

Buccal Corridor as Component of Mini Aesthetic on Caucasoid, Mongoloid, and Negroid Race

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Abstract

Buccal corridor is one of the components of smile aesthetic that needs to be examined before orthodontic treatment is started. One of the factors that can affect buccal corridor's aesthetic is race. Currently, there is no study that compares buccal corridor as a component of mini aesthetic among Caucasoid, Mongoloid and Negroid race. The aim of this study is to compare buccal corridor as a component of mini esthetic among Caucasoid, Mongoloid and Negroid race.

This literature review is done by conducting literature search on Science Direct, Ebscohost, PubMed, Scopus, and Google Scholar database to acquire studies that evaluates buccal corridor as a component of mini esthetics using either Caucasoid, Mongoloid or Negroid population.

On Caucasoid subjects, narrow buccal corridor has good esthetics. On Mongoloid and Negroid subjects, medium buccal corridor has good esthetics

Buccal corridor as a component of mini esthetics is not only affected by race but also other psychosocial factors.

Review (J Int Dent Med Res 2021; 14(3): 1177-1184)

Keywords: Human health, Dentistry, Orthodontics, Medicine, Good Health and Well-Being.

Received date: 01 May 2021

Accept date: 11 July 2021

Introduction

The prevalence of malocclusion is quite high. In Indonesia, the prevalence of malocclusion reaches 80% out of the total population with only 0.7% of them receives orthodontic treatment^{1,2}. Some of the reasons why people seek orthodontic treatment are disfunction and/or discomfort during occlusal activity, and aesthetic. The research done by Faiz *et al.* shows that aesthetic is one of the common reasons people seek orthodontic treatment³.

Orthodontic treatment can affect dento-alveolar structures. With the correction of dento-alveolar structure through orthodontic treatment, the arrangement of teeth and components of smile that can affect smile aesthetic can also be corrected. One of the components of smile aesthetic is buccal corridor width⁴⁻⁶.

The research done by Ker *et al.* shows

that the ideal buccal corridor width is 16% out of the total width of the smile (measured between two lip commissures) with minimum amount of acceptable buccal corridor is 8% and the maximum amount of buccal corridor is 22%⁷. The research done by Parekh *et al.* shows that on Caucasoid population, narrow buccal corridor is the most aesthetic⁸. The research done by Nascimento *et al.* shows that on Negroid population, medium buccal corridor has the best aesthetic⁹. From this premises, it is suggested that race can affect buccal corridor in smile aesthetic. Currently, there is no literature that compares the aesthetic of buccal corridor between Caucasoid, Mongoloid, and Negroid population. Hence, the aim of this study is to review the buccal corridor as a component of mini aesthetic on the Caucasoid, Mongoloid and Negroid population.

Materials and methods

A strategic literature search was conducted on Science Direct database by using the keyword "buccal corridor". The literatures were selected based on certain inclusion criteria, restricting the literature selection only to literatures that conduct cross sectional experiment on the aesthetic aspect of various

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width of buccal corridor in either Caucasoid, Mongoloid, or Negroid population using visual analog scale system within the last 16 years (2005-2021). Numerous additional literatures were retrieved from Ebscohost, PubMed, Scopus and Google Scholar database following the same inclusion criteria. The flow chart of this literature search process is presented on Figure 1.

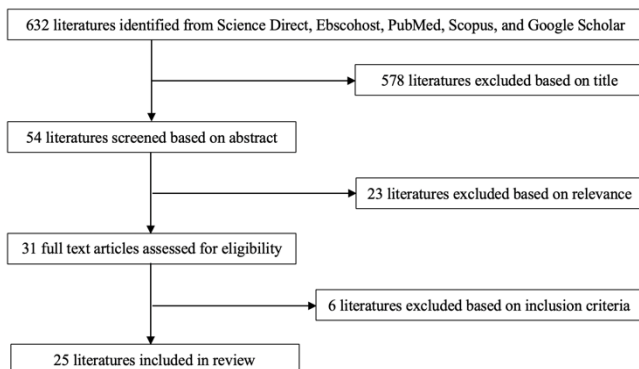


Figure 1. Literature search flow chart.

Results

After conducting literature search, a total of 622 literatures related to "buccal corridor" from Science Direct, and 39 additional literatures from Ebscohost, PubMed, Scopus & Google Scholar were retrieved. Said literatures were then identified from the titles and then screened from the abstracts. After evaluating the eligibility of literatures based on the inclusion criteria by reading the full-text articles, total of 25 literatures is included in this literature review. The qualitative data from the literatures are gathered and presented on Table 1.

Discussion

Various examinations, diagnosis, and treatment planning is the standard procedure before carrying orthodontic treatment. Accurate examinations will result in correct diagnosis. Correct diagnosis will yield proper treatment planning. Proper treatment planning will result in satisfactory occlusion and smile. This demonstrate the importance in the first step of orthodontic treatment which is examination. Examination can be done both clinically and through various patient records such as dental cast, radiographic photos, and intra oral & extra oral photos¹⁰. One of the smile characteristics that can be examined through intra oral & extra

oral photos are smile aesthetic. Aesthetic in dental field can be categorized into micro aesthetic, mini aesthetic, and macro aesthetic. Micro aesthetic is the component of smile aesthetic that overviews the relation and arrangement between one tooth and the others. Mini aesthetic is the component of smile aesthetic that overviews the relation between teeth and other immediate tissues such as the inner commissure of the lip in which is called buccal corridor. Macro aesthetic is the component of smile aesthetic that overviews the relation between smile and the whole face^{11,12}. Recently, there are an increase of interest from dental researcher on how the variety of buccal corridor can affect smile aesthetic¹³. Despite of that fact, there is yet research that compares buccal corridor as component of mini aesthetic on Caucasoid, Mongoloid, and Negroid race¹⁴. Hence, this literature review will be focused on buccal corridor as component of mini aesthetic on Caucasoid, Mongoloid and Negroid race.

The research done by Moore *et al.*¹⁵, Zange *et al.*¹⁶, Pithon *et al.*¹⁷, and Lacerda-Santos *et al.*¹⁸, on the Alpine Caucasoid race populations, Kiani *et al.*¹³, Al Taki *et al.*¹⁹, Sadrhaghghi *et al.*²⁰, Afsari *et al.*²¹, Mollabashi *et al.*²², and Rajeev *et al.*²³, on the Mediterranean Caucasoid race populations, and loi *et al.*^{24,25}, on the Northern Mongoloid race populations show that narrow buccal corridor is considered the most aesthetic compared to medium and wide buccal corridor. These findings are congruent with the research done by Martin *et al.*²⁶, and Parekh *et al.*⁸, on the Alpine Caucasoid race populations and the research done by Badran & Mustafa²⁷, and Alper Oz *et al.*²⁸, on the Mediterranean Caucasoid race populations in which they all considered that wide buccal corridor has worst aesthetic and narrow buccal corridor considered to be the most aesthetic.

The research done by Chotimah *et al.*²⁹, Trisnawaty³⁰, Nimbalkar *et al.*³¹, Charoenpong *et al.*³², on the Southern Mongoloid race population all shows that medium buccal corridor has the best aesthetic compared to narrow and wide buccal corridor. The research done by Nascimento *et al.*⁹, on the Negroid race population also shows similar finding in which medium buccal corridor has superior aesthetic compared to the other two variations of buccal corridor width. The research done by Pisulkar, *et al.*³³, on the Mediterranean Caucasoid race

population suggests that a buccal corridor that is too narrow can reduce the aesthetic of the smile because it gives the impression of an unnatural smile similar to the looks of prosthetic denture smile.

Some research yields contradictory results to other research mentioned before. The research done by Roden-Johnson *et al.*³⁴, and Meyer *et al.*³⁵, on the Alpine Caucasoid race population and Srinivas *et al.*³⁶, on the Mediterranean Caucasoid race population suggest that the variation of buccal corridor width has no significant effect on smile aesthetic.

Caucasoid race according to Kalistu *et al.* tends to have narrow transversal dimension of the face hence categorized as dolichofacial face. Caucasoid race also known to have relatively narrow dental arch compared to another race³⁷. According to the research done by Kaur *et al.*, dolichofacial individuals tend to have thin masseter muscle and small muscle tonicity³⁸. The congruency between transversal dimension of the face and transversal dimension of dental arch, also the small tonicity of masseter muscle can cause a narrow buccal corridor. These findings could help explain the results of this literature review in which in most of the Caucasoid population, narrow buccal corridor is the most aesthetic compared to medium or wide buccal corridor.

Mongoloid race according to Pickering & Bachman tends to have wide transversal dimension of the face and medium width of the dental arch¹⁴. The discrepancy between transversal dimension of the face and transversal dimension of dental arch has the probability to results in medium buccal corridor. These findings could help explain the result of this literature review in which in Southern Mongoloid population medium buccal corridor is the most aesthetic.

Negroid race according to Pickering & Bachman tends to have narrow transversal dimension of face and medium transversal dimension of dental arch but on the other hand Negroid race tends to have brachyfacial face type¹⁴. Brachyfacial face type tends to have high tonicity of masseter muscle. Research done by Kaur *et al.* shows that high tonicity of masseter muscle can increase the size of buccal corridor³⁹. This could help explain the result of this literature review in which in Negroid population medium buccal corridor is considered the most aesthetic.

There are few contrasting findings in this literature review. The research done in Mongoloid population by Chotimah *et al.*²⁹, Trisnawaty³⁰, Nimbalkar *et al.*³¹, Charoenpong *et al.*³², Pisulkar, *et al.*³³, shows that medium buccal corridor is the most aesthetic, while the research done also in Mongoloid population by loi *et al.*^{24,25}, shows that narrow buccal corridor is the most aesthetic. The research done in Mediterranean Caucasoid population by Kiani *et al.*¹³, Al Taki *et al.*¹⁹, Sadrhaghghi *et al.*²⁰, Afsari *et al.*²¹, Mollabashi *et al.*²², and Rajeev *et al.*²³, shows that narrow buccal corridor is the most aesthetic, while the research done also in Mediterranean Caucasoid population by Pisulkar, *et al.*³³, shows that medium buccal corridor is the most aesthetic. This demonstrates that race is not the only factor affecting the aesthetic of buccal corridor. According to Chotimah *et al.*, other factors that can affect buccal corridor are social environment and psychosocial condition of the evaluator²⁹.

The contradictory results from the research done by Roden-Johnson *et al.*³⁴, Meyer *et al.*³⁵, and Srinivas *et al.*³⁶, was probably caused by the difference in the principle of research methods. Roden-Johnson *et al.*³⁴, conduct research by measuring buccal corridor from inner commissure of lip to buccal surface of canine teeth, while all the other research included in this literature review measure buccal corridor from inner commissure of lip to buccal surface of the most posterior teeth visible. Meyer *et al.*³⁵, and Srinivas *et al.*³⁶, both conduct research by gathering large amount of subject then frontal extra oral picture of their subjects are taken and categorize them according to the width of buccal corridor, while all the other research included in this literature review use few subject whose extra oral picture is digitally modified to yields variation of buccal corridor.

Conclusions

Based on the findings of this literature review, it can be concluded that race is not the only factor affecting the buccal corridor in smile aesthetic. Other factors such as social environment and psychosocial condition of a person can also affect buccal corridor as component of smile aesthetic.

Declaration of Interest

The authors report no conflict of interest.

No	Authors, Year	Sample	Aim	Population	Result
1	Moore <i>et al.</i> , 2005	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10%, 15%, 22% and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Narrow buccal corridor is the most aesthetic.
2	Zange <i>et al.</i> , 2011	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10%, 15%, 22% and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Narrow buccal corridor is the most aesthetic.
3	Pithon <i>et al.</i> , 2014	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10%, 15%, 22% and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Narrow buccal corridor is the most aesthetic.
4	Lacerda-Santos <i>et al.</i> , 2015	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 5%, 10%, 15%, 20%, 25% and 30% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Narrow buccal corridor is the most aesthetic.
5	Martin <i>et al.</i> , 2007	Digitally manipulated frontal picture of subject with normal occlusion to produce narrow, medium and wide buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Narrow buccal corridor is the most aesthetic.
6	Parekh <i>et al.</i> , 2007	Digitally manipulated frontal picture of subject with normal occlusion to produce narrow, medium and wide buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Narrow buccal corridor is the most aesthetic.
7	Roden-Johnson <i>et al.</i> , 2005	Digitally manipulated frontal picture of subject with normal occlusion to produce smile with buccal corridor and smile without buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Variation of buccal corridor has no effect on smile aesthetic.

8	Meyer <i>et al.</i> , 2014	Frontal photo of numerous subjects after orthodontic treatment with and without extraction is taken and categorized based on the width of buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Alpine Caucasoid	Variation of buccal corridor has no effect on smile aesthetic.
9	Kiani <i>et al.</i> , 2013	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 4%, 8%, 12% dan 16% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
10	Al Taki <i>et al.</i> , 2016	Digitally manipulated frontal picture of subject with normal occlusion to produce narrow, medium and wide buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
11	Sadrhaghighi <i>et al.</i> , 2015	Digitally manipulated frontal picture of subject with normal occlusion to produce narrow, medium and wide buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
12	Afsari <i>et al.</i> , 2018	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10%, 15% and 22% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
13	Mollabashi <i>et al.</i> , 2018	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 15% and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
14	Rajeev <i>et al.</i> , 2018	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10%, 15%, 22% and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
15	Badran & Mustafa, 2013	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 5%, 10%, 15%, 20%, and 25% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.

16	Alper Öz <i>et al.</i> , 2017	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 4%, 8%, 12%, 16%, 20% and 24% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Narrow buccal corridor is the most aesthetic.
17	Pisulkar <i>et al.</i> , 2019	Digitally manipulated frontal picture of subject with normal occlusion to produce narrow, medium, and wide buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Medium buccal corridor is the most aesthetic.
18	Srinivas <i>et al.</i> , 2018	Frontal photo of numerous subjects is taken and categorized based on the width of buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Mediterranean Caucasoid	Variation of buccal corridor has no effect on smile aesthetic.
19	loi <i>et al.</i> , 2009	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 5%, 10%, 15%, 20% and 25% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Northern Mongoloid	Narrow buccal corridor is the most aesthetic.
20	loi <i>et al.</i> , 2012	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 5%, 10%, 15%, 20% and 25% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Northern Mongoloid	Narrow buccal corridor is the most aesthetic.
21	Chotimah <i>et al.</i> , 2017	Digitally manipulated frontal picture of subject with normal occlusion to produce narrow, medium and wide buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Southern Mongoloid	Medium buccal corridor is the most aesthetic.
22	Trisnawaty, 2017	Digitally manipulated frontal picture of subject with normal occlusion to produce 0%, 5%, 10%, 15%, 20% and 25% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Southern Mongoloid	Medium buccal corridor is the most aesthetic.
23	Nimbalkar <i>et al.</i> , 2016	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10%, 15%, 22%, and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Southern Mongoloid	Medium buccal corridor is the most aesthetic.

24	Charoenpong <i>et al.</i> , 2017	Digitally manipulated frontal picture of subject with normal occlusion to produce 2%, 10% 15%, 22% and 28% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Southern Mongoloid	Medium buccal corridor is the most aesthetic.
25	Nascimento <i>et al.</i> , 2012	Digitally manipulated frontal picture of subject with normal occlusion to produce 6%, 16%, and 26% buccal corridor.	To evaluate the effect of buccal corridor width variation to smile aesthetic.	Negroid	Medium buccal corridor is the most aesthetic.

Table 1. List of published research between 2005-2021 included in the present review, evaluating the effect of buccal corridor width variation on smile aesthetic.

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