INTRODUCTION

Tooth wear is the non-carious loss of tooth tissue due to attrition, erosion, or abrasion.1 Attrition is the loss of enamel, dentine, or restoration by tooth-to-tooth contact, during normal or para-functional masticatory activities.2 It is located only in occlusal contact areas, and with shiny, flat wear facets3 and appears to be a general physiologic phenomenon at all ages.4

Gradual tooth wear is common in both deciduous and mixed dentition.5 According to a study prevalence of tooth wear ranged from 21%–81% with up to 35% of children having severe wear.6 More common and severe wear is reported in maxilla.7 Males showed more attrition than females.8 In modern population tooth wear appears to be reduced.9 Some studies relate this reduced attrition with malocclusion.10,11 According to these studies functional shift that changes the flush terminal plane into a normal class I relation does not occur without physiologic attrition so results in a malocclusion.11,12 Also in a longitudinal study Knight et al found that severe tooth wear in deciduous dentition was significantly related to subsequent tooth wear in adults13, so identifying them would help to develop strategies to prevent it later in life.

Studies are being carried out to correlate between tooth wear and malocclusion; therefore the aim of my study is to investigate the correlation between tooth wear and malocclusion in children of Khyber Pakhtunkhwa with mixed dentition. Due to high prevalence of malocclusion in patients of this region, it is relevant to verify tooth wear in various occlusal relationships in mixed dentition.

METHODOLOGY

This cross-sectional retrospective study’s material composed of pretreatment dental casts from a sample of 144, including males and females, affected by class I (59), class II (45) and class III (40) malocclusions out of these 144 patients 44 were excluded because of large restorations, broken casts, large voids or other problems. The following criterion was used to select the subjects.

Inclusion Criteria

* Subjects having dental class I, II and III malocclusions and are in the 2nd phase of mixed dentition.
* No previous orthodontic treatment.
* Availability of dental casts of good quality.

Exclusion Criteria

Patients with missing teeth, dental anomalies, deep caries, restorations, periodontic crowns.
Patients with unilateral crossbite because of significant difference of tooth wear between the sides with and without crossbites.

Tooth wear was evaluated on upper and lower C, D, E of both the quadrants and given a score according to the method by Knight et al.

Scoring was done as follows:

SCORE 0: Occlusal/incisal structures intact, no obvious wear.\textsuperscript{13}

SCORE 1: Mild wear facets in enamel (occlusal/incisal structure slightly altered).\textsuperscript{13}

SCORE 2: Moderate wear into dentine, (dentine exposed occlusally/incisally).\textsuperscript{13}

SCORE 3: Extensive wear into dentine, (greater than one third of the crown lost).\textsuperscript{13}

**Statistical Analysis**

SPSS version 16 was used for data analysis. Descriptive cross tabs and chi square test were done to find P values of different tooth wear grades.

**RESULTS**

Out of 1200 examined teeth, tooth wear was found only on 465 teeth. 735 teeth were free of attrition. As shown in Table 1 in class I malocclusion tooth wear was equal in both the jaws (40%) while in class II group increased tooth wear was found in maxilla (34%) then mandible (24.6%) (P> 0.05), while in class III group, tooth wear was more common in mandible (69.6%) then maxilla (37.1%).

Descriptive data on the grades of individual tooth wear of the children evaluated are presented in Table 2. The deciduous canines were the most abraded (score 3) teeth in class I and III, while in class II extensive attrition was noted in D and E. Out of the total examined teeth 19% teeth scored 1, 12.5% teeth scored 2 and 7.5% teeth scored 3, while 61% teeth showed no attrition (score 0).

**DISCUSSION**

In deciduous dentition, tooth wear can be considered as a physiologic condition.\textsuperscript{14} This physiologic attrition is necessary for mesial shifting of mandible so that flush terminal plane in the mixed dentition is converted to class I occlusion.\textsuperscript{11,14} If no wear occurs, cuspal interferences guide the mandible in an incorrect position, resulting in a malocclusion.\textsuperscript{11,12}

In primitive populations, tooth wear was severe and progressed rapidly.\textsuperscript{15} In a previous study it was concluded that children born in 1990s showed significantly less attrition in comparison with the children born in 1950s. A shift from the primitive to civilized way of life and resultant change in diet from course and rough to more processed and refine food affected the tooth wear in primary and mixed dentition\textsuperscript{11}, and it resulted in increased prevalence of malocclusion in modern group.\textsuperscript{12}

Data shows that there was an increased tooth wear in primitive populations because of which they had

### Table 1: Tooth Wear in Different Malocclusions

<table>
<thead>
<tr>
<th>Malocclusion</th>
<th>Jaws</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Total Wear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>Maxilla</td>
<td>60%</td>
<td>20.5%</td>
<td>13.3%</td>
<td>6.2%</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Mandible</td>
<td>59.8%</td>
<td>24.3%</td>
<td>8.4%</td>
<td>7.4%</td>
<td>40.2%</td>
</tr>
<tr>
<td>Class II</td>
<td>Maxilla</td>
<td>65.9%</td>
<td>18%</td>
<td>10.9%</td>
<td>5%</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>Mandible</td>
<td>75.4%</td>
<td>10.2%</td>
<td>11.6%</td>
<td>2.7%</td>
<td>24.6%</td>
</tr>
<tr>
<td>Class III</td>
<td>Maxilla</td>
<td>62.9%</td>
<td>15.5%</td>
<td>12.6%</td>
<td>9%</td>
<td>37.1%</td>
</tr>
<tr>
<td></td>
<td>Mandible</td>
<td>30.4%</td>
<td>31.2%</td>
<td>23.9%</td>
<td>14.5%</td>
<td>69.6%</td>
</tr>
</tbody>
</table>

### Table 2: Individual Tooth Wear in Different Malocclusions

<table>
<thead>
<tr>
<th>Malocclusion</th>
<th>Tooth</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>C</td>
<td>54</td>
<td>23</td>
<td>23</td>
<td>17</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>100</td>
<td>44</td>
<td>7</td>
<td>4</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>112</td>
<td>31</td>
<td>16</td>
<td>9</td>
<td>168</td>
</tr>
<tr>
<td>Class II</td>
<td>C</td>
<td>71</td>
<td>22</td>
<td>24</td>
<td>4</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>116</td>
<td>18</td>
<td>7</td>
<td>6</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>80</td>
<td>18</td>
<td>12</td>
<td>6</td>
<td>116</td>
</tr>
<tr>
<td>Class III</td>
<td>C</td>
<td>7</td>
<td>22</td>
<td>22</td>
<td>29</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>123</td>
<td>22</td>
<td>12</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>72</td>
<td>29</td>
<td>24</td>
<td>4</td>
<td>54</td>
</tr>
</tbody>
</table>
decreased malocclusion prevalence e.g. in a comparative study done by Andrea et al, they found absence of tooth wear only in 0.33% in 1950’s group and 5% out of the total examined teeth in 1990’s group, in contrast, present study showed that 61% of the total examined teeth scored 0 (no attrition) which is a quite high percentage, that can be related to the increased prevalence of malocclusion in this population.11 Similarly in another study, out of 126 examined subjects, 81 had attrition and 61 had combination of attrition and abrasion10, which is also a very clearly increased value than the current results.

The results of another study done by John et al, on the children of mean age + 4.7 years showed that no child was completely free of tooth wear and 83.4% of all examined teeth showed some attrition.11 This percentage is also quite high than the results of this study which shows only 39% tooth wear.

In a study conducted on Swedish population incisal and occlusal wear was reported. Prevalence of wear ranged from 21%-81%. Similar result was found in a study conducted on Nigerian population that showed attrition in 81 patients out of 126 and frequency of wear increased with the age of the patient.10 The results of all these studies showed significant increased wear in their populations. In this study, prevalence of wear showed decrease.

In contrast to the findings of Andrea et al, who showed extensive wear (score 3) in 1.5% of the total examined teeth, the present study showed extensive wear in 7.5% teeth which is quite high percentage even when compared with the study done by Knight et al (2.7%).13 Also in another study done on deciduous teeth severe tooth wear was found only in 2.1% of the total examined teeth.14 Parafunctional activities such as bruxism, erosive and abrasive environmental influences may result in malocclusion.14

In previous studies C was considered as the most abraded tooth in all the malocclusions while in our study, tooth C scored 3 only in class I and III while in class II malocclusion extensive wear is seen in D and E.13-15

The limitation of this study was it’s cross sectional design. To investigate in detail the effects of tooth wear on occlusion, longitudinal study is required.

REFERENCES