Original Article

Relationship Between Malocclusion and Body Mass Index: A Cross-sectional Study in the Tikrit Dentistry Collage

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ABSTRACT

Objective: To determine the effects of obesity and overweight on malocclusion.
Study Design: Cross-sectional study
Place and Duration of Study: This study was conducted at the Tikrit Dentistry Collage from 1st February 2024 to 31st July 2024.
Methods: A total of 103 adults, aged between 19-24 years were part of this study. The following adult subjects were excluded from this work: Subjects who had undergone, previous orthodontic treatment, subject with habits such as atypical swallowing and lip sucking, systemically compromised students, craniofacially abnormal students (clefts and syndromes). Sample was divided into 3 groups based on their body mass index level, G1 normal weight adults, G2 overweight or obese adults and G3 underweight adults.
Results: There was a significant relationship between body mass index and face height. However malocclusion and crowding were not substantially linked with body mass index.
Conclusion: Dietary status may impact craniofacial development and there was no significant link between body mass index and malocclusion or dental crowding.

Key Words: Body mass index (BMI), Growth, Malocclusion, Nutrition, Obesity

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INTRODUCTION

Ideal occlusal scheme is a theoretical concept which is based on the original anatomy of the patient and it is hardly found in nature. This conception was used to a state when the skeletal bases of maxillary archor mandible arch are of the accurate size in relation to one and the other, and the teeth should be in the correct relationship in all three planes of space at rest position.[1,2]

Class I type of malocclusion is the most common kind, much more so than normal one, as there is no clear evidence on its cause.[2-4] Understanding the genesis of this type of malocclusion requires a thorough understanding of how and when it occurs.[5] Class II in the deciduous dentition is characterized by distal terminal plane of the second deciduous molars, distal canine connection, overjet, and substantial overbite.

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Additional abnormalities include a small upper dental arch and maxillary base, as well as inadequate anterior spacing.[6-11] These variables are known to contribute to the development of skeletal malocclusion and facial abnormalities, and they are assumed to be caused by hereditary and/or environmental factors.[12,13] The posterior discrepancy is a significant etiological component in Class III malocclusion.[6] It influences the plane of occlusion. This concept must be revised to provide an acceptable therapeutic approach to the treatment of Class III malocclusion.[7]

Obesity and overweight are considered a global epidemic.[10] It is more than just the result of an unhealthy lifestyle; it is a condition in which weight gain has reached a critical level, posing major health concerns. Obesity can be viewed as both a sickness and a risk element for other disorders.[11] In grown-ups is linked to an increased risk of illnesses that cause significant morbidity.[14,15]

METHODS

This cross-sectional study was conducted at Tikrit Dentistry College, Iraq from 1st February 2024 to 31st July 2024 vide letter No. 23344/QM/Approval/4JKJD8 dated January 8, 2024. A total of 103 subjects were enrolled. The subjects were divided into three groups, G1 normal weight, G2 overweight, and G3 underweight. The exclusion criteria were students who had reported bad habits such as atypical swallowing and lip sucking, students with manifestations illnesses, and

who were undergoing or previously sensed treatment (Fig. 1). The oral examination was done by sitting the students on the dental chair in the college dental clinic, using a disposable mask, gloves, dental mirrors, and dental Vernia to collect the clinical data.[16]

Nutritional status was assessed using BMI, calculated from each participant's height and weight. Weight was measured to the nearest 0.1 kg using a calibrated Beurer scale, with students standing upright and evenly balanced. Height was recorded to the nearest 0.1 cm using a stature meter. Body mass index was then computed using the standard formula: weight (kg) + height² (m). Statistical tests include the use of SPSS version 26. Chi-square association were utilized to analyze the data at P≤0.05.

RESULTS

There was a non-significant changes between them in 23 cases of normal weight 60.5%, 12 cases of overweight 31.5%, and 3 cases of underweight 8% of the abnormal group had malocclusion (Table 1).

There were 11 cases in normal weight, 9 cases in overweight and 1 case in underweight had class II malocclusion while 7 cases in normal weight, 3 cases in overweight and 2 cases in underweight had class III malocclusion. There was a non-significant association between body mass index and class II & III (Table 2, Fig. 2).

Table 1: Association between body mass index and malocclusion

Body mass index	Normal		Abnormal	
	No.	%	No.	%
Normal Weight	31	47.7	23	60.5
Overweight	60	46.2	12	31.5
Underweight	4	6.1	3	8.0

Figure No. 1: Weight categories based on body mass index

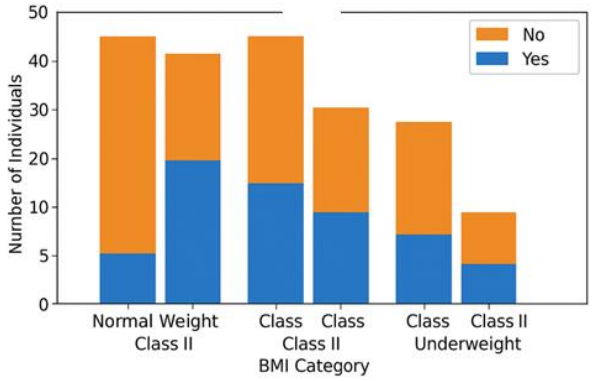

Figure No. 2: Association between body mass index and classes of malocclusion

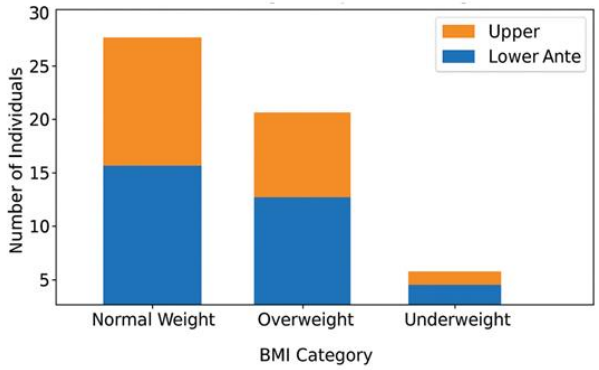

Figure No. 3: Distribution of upper and lower anterior involvement across body mass index categories

Table 3 reveals the relationship between body mass index and crowding, a non-significant association between body mass index and crowding, there are 19 cases in normal weight, 15 cases in overweight, and 5 cases in underweight had crowding in the lower arch, in contrast, 7 cases in normal weight and 4 cases in overweight had crowding in the upper arch.

Six cases of overweight had abnormal lower facial height while 2 cases of overweight had abnormal middle facial height and in 1 case overweight had abnormal upper facial height on other side, in the normal weight group 2, 3, 3 cases had abnormal lower, middle and upper facial height respectively. There was a significant association between BMI and facial height (Table 4).

Table No.2: Association between body mass index and classes of malocclusion

Body mass index	Class II				Total	Class III				Total
	Yes	%	No	%		Yes	%	No	%	
Normal Weight	11	52.4	43	54.4	54	7	58.3	47	51.6	54
Overweight	9	42.9	33	40.3	42	3	25.0	39	42.9	42
Underweight	1	4.7	6	7.3	7	2	16.7	5	5.5	7
Total	21	100.0	82	100.0	103	12	100.0	91	100.0	103
Chi square value	0.189					2.86				
P value	0.910 (NS)					0.362 (NS)				

Table No. 3: Association between body mass index and crowding

Body mass index	Lower Anterior	Percent	Upper Anterior	Percent	Total
Normal weight	19	48.7	7	63.6	26
Overweight	15	38.5	4	36.4	19
Underweight	5	12.8	0	0.0	5
Total	39	100	11	100	50

Chi-square value = 1.787 P value = 0.409 (NS)

Table No.4: Association between body mass index and facial height

Body mass index	Normal	%	Abnormal						Total
			Lower	%	Middle	%	Upper	%	
Normal weight	46	54.8	2	22.2	3	60.0	3	60.0	54
Overweight	33	39.3	6	66.7	1	20.0	2	40.0	42
Underweight	5	5.9	1	11.1	1	20.0	-	-	7
Total	84	100	9	100	5	100	5	100	103

Chi-square value = 5.775 P value = 0.034 (S)

DISCUSSION

Psychological problems are associated with obesity in adults that may affect both compliance and lifestyle. Lastly, the major cause of the increasing prevalence of obesity remains an incorrect lifestyle which would promote the excessive accumulation of body fat, in particular, a high-calorie diet high in fats and fermentable sugars and a reduction in exercise physical.[17,18]

Overweight/obesity (31.5%) cares abnormal malocclusion in the students was non-significant associated ($p>0.05$) (Table1), that means no effect of obesity on malocclusion that was agree with results reported by Dohou et al[18], also no effect on the underweight group (8.0%) that coincidence with some studies.[19,20]

These results found that the overweight group (42.9%) have broad maxilla, large upper teeth with foreword direction, and increase overjet (6-8mm), while narrow mandible, retrusion arch, and also convex facial profile that greater than the underweight group (4.7%), all these features of class II malocclusion. show results that the overweight group (25.0%) have a small upper arch while large and protrusive lower arch, edge-to-edge incisors, reverse overjet, and in some cases reverse overbite or anterior cross bite that also increase in the underweight group (16.7%) but decrease by a half percentage of normal group (58.3%) [Table 2]. The result showed (38.5% lower anterior) (36.4%upper anterior) dental crowding in overweight students; a Non-significant association that disagreed with Thomas et al[21] and symmetry with other studies that found no association between under-weight (12.8% lower anterior) (0.0% upper anterior) and crowding (20-24) [Table 3]. In the present study, the majority of patients with abnormal facial height are from the overweight/obese group lower, upper, and middle thirds (66.7%, 40.0%, and 20.0% respectively). There is also a greater abnormality in the height of the lower facial level in the overweight/obese group (66.7%) compared to the normal weight group (54.8%). However, these results were statistically significant ($p<0.05$). [Table 4].[22-23]

CONCLUSION

A major relation was found between facial heights and obesity and further research is needed to heighten the consistency of these outcomes and upgrade perception.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Maha Esam
Drafting or Revising Critically:	Maha Esam
Final Approval of version:	All the above author
Agreement to accountable for all aspects of work:	All the above author

Conflict of Interest: The study has no conflict of interest to declare by any author.

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