

Skeletal discrepancies in patients with skeletal class 2 malocclusion treated at a private dental hospital - an OP report

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Abstract

Aim: The purpose of this study was to determine whether patients with class 2 skeletal malocclusion in a private dental hospital had skeletal discrepancies.

Materials and methods: This was a descriptive, retrospective study, and the dental information archiving software was used to collect all the data from the patients who attended the dental clinics at Saveetha Dental College, SIMATS, Chennai, India (DIAS). March 2020 through March 2021 saw the collection of patient records. We gathered and tabulated the data. The gathered data underwent additional processing, was entered into Microsoft Excel, and then went through statistical analysis using IBM SPSS statistics analyzer v.23.0.

Results: The current study used a total sample size of 88950 patients. Skeletal class 2 malocclusion was seen in 0.01 percent of cases overall. The data in this study was examined for the occurrence of different skeletal inconsistencies. Results were satisfactory and showed that there were skeletal differences. A gender bias was evident, with 50.4 percent of the sample population being female. Mandibular deficit was the most frequent skeletal discrepancy, and class 2 div 1 dental malocclusion was most frequently detected.

Conclusion: Mandibular deficit was shown to be the most common skeletal discrepancy within the constraints of the current investigation, and a substantial correlation between the skeletal discrepancies and the gender of the study group was found.

Keywords: skeletal class 2, discrepancies, dental malocclusion, prevalence, maxillary excess, mandibular deficiency.

Introduction:

Dental malocclusion is an ever presenting problem in modern society where there is increased concern and awareness regarding one's own appearance not only in adults, but also in adolescents and children.^[1,2] Malocclusion is the abnormal relationship between the dental arches or the presence of abnormalities in the teeth.^[3,4] Malocclusion has recently come under scrutiny as a public health issue because of its unsightly appearance.^[5,6] The formation of malocclusion is rather complex and cannot be equated to a single positive factor. Malocclusion is thought to be a developmental disturbance and many of the causative factors are not understood clearly till date.^[7-9] Malocclusion, after tooth cavities and periodontal issues, is the third most common orofacial complaint.^[10] It was found that the formation of skeletal discrepancies is not very rare due to the increased complexity of the growth and development of the orofacial complex.^[11,12] These skeletal malocclusions are thought to be caused by general and local factors where, the general factors include genetic and hereditary etiology, environmental factors and traumatic injuries, whereas local factors include the shape, size and number of teeth present.^[13,14]

In a recent study, it was discovered that environmental factors such hormones, trauma, and other factors as well as heredity had a part in the prediction of skeletal malocclusion, and that the current prevalence of skeletal malocclusion was higher as a result. Additionally, it was shown that the cornerstone of treatment, orthognathic surgery, was usually invariably carried out following the emergence of the malocclusion .^[15-17] It was also found in another study that class 2 malocclusion was associated with skeletal discrepancies in 75 percent of the study population .^[18] Skeletal malocclusion was also found to possess an increased likelihood for dental trauma, affecting facial aesthetics, function and stability and also affects the psychology of such patients .^[19-22]

To determine the prevalence of skeletal discrepancies among patients with Class 2 skeletal malocclusion. The absence of prevalence studies on the various kinds of skeletal discrepancies in patients with Class 2 skeletal malocclusion will be addressed by this study. Our staff has a wealth of knowledge and research expertise, which has resulted in publications of the highest calibre.^[23-42] The current study's objective is to determine the frequency of skeletal discrepancies among patients in a private dental institution who have class 2 skeletal malocclusions.

Materials and Methods:

All patient information from those who visited Saveetha Dental College and Hospitals, SIMATS, Chennai, India, and were identified as having skeletal class 2 malocclusion was gathered from the dental information archiving programme for this descriptive study (DIAS).

The research investigation was carried out in the dental clinics of Saveetha Dental College in a university setting. The presence of a larger population and the abundance of data were positives. One of the drawbacks was that the study had a fairly small demography and was conducted in a single location. The existence of skeletal class 2 malocclusion was one of the study's dependent variables. One of the subject's independent variables is gender. There was a random process used to choose the research population. The patients who visited the undergraduate and graduate dentistry clinics at Saveetha Dental College were chosen as the population. The Saveetha University's ethics board had given its consent for this research investigation to be conducted (applied). 961 patients were identified to have skeletal class 2 malocclusion out of the n = 88,950 instances that were reviewed, after which cross-verification by a second reviewer was conducted. A second reviewer was added, who collected all the data from the institution, and simple random sampling was also carried out as an additional safeguard to reduce sample bias. High internal and low external validity were both present. March 2020 through March 2021 saw the collecting of samples.

The information was calculated based on four characteristics, including the subject's gender, skeletal discrepancies, and the type of dental malocclusion, after being methodically organised using the Microsoft Excel programme. The information was verified by a second reviewer. The study did not include any incomplete or censored data that might have been present in the data that was gathered.

The IBM SPSS statistical analyzer was used to do the statistical analysis on the compiled data. For statistical analysis, the chi square test was performed. Regardless of age or gender, outpatients with skeletal class 2 malocclusion met the inclusion criteria for this study. Outpatients who did not demonstrate skeletal class 2 malocclusion were among the exclusion criteria.

Results and Discussion:

Based on the three previously indicated factors, the data was gathered and sorted. We found that 0.01 percent of people who visited the private dental hospital had skeletal class 2 malocclusions overall. The reason for undertaking this research study is due to lack of substantial research regarding the various discrepancies involved in skeletal class 2 malocclusion and their association with different parameters such as gender and head shape.

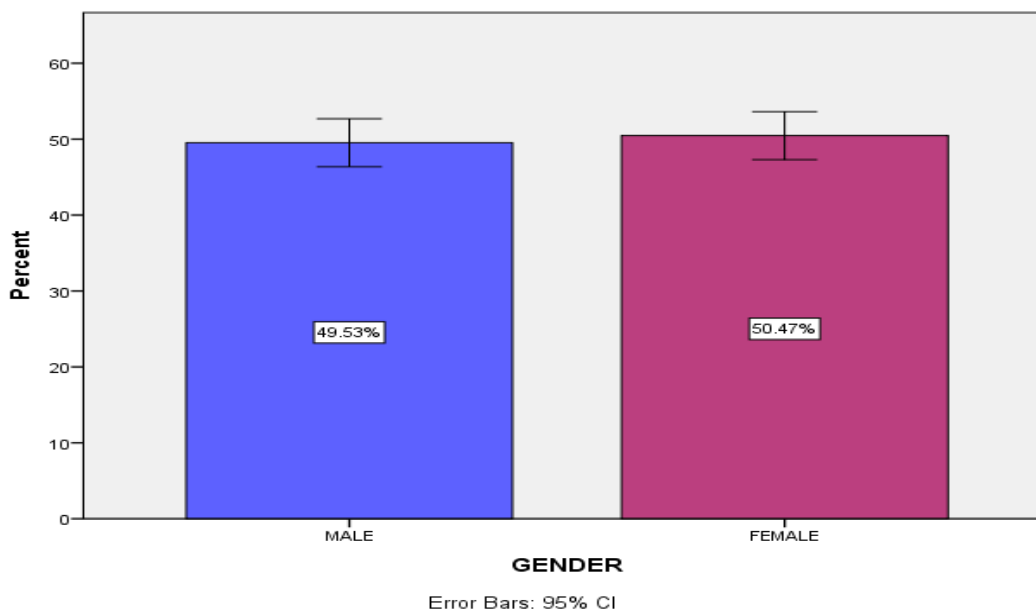
The gender distribution of the study population was shown in Table 1 and Graph 1, where it showed that out of 961 instances, a slightly higher female inclination of 50.47 percent and a male predilection of 49.53 percent was found. The prevalence of skeletal class 2 malocclusion in females may be due to the fact that males and females have different growth patterns, morphologies, and hormonal levels, particularly during the developing years of life, even though this is not a significant difference. However, more research is required to support this claim. In a recent study, Komazaki, Yuko, et al. (2012) discovered that there were 1.56 times more females than men in the sample group of 821 adolescents.^[43] However, a study by Siddegowda, Roopa, and Rani M. Satish (2014) found that males (21.5%) had a higher incidence of skeletal class 2 malocclusion than females (19.8%%), indicating that results are variable and that the current study's findings are neither consistent with nor contradictory to the literature.^[44]

Table 1: Gender

GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	476	49.5	49.5	49.5
	FEMALE	485	50.5	50.5	100.0
	Total	961	100.0	100.0	

Graph 1: Distribution Of Skeletal Class 2 Malocclusion Among Different Genders



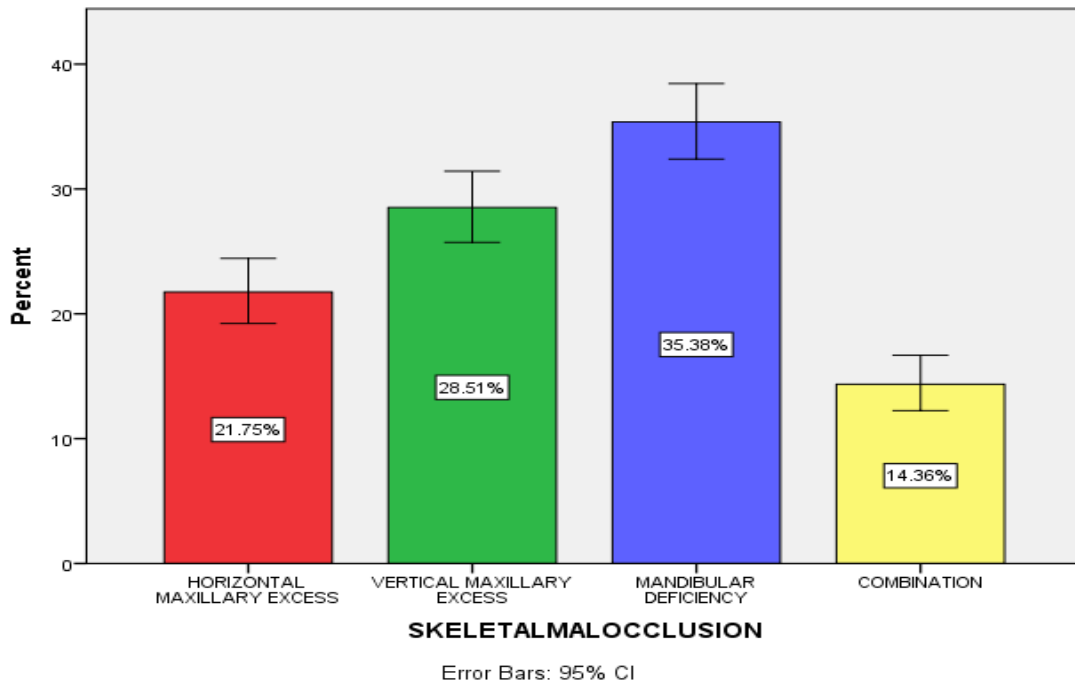
A bar graph with gender on the x-axis and the percentage of the population on the y-axis illustrates the prevalence and distribution of skeletal class 2 malocclusion among various genders. Female patients made up nearly 50.47 percent of the study population, making them the most prevalent group, followed by male patients with 49.53 percent.

TABLE 2: Skeletal Malocclusion

SKELETAL MALOCCCLUSION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HORIZONTAL MAXILLARY EXCESS	209	21.7	21.7	21.7
	VERTICAL MAXILLARY EXCESS	274	28.5	28.5	50.3
	MANDIBULAR DEFICIENCY	340	35.4	35.4	85.6
	COMBINATION	138	14.4	14.4	100.0
	Total	961	100.0	100.0	

Graph 2: Distribution Of Skeletal Discrepancies Among Patients With Skeletal Class 2 Malocclusion



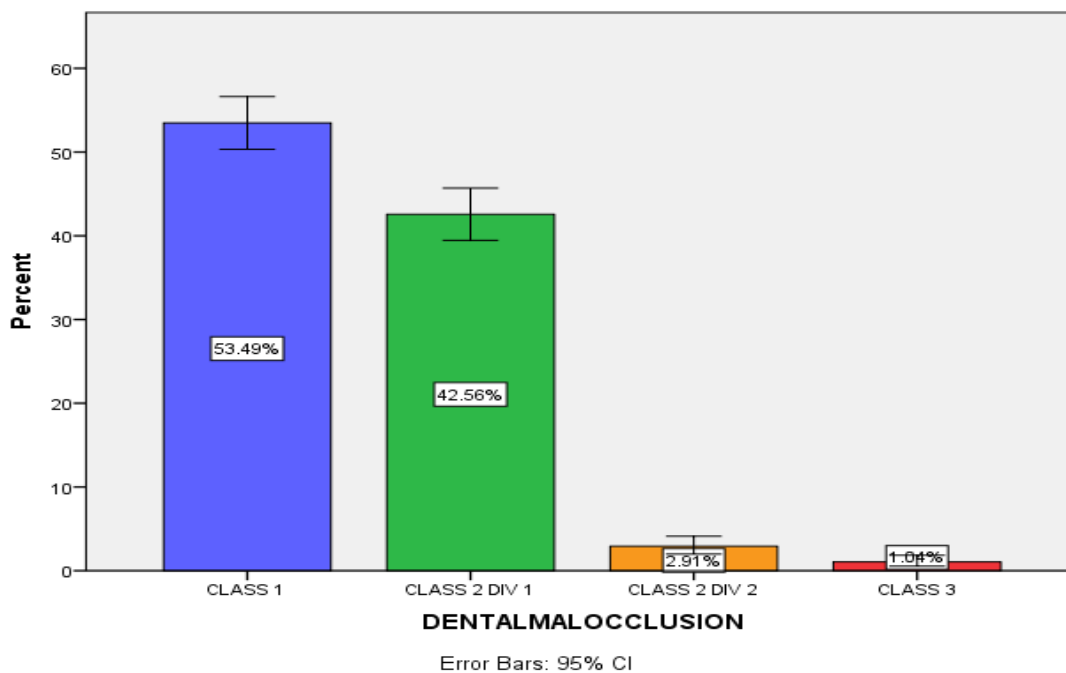
A bar graph with the percentage of the population in the y axis and the prevalence and distribution of skeletal discrepancies among patients with skeletal class 2 malocclusion is shown. Mandibular deficiency, which is the most prevalent condition, was discovered to affect about 35.38 percent of the population. Vertical and horizontal maxillary excesses were found to affect 21.75 and 14.36 percent of the population, respectively.

TABLE 3: Dental Malocclusion

DENTAL MALOCCCLUSION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CLASS 2 DIV 1	514	53.5	53.5	53.5
	CLASS 2 DIV 2	409	42.6	42.6	96.0
	CLASS 1	28	2.9	2.9	99.0
	CLASS 3	10	1.0	1.0	100.0
	Total	961	100.0	100.0	

Graph 3: Distribution Of Dental Malocclusion Among Patients With Skeletal Class 2 Malocclusion:



A bar graph with the percentage of the population in the y axis and the frequency and distribution of dental malocclusion among individuals with skeletal class 2 malocclusion is shown. The most prevalent type of malocclusion, class 2 div 1 (found in nearly 53.49 percent of the population), is followed by class 2 division 2 (found in 42.56 percent), class 1 (found in 2.91 percent), and class 3 (found in 1.04 percent).

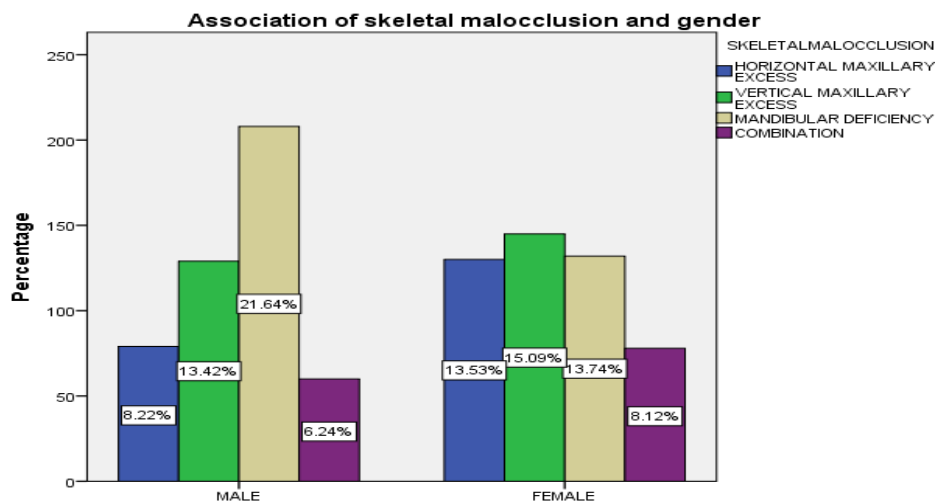
Table 4: Association Between The Gender Of The Participants And The Type Of Skeletal Discrepancy In Class 2 Skeletal Malocclusion:

GENDER * SKELETAL MALOCCLUSION Cross tabulation

Count

		SKELETAL MALOCCLUSION				Total
		HORIZONTAL MAXILLARY EXCESS	VERTICAL MAXILLARY EXCESS	MANDIBULAR DEFICIENCY	COMBINATION	
GENDER	MALE	79	129	208	60	476
	FEMALE	130	145	132	78	485
Total		209	274	340	138	961

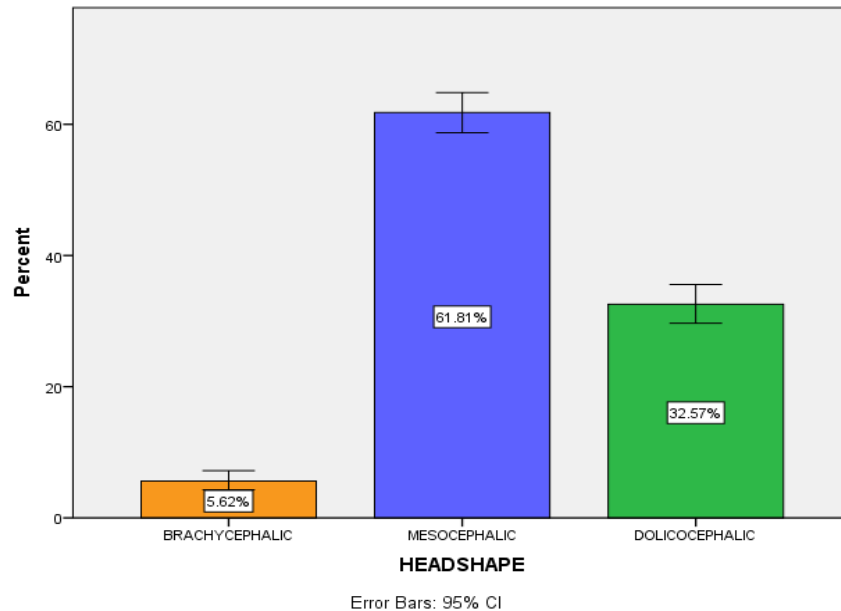
Graph 4: Association Between The Gender Of The Participants And The Type Of Skeletal Discrepancy In Class 2 Skeletal Malocclusion:



A bar graph illustrating the relationship between participant gender and skeletal disparities. The population's gender is shown by the X axis, while its proportion is represented by the Y axis. Brown colour signifies mandibular deficiency, green colour indicates vertical maxillary excess, blue colour indicates horizontal maxillary excess, and purple colour

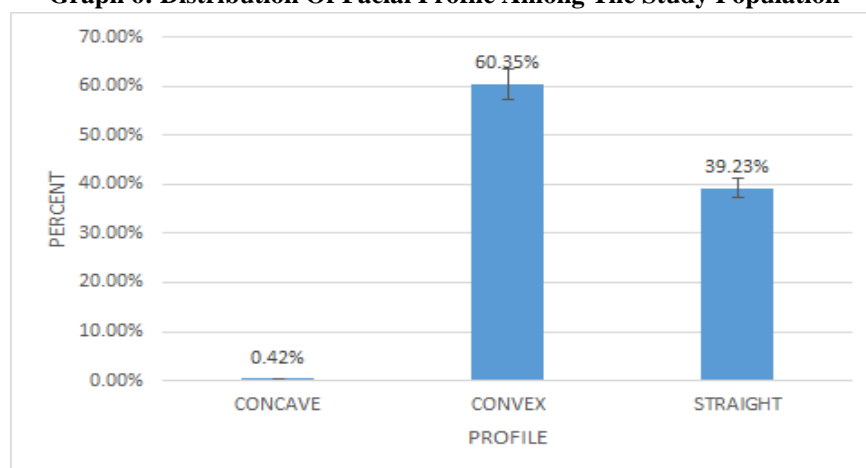
indicates combination. The gender of the individuals and the skeletal disparities were found to be significantly correlated ($p=0.000$, $p0.05$). Mandibular deficit was found to be the most prevalent skeletal discrepancy in males, accounting for 21.64 percent of all cases, whereas vertical maxillary excess was shown to be the most prevalent in females, accounting for 15.09 percent.

Graph 5: Distribution Of Head Shape Among The Study Population



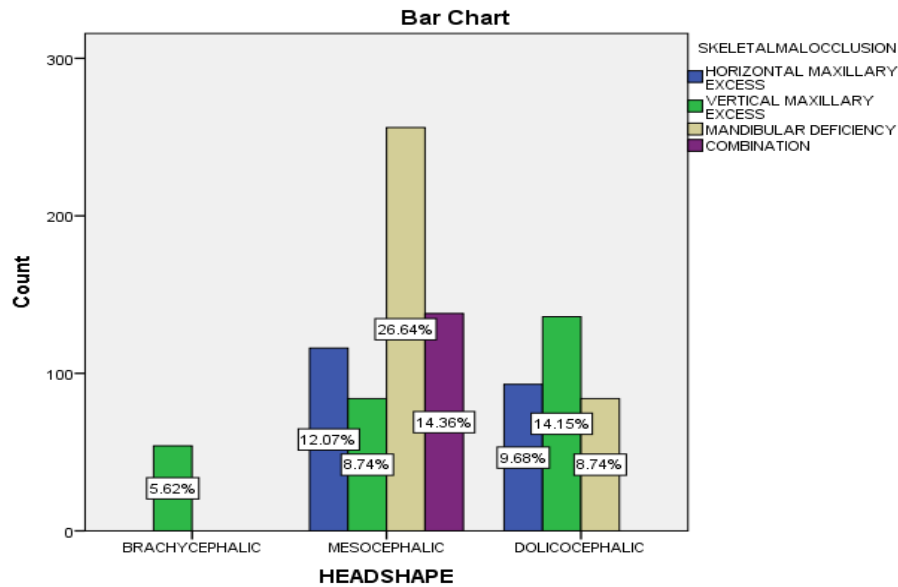
A bar graph with the percentage of the population in the y axis and the frequency and distribution of head shape among individuals with skeletal class 2 malocclusion is shown. The most prevalent head shape, found in nearly 61.81 percent of the population, was mesocephalic, followed by dolichocephalic with 32.57 percent and brachycephalic with 1.04 percent.

Graph 6: Distribution Of Facial Profile Among The Study Population



A bar graph with the percentage of the population in the y axis and the frequency and distribution of facial profiles among patients with skeletal class 2 malocclusions may be seen. Convex profiles were found to be the most prevalent, accounting for about 60.35 percent of the population, followed by straight profiles (39.23 percent) and concave profiles (0.42%).

Graph 7: Association Between The Head Shape And The Type Of Skeletal Discrepancy In Class 2 Skeletal Malocclusion Patients:



A bar graph illustrating the relationship between participation participants' head shapes and skeletal discrepancies. The population's head shape is shown by the X axis, while its percentage is represented by the Y axis. Brown colour signifies mandibular deficiency, green colour indicates vertical maxillary excess, blue colour indicates horizontal maxillary excess, and purple colour indicates combination. The subjects' head shapes and the skeletal discrepancies were found to be significantly correlated ($p=0.000$, $p<0.05$). Mandibular deficit was shown to be the most prevalent skeletal difference in mesocephalic head shape (26.64 percent). Vertical maxillary excess was the most frequently noted difference between dolichocephalic and brachycephalic head types (14.15 percent and 5.62 percent respectively).

Table-2 and graph-2 explains about the different types of skeletal discrepancies observed in skeletal class 2 malocclusion patients. The different types of discrepancies observed were horizontal maxillary excess, vertical maxillary excess, mandibular deficiency and a combination of multiple discrepancies. On observation, it was found that mandibular deficiency was the most prevalent with 35.38% followed by vertical maxillary excess with 28.51 , horizontal maxillary excess with 21.75% and finally combination of two or more discrepancies with 14.36%. Maxillary defects were more commonly observed compared to mandibular defects. Literature evidence regarding the various discrepancies were found to be limited further emphasizing the need for this study.

Table-3 and graph-3 demonstrates the type of dental malocclusion present in skeletal class 2 malocclusion patients. Among 961 patients, nearly 53.49 % of the population was found to have class 2 div 1 malocclusion which is the most common and characterized by the presence of proclined maxillary incisors and increased overjet followed by class 2 division 2 malocclusion with 42.56 % which has retroclined incisors and increased overbite, class 1 malocclusion with 2.91 % which is considered normal and finally class 3 malocclusion with 1.04 % which is characterized by a reverse overjet.

The relationship between skeletal inconsistencies and participant gender is described in Table 4 and Graph 4. The gender of the individuals and the skeletal disparities were found to be significantly correlated ($p=0.000$, $p<0.05$). It was observed that the most common skeletal discrepancy observed in males was mandibular deficiency with 21.64%, whereas the most commonly seen skeletal discrepancy in females was vertical maxillary excess with 15.09%. In the present study we also aimed at observing which arch was more commonly involved in males and females. On analysis

of data we found that the Male: Female ratios for horizontal maxillary excess was 0.6:1 and vertical maxillary excess was 0.8:1 suggesting that the maxilla was predominantly affected in females. However in the case of mandibular deficiency the Male: Female ratio was 1.5:1 suggesting that the mandible was more frequently affected in males. Although maxilla was more commonly affected in females and mandible was more commonly affected in males, a smaller percentage of the other arch was involved in either gender.

Graph-5 demonstrates the frequency and distribution of head shape among skeletal class 2 malocclusion patients. 61.81 % of the population were found to have mesocephalic head shape which is the most common followed by dolichocephalic head shape with 32.57% and brachycephalic head shape with 1.04 %.

Graph-6 explains the frequency and distribution of facial profile among skeletal class 2 malocclusion patients. The majority of the population were found to have a convex profile (60.35%) and straight profile (39.23%) which are the most common and in accordance with skeletal class 2 malocclusion. A small portion of the study population was also found to present with a concave profile (0.42%). The concave profile observed were only males who presented with class 2 division 2 malocclusion where they had a prominent chin due to soft tissue musculature. In a study conducted by Perović, it was observed that a convex facial profile was the most commonly observed with 54% of the study population.^[45] Studies by Pachori et al. and Shukri et al. also produced similar findings, with the majority of the research group having a convex face profile.^[46,47] This may mean that the current study's findings are consistent with previous research.

The relationship between participant head shapes and skeletal discrepancies is described in Graph 7. The subjects' head shapes and the skeletal discrepancies were found to be significantly correlated ($p=0.000$, $p<0.05$). It was observed that the most common skeletal discrepancy observed in mesocephalic head shape was mandibular deficiency (26.64%). The most commonly observed variation in dolichocephalic and brachycephalic head shapes was vertical maxillary excess (14.15% and 5.62% respectively).

This was found to be a non-classical finding as brachycephalic head shapes are known to involve the mandible and are most commonly seen in skeletal class 3 malocclusion cases as seen in the studies conducted by Franco et al.,^[48] However in the present study we observed that the brachycephalic head shape was purely observed in patients with vertical maxillary excess among the skeletal class 2 patients.

Study drawbacks include a smaller sample size, a uncentered design, a small demographic sample, and a lack of variability in the data collected.

Future directions: This work may open the door to fresh investigations and more accurate evaluations of skeletal class 2 malocclusion. This will lead to an increase in the knowledge and understanding regarding the skeletal discrepancies occurring in the community. This will aid in overall better treatment protocols.

Conclusion:

Within the constraints of the present investigation, we found that females were more likely to have skeletal class 2 malocclusions. Mandibular deficit was the most frequent skeletal discrepancy, while class 2 div 1 malocclusion was the most frequent dental malocclusion. Overall, maxillary involvement was common among females and mandibular involvement was observed in males although a small percentage of the reverse was seen in either gender. The reason for this could be due to varied morphogenetic expression amongst the general population visiting this institution. Findings from the present research will certainly open avenues for further studies, to optimise treatment planning for the chosen population.

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