



## Prevalence of Sagittal Molar Relationship Among Iraqi Adolescents in Erbil City/Iraq

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### Abstract

**Aims:** The aim of this study is to assess the prevalence of Angle's molar classification and recording sagittal malocclusion, among (15- 18) years-old-school students; by studying two factors: gender and the socio-economic status, which are represented by the school type as private or public schools. **Materials and Methods:** In this cross-sectional study, a total of 593 aged between 15 – 18 years old. Students were included from randomly selected male, female and mixed high schools. Distributed in different areas in Erbil city. Excluding those who previously had orthodontic treatment, orthognathic surgery, missing upper or lower first molar, and students with any contagious diseases. The molar relationship was determined by direct clinical examination according to Angle's classifications and sub-classifications. Statistical analysis was obtained using SPSS (Statistical Package for the Social Sciences). Pearson Chi-Square test was used to determine the significance among the data's variables. **Results:** The findings showed 90.2 % of the subjects had malocclusion, and the prevalence of malocclusion was as the following: Class I 59.1%, Class II 24.7%, Class III 16.2%, respectively. According to gender, Chi-square was significant in molar classification and sub-classification. As for the school type, Chi-square was not significant in molar classification, but it was significant in sub-classification at p-value  $\leq 0.05$ . **Conclusions:** Malocclusion is relatively high in Erbil city among adolescents.

### الخلاصة

**الأهداف:** الهدف من هذه الدراسة هو تقييم مدى انتشار سوء الإطباق وتسجيل التصنيف المولي للزاوية ومعرفة الفروق في المستوى الأمامي والخلفي بين طلاب المدارس (15-18) عامًا. من خلال دراسة عاملين؛ النوع الاجتماعي والوضع الاجتماعي الاقتصادي الذي يمثل نوع المدرسة كمدارس خاصة أو عامة. **المواد وطرائق العمل:** في هذه الدراسة المقطعية، تم تضمين 593 طالبًا من مدارس الثانوية والاعدادية للبنين والبنات والمختلطة تم اختيارها عشوائيًا، موزعين على مناطق مختلفة في مدينة أربيل. باستثناء أولئك الذين خضعوا في السابق لعلاج تقويم الأسنان وجراحة تقويم الفكين وفقدان الضرس الأول العلوي أو السفلي والطلاب المصابين بأمراض معدية. يتم تحديد العلاقة الضرسية وفقًا لتصنيف العالم Angle والتصنيفات الفرعية. **النتائج:** أظهرت النتائج أن 90,2٪ من الأشخاص يعانون من سوء الإطباق وأن انتشار سوء الإطباق كان: الفئة الأولى 59,1٪، الفئة الثانية 24,7٪، الفئة الثالثة 16,2٪ على التوالي، ووفقًا للجنس يعتبر مربع كاي مهمًا في التصنيف الضرسية والفرعية. **التصنيف، وبالنسبة لنوع المدرسة، فإن Chi-square ليست مهمة في التصنيف الضرسية ولكنها مهمة في التصنيف الفرعية. الاستنتاجات:** سوء الإطباق مرتفع نسبيًا في مدينة أربيل بين المراهقين.

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## INTRODUCTION

Recently, malocclusion has become one of the most common problems recognized by orthodontists, and it is increasing, especially in the millennial generation<sup>1</sup>. Understanding and studying the factors that implement it, or at least have a negative effect on the occlusion is a responsibility that we should take into consideration<sup>2</sup>; so that to help understand it better, in order to try to change the outcomes, and maybe figure out how to prevent it<sup>3</sup>.

Malocclusion can have functional, mental and psychological effects on the human physiology; thus, the general wellbeing and health of the person can be compromised<sup>4, 5</sup>. In addition, esthetic demands and perfection are becoming the new norm of the new generations; and they are as important as the function<sup>6</sup>.

According to Angle's classification from sagittal plane, Class I malocclusion cases exhibit normal mesiodistal relations of the jaws; which is when the mesiobuccal cusp of the maxillary first molar; rests in the buccal groove of the mandibular first molar<sup>7</sup>. When Class II distal relation of the lower arch relates to the upper arch; the lower first permanent molar will lock more than one-half of a cusp distal to normal relation with the upper first permanent molar<sup>7, 8</sup>. Class II is divided into division 1 when upper incisors are protrusive; and division 2, retruded upper incisors. Class III, a

mesial relation of the lower arch to the upper arch, the lower first molar locking more than one-half cusp mesial to normal relation with the upper first molar<sup>7-9</sup>.

This study is necessitated in Erbil-Iraq, for the high demands of orthodontic treatment among adolescents; and the lack of information regarding the occlusal patterns, with no previous investigations. Therefore, this study aims to assess the prevalence of Angle's Molar Classification and see the differences in sagittal plane among (15- 18) year-old-school students and the effect of two factors on the occlusion, which are: gender and school type. This may give us an idea about malocclusion in this area.

## MATERIALS AND METHODS

The study was Cross-sectional, and the data were collected from random high schools; geographically, randomly distributed in Erbil, and including areas with different socio-economic status, and both governmental (public) and private schools. The study was conducted over a period of six months (from November 2017 to April 2018), and the data were collected from six schools in the city.

Prior to the start of the study, permission from the Directorate of Education of Erbil city, deanery of Tishk International University was obtained. The researchers got an approval from ethical committee of research center in Tishk International University for collection of data from high school students. Then got

approval from the selected schools principals in advance.

Each research's participant was informed about the risk-benefit of the study. During the study, and before the process of examining the study's individuals, the classroom's students were well informed in details about the research. All were given the choice of participating. A verbal consent was given by the students (participants) before the examination was carried out. The study's subjects were given the right to cut-out/stop the examination if they didn't feel comfortable during the examination; or there was a violation of the researcher's ethical work.

The study subjects included adolescents with normal occlusion and abnormal malocclusion, males and females aged between 15 – 18 years old. Excluding students that previously had an orthodontic treatment, or any kind of maxillofacial surgery. Adolescents with extracted upper and lower first molar, or with any contagious disease. Also, schools of displaced people, refugees, preparatory industry schools, and Night Shifts Schools were excluded; because their ages are over 18 years old <sup>10-12</sup>. Pilot study was conducted to assess inter-examiner reliability; and the results were compared. The decision was made to start the examination from the left side, shifting to the anterior segment, then the right side.

This method was found to be the most practical and time saving.

Molar relationship was the orthodontic variable used to determine malocclusion. This relationship between the upper and lower first permanent molars was determined; according to Angle's Classification. Patients with subdivision malocclusions were included in: the Class I, Class II and Class III groups, on the basis of the predominant occlusal characteristics, or according to incisors and canine relationship.

Students were examined at the schools, in quiet classrooms. Using gloves, face masks, and disposable dental mirror with the presence of the classroom's teacher; and/or advisor and representative of the classroom. The examination was done in upright position for students' heads and the jaws were in centric relation during examination under natural (sunlight) and/or artificial illumination on need. Each 2 researchers were examining one student at a time (two opinions can give a superior decision in the inconclusive cases), and the supervisor's help was given in the inconclusive or unusual cases. The examination lasted approximately 5 min per student. A professional camera was used to register some of the cases; which was found interesting. Trash bags and sanitizing gels were used by the researchers, whereas preventing contamination and protecting

the study individuals were the main priority of the researches.

The data were entered, each case-sheet separately, and processed using SPSS (Statistical Package for the Social Sciences), version 24.0. Statistical analysis was obtained using this program. Descriptive Statistics were used to inferences about the data with normal distribution ( $p > 0.05$ ) One-way Anova. The test used was Pearson Chi-Square, which helped in determining the significance among the data's variables.

## RESULTS

Table (1, according to school type; 23 out of 304 (7.6%) in public schools,

The distribution of the sample according to gender was 59.6% females and 40.3% males. Distribution according to school type was 48.6% of Private schools and 51.4% Public schools.

The prevalence of malocclusion was 90.2%. The prevalence of molar relation Class I, II and III was 58.7%, 25.8%, and 15.5% respectively. According to gender: 29 out of 230 (8.3%) males had normal occlusion, 39 out of 363 (10.7%) females had normal occlusion, with a total percentage of 9.8% of subjects had normal occlusion mentioned in and 33 out of 289 (11.4 %) in private schools, which is mentioned in Table (2.

**Table (1):** Prevalence of Angle's molar Sub-Classification according to gender

Molar Sub-Classification	Male	Female	Total
Class I / normal	19 (3.2%)	39 (6.6%)	58 (9.8%)
Class I / malocclusion	105 (17.7%)	185 (31.2%)	290 (48.9%)
Class II / division 1	42 (7.1%)	79 (13.3%)	121 (20.4%)
Class II / division 2	14 (2.4%)	18 (3.0%)	32 (5.4%)
Class III / true	49 (8.3%)	39 (6.6%)	88 (14.8%)
Class III / pseudo	1 (0.2%)	3 (0.5%)	4 (0.7%)
Total	230 (38.8%)	363 (61.2%)	593 (100.0%)

Pearson Chi-Square = 13.779  
Sig. = 0.017 (Significant)

**Table (2):** Prevalence of Angle's Sub-Classification according to school type.

Molar Sub-Classification	Public School	Private school	Total
Class I / Normal	23 (3.9%)	33 (5.6%)	56 (9.5%)
Class I / Malocclusion	157 (26.4%)	134 (22.5%)	291 (49%)
Class II / Division 1	53 (8.9%)	69 (11.6%)	122 (20.5%)
Class II / Division 2	19 (3.2%)	13 (2.2%)	32 (5.4%)
Class III / True	48 (8.1%)	40 (6.8%)	88 (14.9%)
Class III / Pseudo	4 (0.7%)	0 (0.0%)	4 (0.7%)
Total	304 (51.2%)	289 (48.7%)	593 (100%)

Pearson Chi-Square=11.122, Sig. = 0.049 (Significant)

Results have shown significant association between molar classification,

and gender ( $p$ -value= 0.003). As displayed in Figure (1, Class I and II were more in

females than males. The prevalence of Class III in males was exceeding the females, in that, it was 22% in males, and 12% in females.

As for the prevalence of Angle's molar sub-classification according to

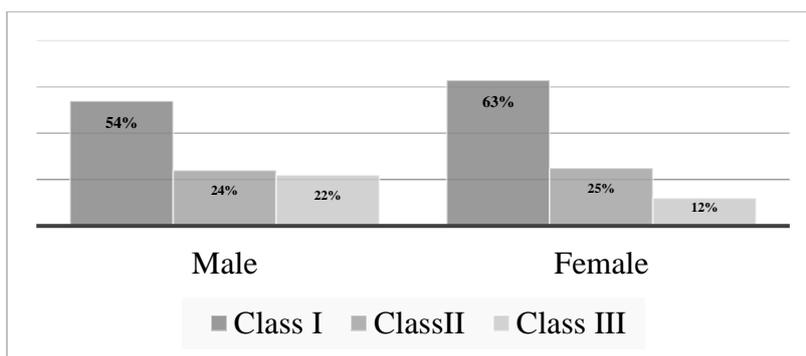
Table (1). The findings showed that, the female population had a slightly higher rate of normal occlusion; Class I malocclusion and Class II div 1 than males. In males the rate of true Class III was more than that.

According to school type, the relation of malocclusion was not significantly related to the type of school and quality of life as in Figure 2. The

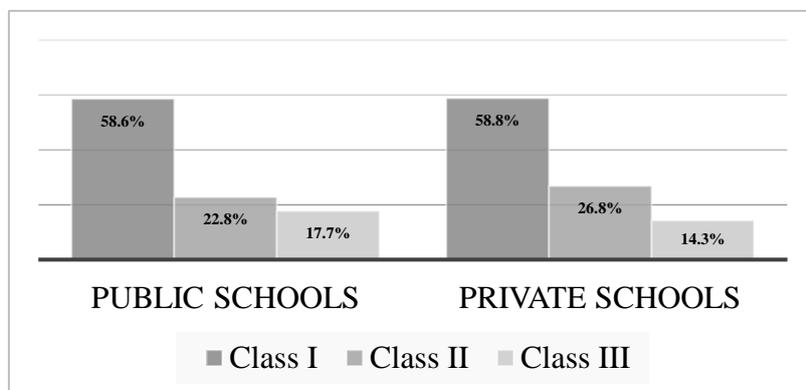
gender; statistically, results demonstrated that, there was a significant difference in molar Sub-Classification between genders as shown in

prevalence of Class I was approximately the same in public and private schools. Class III was more in public school, but Class II was more in private schools.

The Chi-Square = 11.122,  $p = 0.049$ , which was mentioned in Table (2) showed that there was statistically significant association between private and public school (school type); and Angle's Sub-Classification.



**Figure (1):** Distribution of the prevalence of Angle's Molar Classification according to gender.



**Figure (2):** Distribution of the prevalence of Angle's Molar Classification according to school type.

## DISCUSSION

The lack of published studies about molar Sub-Classification in relation to socio-economic status and their effect on malocclusion; prohibited the comparison of the results with its counterpart, which provide the rationale for the current investigation.

This cross-sectional study has done in the city of Erbil in Iraq; to assess the prevalence of malocclusion in the schools of children, according to epidemiological distribution; and its relation with the gender, which might be an important factor affecting the occlusion. Also, another factor was included, which is school type (private or governmental) as the education level, and the economical-status varies in these school. Examination was limited to high school students because of ease of accessibility; with a complete permanent dentition, as malocclusion occurring in the mixed dentition, which is sometimes transitional leading to erroneous conclusions, and the results may not be reliable<sup>13</sup>.

In the present study, the prevalence of Angle's Classification of Malocclusion was found to be significantly; related with gender, which showed higher prevalence in females more than males. According to Angle's Sub-Classification, the results also showed a significant relation with gender, which was higher in females.

In general, comparisons of the outcomes of this study with others are troublesome and tricky; because of the

wide range of age, and sizes of the study's samples, and the methods that are used to record occlusion traits. In addition to that, the statistical processing, and the tremendous ways of analyzing them; can play an essential role as well.

The findings in this study showed a prevalence of malocclusion with percentage of 59.1%, 24.7% and 16.2% for Class I, Class II and Class III respectively. Three studies in Saudi Arabia, which have been done for the prevalence of malocclusion; are comparable to this study<sup>14-16</sup>. The first study observes that 52.8% has Angle's Class I occlusion, 31.8% has Class II, and 15.4% has Class III which is close resemblance to our findings<sup>14</sup>. The second study has Class I molar relationship of (61%), while Class II and III molar relationships are 16.3%, 7.7%, respectively<sup>15</sup>. The third study has 57% Class I malocclusion, 17% Class II malocclusion; and 14% has Class III malocclusion<sup>16</sup>. Our eastern traditions and demographic distribution, environmental and climate similarity may be attributed to the cause for similar results. Another study in Italy shows comparable frequencies with Molar Class I, which was the most frequently encountered molar relationship; followed by molar Class II, and then molar Class III<sup>17</sup>.

Several studies have found a similarity to the current findings regarding the significant association; between molar classification and gender<sup>16, 18, 19</sup>. Two of

them are in Saudi Arabia<sup>16,18</sup> and one in Brazil<sup>19</sup>.

Another study has been done in Dhaka, Bangladesh in 2013, seems to be in an agreement to this study; with significant association between malocclusion, and gender. As well as the most common malocclusion is Class I followed by Class II and Class III, and with the highest frequency of females<sup>20</sup>.

This similarity may be due to the fact that their number of samples which are relatively close to this study; including that most of the participants are females like this current study, and approximately similar to age group.

A study in Brazil showing similar prevalence of molar Sub-Classification to this study; with Class I malocclusion being the most prevalent alteration. The occlusal pattern of Class III is more common than Class II division 2; among the participants<sup>21</sup>. This similarity may be due to the data collecting methods which are close to this study; and the sample gender distribution that most of the participants are females like this research.

Indian study in 2014 shows disagreement with this research, there is no significant association between malocclusion, and gender. The prevalence of Angle Class I, Class II and Class III molar relations are 78.4%, 21.5%, and 0.1% boys. As for the girls, 80.2%, 19.8%, and 0% are the prevalence of Class I, Class II, and Class III molar relations respectively<sup>25</sup>. The sample size which is 9505 and the age group difference which is (10-16) years old, but ours being (15-

18) years, are considered logical reasons for the dissimilarities<sup>22</sup>.

In Nepal, a study has been done in Gandaki province based on Angle's classification of malocclusion. In which the results show that, Angle's Class I, II, and III were observed 68.42%, 9.48%, and 22.10% respectively<sup>23</sup>. These results are dissimilar to the current study, which show ratios of 48.9% of Class I malocclusion excluding Class I normal, and Class II division I of 20.4% w, Class II division II of 5.4 % and Class III collectively true and pseudo of 15.5%. Thus, the dissimilarities may be related to race or sample size.

For the prevalence of Angle's classification according to school type, the results of the study show that, the relation of malocclusion is not significantly related to the type of school; and quality of life.

In a study done by Araki in 2017 in Mongolia, which is comparable to this study, there is no significant association between malocclusion; and 'Oral Health Related-Quality of Life' in adolescents, after assessment of family income<sup>24</sup>. Another study of adolescents aged 11-14 years in Nigeria, show no relation between malocclusion, and socioeconomic class<sup>25</sup>. In our study, the socio-economic status is reflected by school type, public and private. However, the study is in disagreement with a nationally representative survey of children in England, Wales, and Northern Ireland; because they have found a relationship between socioeconomic status, malocclusion and "Oral Health Related-Quality of Life"<sup>26</sup>. Another study in

Ghana, have shown linkage between the social class and the malocclusion, and disagreeing with this study<sup>27</sup>. The variation in the results can be attributed in the race, and their descent, as well as, their cultural and habitual differences, and the sample size, which can have a big effect, theirs being 4,217 adolescents<sup>27</sup>.

A study conducted at College of Dentistry in Basra city, Iraq, shows similarities to this study. According to their statistical analysis, class I malocclusion was the most prevalent type (55%) followed by class II (39%) and class III malocclusion (6%)<sup>28</sup>.

Another local study done in orthodontic department at the khanzad polyclinic teaching center / Erbil city, Iraq showed resemblance in malocclusion patterns results, with Class I malocclusion was found in 72.5%, class II was found in 19.5%, and class III malocclusion 8.0% of all examined patients<sup>29</sup>. The similarities can be reflected to the same racial descent and geographical spot.

Conclusion: The prevalence of Angle's classification and sub-classification of malocclusion was significantly related to gender, showing a higher prevalence in females than males. However. According to school type, the prevalence of Angle's sub-classification showed a significant relation between Angle's sub-classification of malocclusion and school type.

Suggestions: Further studies are needed on a broader spectrum to evaluate other factors that can have an effect on malocclusion. Also, preventive programs

are necessary to combat the prevalence of malocclusion.

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