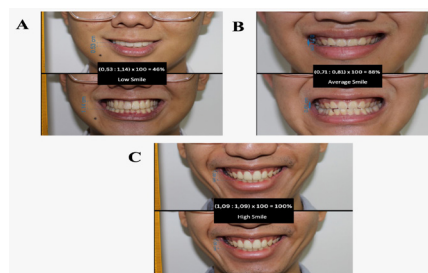


Figure 2: Result of The Maxillary Incisor Display of Males During a Social Smile. A) Low smile exposes 75% of the maxillary incisor. B) Average smile exposes 75–100% of the maxillary incisor and interdental papilla. C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

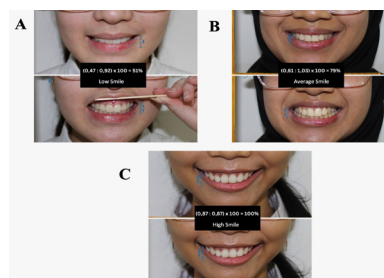


Figure 3: Result of The Maxillary Incisor Display of Females During a Social Smile. A) Low smile exposes 75% of the maxillary incisor; B) Average smile exposes 75–100% of the maxillary incisor and interdental papilla; C) High smile exposes a complete cervico-incisal maxillary incisor (100%) with some amount of gingival margin.

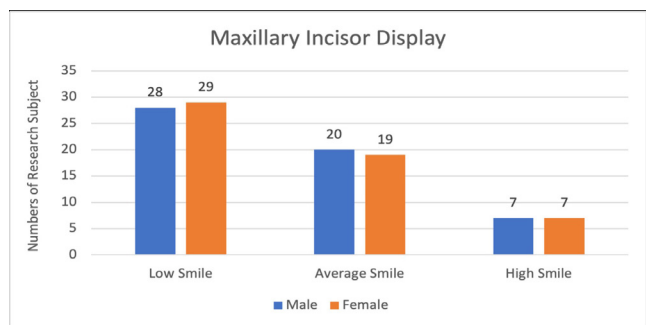


Figure 4: Frequency Distribution of Maxillary Incisor Display Based on Social Smiles.

The Buccal Corridors

The buccal corridor-based smile frequency pattern was differently distributed between genders (Figure 5 – 7); medium-broad (10% buccal corridor) was the most observed among participants in both males (40%) and females (34,5%), followed by broad (male 18,2% and female 27,3%), extra broad (male 7,3% and female 18,2%), medium (male 16,4% and female 9,1%), medium-narrow (male 12,7% and female 3,6%) and narrow (male 5,5% and female 7,3%). The least observed in males and females were narrow (25% buccal corridor) and medium-narrow (20% buccal corridor), respectively. Due to the fact that the chi-square test revealed that the value did not meet the requirement and more than 20% of the cells had less than the expected value, Mann-Whitney was performed as the alternative method, and it showed that the buccal corridor among genders was significantly different.

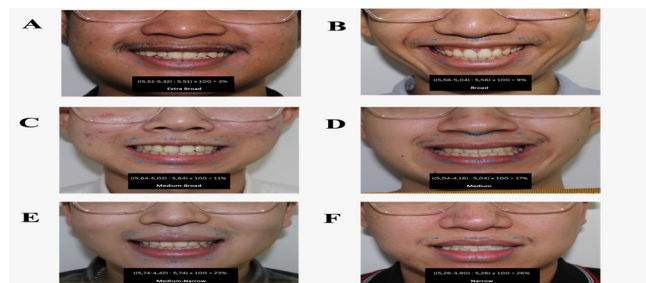


Figure 5: Result and Calculation of The Buccal Corridors of Males During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).



Figure 6: Result and Calculation of The Buccal Corridors of Females During a Social Smile. A) Extra Broad Smile (0% buccal corridor); B) Broad Smile (5% buccal corridor), C) Medium-broad Smile (10% buccal corridor); D) Medium Smile (15% buccal corridor); E) Medium-narrow Smile (20% buccal corridor); F) Narrow Smile (25% buccal corridor).

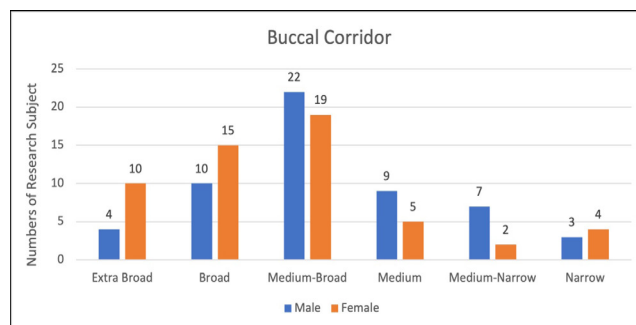


Figure 7: Frequency Distribution of Buccal Corridors Based on Social Smiles.

DISCUSSION

The smile components must be considered by dentists as a reference in planning patient dental treatment in order to achieve an aesthetic smile. The maxillary incisor display and buccal corridor are two components which have a considerable impact on a person’s smile’s beauty. As a result, the present study aimed to observe differences in maxillary incisor display and buccal corridor between males and females when performing social smiles.

A total of 110 photographs from 55 male and 55 female participants were collected for the present study. Two calibrated assessors used Corel Draw Graphic Suite 2022 to measure the maxillary incisor display and buccal corridor. The Cohen’s Kappa test was first performed to determine the strength of agreement in measuring between them. The Kappa coefficient values on the maxillary incisor display and buccal corridor were 0.831 and 0.812, respectively (Table 1). These indicated that the strength of the measurement agreement between the two assessors was almost perfect, meaning that the data can be trusted.

Interrater Reliability

To determine the reliability of two calibrated assessors measuring the maxillary incisor display and buccal corridor, Cohen’s Kappa was performed and showed the kappa coefficient values for the maxillary incisor display and buccal corridor were 0,831 and 0,812, respectively. These indicated that the agreement degree between two assessors was almost perfect.

Table 1: Cohen’s Kappa Test Result

No.	Smile Components	Kappa Value	Power of Agreement
1.	Maxillary Incisor Display	0,831	Perfect
2.	Buccal Corridor	0,812	Perfect

No significant difference between genders in maxillary incisor display was found in this study. Most participants were classified as having a low smile, males (50.9%) and females (52.7%), followed by an average smile (males 36,4%, females 34,5%) and a high smile (males and females 12,7%). This finding is consistent with a

previous study(23) which found that low smile was the second most common smile among the gender. However, it was in contrast to previous study(18). They reported that the maxillary incisor crown visible during smiling was longer in women than in men. The contrast might be due to a difference in measurement techniques and ethnicity between the participant population.

The appearance of maxillary incisor display when smiling depends on the contribution of *musculus zygomaticus major* and *musculus levator labii superioris*, depending on which muscle contracts more dominantly. Iwanaga et al.(6) explained in their research, when *musculus zygomaticus major* is dominant, the mouth corners are lifted superiorly and laterally then *musculus levator labii superioris* raises the upper lip and exposes the maxillary teeth. In other hand, when *musculus levator labii superioris* is dominant and firstly contracts, the maxillary incisor teeth are revealed up to the canines. The simultaneous contraction of *musculus depressor labii inferioris* also contributes to the smile pattern, revealing the entirety of the upper and lower teeth.

The maxillary central incisor display during smiling may decrease with age in both males and females from 20 years of age.(18,24) Facial muscle exercises could help to create an aesthetic smile and prevent muscle sagging.(18) The dentoalveolar height of the anterior maxilla has also been shown to have a relationship with the excess of maxillary incisors display. Excessive anterior maxillary height is likely to result in gummy smile exposure(21) and reduce the aesthetic value of the smile.(31)

The assessment of smile aesthetics includes the evaluation of the buccal corridor(32) which is **nown** as the dark space between the buccal surface of the last of the maxillary posterior teeth displayed during smiling and the inner commissure.(16,25) Its presence was important for a natural-looking smile. The excessive buccal corridor, more than 15% (narrow smile), was considered as less attractive by orthodontists and dental students.(33)

Most participants were classified as having a medium-broad smile, males (40%) and females (34,5%). The results also show that males tend to have a medium to a narrow smile, while women tend to have a broad to a very broad smile. This finding was in agreement with previous study(22) which found that the buccal corridor in females was mostly classified as medium-broad smile (32,9%) whereas in males, most of buccal corridor was categorised as a medium smile (58,3%). This indicated that females have a wider smile than males. This study found a significant difference in buccal corridor among genders. Hadi et al.,(34) also found a significant difference in buccal corridor among the genders, but stated that males tended to have an extra broad smiles than females. The difference might be due to differences in the technique used to measure the buccal corridor.

Its appearance is affected by various factors, such as the width of the maxillary arch, the facial muscles, the labial surface of the maxillary premolars, and the prominence of the canines, particularly at the distal marginal ridge.(22,25,35) The maxillary arch has a direct impact on the buccal corridor. A broad arch that forms a U shape is considered an ideal arch. However, a narrow arch is considered an unattractive arch because it has a wide buccal corridor.(36) The facial type also contributes to the appearance of the buccal corridor. A medium smile was seen in the dolichofacial facial type. A medium-broad smile was seen in those with mesofacial. Whereas, the brachyfacial tends to have a broad smile.(22) Furthermore, as people age, changes occur in the facial muscles that result in a loss of muscle elasticity and tone.(17)

The lack of age group variation, such as young adulthood, adulthood, and the elderly, is a limitation of our study because the maxillary incisor display(17,18) and buccal corridor(17) may change with age. Further research is needed with more focus on the type of smile, upper lip contraction, dental appearance, and gingival tissue in different age groups. This study shows that the use of individual profile photos during social smiling can be used for evaluation in the preparation of dental treatment plans. Clinicians should remember that a small change in the maxillary incisor and buccal corridor may significantly affect the perceived aesthetics of the smile.

CONCLUSION

The study found significant differences in the buccal corridor between male and female social smile types, but no significant differences in maxillary incisor display.

ACKNOWLEDGEMENT

The authors were grateful for the assistance provided by the technical and support staff at the Anatomy Subsection, Department of Oral Biology, Faculty of Dentistry, Universitas Trisakti.

REFERENCES

1. Sapkota B, Srivastava S, Koju S, Srii R. Evaluation of Smile Line in Natural and Forced Smile Position An Institution-based Study. *Orthodontic Journal of Nepal*. 2017;7:27–32.
2. Machado AW. 10 commandments of smile esthetics. *Dental Press J Orthod*. 2014 Jul 1;19(4):136–57.
3. Abdurachman. *Anatomi Senyum Kajian Kinesiologi*. Vol. 1. Airlangga University Press; 2018.
4. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. *Perspektif anatomi dan antropometri pada senyum*. Vol. 2. 2020.
5. Anggraini W, Anatomi-Biologi B, Fakultas O, Gigi K. *Perspektif anatomi dan antropometri pada senyum*. Vol. 2. 2020.
6. Iwanaga J, Hur MS, Kikuta S, Ibaragi S, Watanabe K,

- Tubbs RS. Anatomical contribution of the orbicularis oculi to the zygomaticus major: An improved understanding of the smile with consideration for facial cosmetic procedures. *PLoS One*. 2022 Jul 1;17(7 July).
7. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
 8. Sabri Roy. The eight components of a balanced smile. *J Clin Orthod*. 2005;39(3):155–67.
 9. Rubin LR; MYLG. Anatomy of the Nasolabial Fold: The Keystone of the Smiling Mechanism. *Plastic and Reconstructive Surgery*. 1989 Apr 9;
 10. Vandeventer J, Patterson E. Differentiating Duchenne from non-Duchenne smiles using active appearance models. In: 2012 IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems (BTAS). 2012. p. 319–24.
 11. Alexandra S, Anggraini W, Sulistyowati I, Putri Ariyani A. Lengkung Senyum dan Tampilan Gingiva Pada Senyum. *Jurnal Kedokteran Gigi Terpadu [Internet]*. 2023 Jul 4;5(1). Available from: <https://e-journal.trisakti.ac.id/index.php/jkgt/article/view/16885>
 12. Pithon MM, Nascimento CC, Barbosa GCG, Coqueiro RDS. Do dental esthetics have any influence on finding a job? *American Journal of Orthodontics and Dentofacial Orthopedics*. 2014 Oct 1;146(4):423–9.
 13. Effendi Nasution E, Octavia Nasution R. Penatalaksanaan Aesthetic Crown Lengthening untuk Perawatan Gummy Smile Berhubungan dengan Altered Passive Eruption. *Clinical Dental Journal UGM*. 2020;6(2).
 14. Wang C, Hu WJ, Liang LZ, Zhang YL, Chung KH. Esthetics and smile-related characteristics assessed by laypersons. *Journal of Esthetic and Restorative Dentistry*. 2018 Mar 1;30(2):136–45.
 15. Batwa W, Grewal B, Gill D. Smile analysis: what to measure. *Dent Update [Internet]*. 2014;41(6):483–9. Available from: <https://doi.org/10.12968/denu.2014.41.6.483>
 16. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
 17. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
 18. Zaini NA, Rikmasari R, Damayanti L. Difference in clinical crown length of maxillary central incisors and gingival display at rest and during smiling based on gender. *Padjadjaran Journal of Dentistry*. 2013;25(1):48–56.
 19. Pausch NC, Katsoulis D. Gender-specific evaluation of variation of maxillary exposure when smiling. *Journal of Cranio-Maxillofacial Surgery*. 2017 Jun 1;45(6):913–20.
 20. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
 21. Jeelani W, Fida M, Shaikh A. The maxillary incisor display at rest: Analysis of the underlying components. *Dental Press J Orthod*. 2018;23(6):48–55.
 22. Analia Y, Ismaniati NA, Purbiati M. Gambaran Komponen Senyum Pasien Sebelum Perawatan Ortodonti (Kajian Foto Frontal di Klinik Ortodonti RSGMP FKG UI). *Indonesia Indonesian Journal of Dentistry [Internet]*. 2008;15(1):23–8. Available from: <http://www.fkg.ui.edu>
 23. Bahirrah S, Sitorus O. Gambaran Tipe Senyum Berdasarkan Fotometri Pada Mahasiswa India Tamil Malaysia Fkg Usu (Smile Analysis With Photometric Methods Of Malaysian Indian Tamil Dentistry Students At University Of Sumatera Utara). Vol. 18, *dentika Dental Journal*. 2015.
 24. Drummond S, Capelli J. Incisor display during speech and smile: Age and gender correlations. *Angle Orthodontist*. 2016 Jul 1;86(4):631–7.
 25. Cunha Nascimento D, Rodrigues dos Santos Ê, Wilson Lima Machado A, Alan Vieira Bittencourt M, Alan Vieira Bittencourt Av Araújo M. Influence of buccal corridor dimension on smile esthetics. Vol. 17, *Dental Press J Orthod*. 2012.
 26. Tikku T KRMARAN. Role of buccal corridor in smile esthetics and its correlation with underlying skeletal and dental structures. *Indian J Dent Res Mar-Apr;23(2):187-94* . 2012;23(2):187–94.
 27. Ira Latifatul Mufidah. Perbedaan Komponen Senyum Berdasarkan Jenis Kelamin Pada Mahasiswa Fakultas Kedokteran Gigi Universitas Jember Angkatan 2008. [Jember]: Faculty of Dentistry, Jember University; 2012.
 28. Maniyar M, Kalia A, Mirdehghan N, Nene S, Bhagwagar P. Evaluation of the Influence of Gingival Display on Smile Esthetics in Indian Females-A Computer-Aided Photographic Analysis. *Journal of Indian Orthodontic Society*. 2018 Apr;52(2):100–5.
 29. Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. Vol. 7, *Journal of Pharmacy and Bioallied Sciences*. Wolters Kluwer Medknow Publications; 2015. p. S271–5.
 30. Nurfitriah A, Christnawati C, Alhasyimi AA. Comparison of esthetic smile perceptions among male and female Indonesian dental students relating to the buccal corridors of a smile. *Dental Journal (Majalah Kedokteran Gigi)*. 2018 Feb 21;50(3):127.
 31. Al-Hazmi BA. A conservative approach for treating excessive gingival display: a clinical report. *J Dent Health Oral Disord Ther*. 2018 Mar 22;9(2).
 32. Yang IH, Nahm DS, Baek SH. Which hard and soft tissue factors relate with the amount of buccal corridor space during smiling? *Angle Orthodontist*. 2008 Jan;78(1):5–11.
 33. Ioi H, Nakata S, Counts AL. Effects of buccal corridors on smile esthetics in Japanese. *Angle Orthodontist*. 2009 Jul;79(4):628–33.
 34. Hadi L, Sembiring MB, Muttaqin Z. The Comparison of Smile Aesthetic of Males and Females Based on Buccal Corridor and Smile Arc. *Dentika Dental*

- Journal. 2020;23(1):23–7.
35. Sachdeva K, Singla A, Mahajan V, Jaj HS, Negi A. Esthetic and Smile Characteristics at Rest and during Smiling. *J Indian Orthod Soc.* 46(1):17–25.
 36. Bhuvaneshwaran M. Principles of smile design. *Journal of Conservative Dentistry.* 2010;13(4):225.