

## Prevalence Of Ellis Class-II Restoration In Patients Above 16 Years Of Age-A Retrospective Study

Research Article

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### Abstract

Traumatic injuries of teeth are commonly seen among children and young adults. Such injuries are predominant in the upper anteriors. The uncomplicated fractures that affect only the enamel and dentin layer of the teeth without involving the pulp comes under Ellis class II type of traumatic injuries. These injuries may elicit as a loss of about 1/3rd crown structure with rough endings affecting the traumatised teeth. In other words, this level of injury includes crown fractures that extend through the enamel and dentin without pulpal involvement. The aim of this study is to elicit the prevalence of Ellis class-II restorations in patients above 16 years of age. The data collected from the records were 86000 and they were screened for patients with Ellis class II restoration. Patients above 16 years of age who underwent Ellis class-II restoration from June 2019 to March 2020 were chosen and divided into three age groups. Group 1 includes patients between 16-25 years of age, group 2 includes patients between 26-35 years of age and group 3 includes 36-70 years of age. The most predominant age group with the maximum number of restorations was estimated statistically. From the study it can be estimated that among 284 patients who have undergone Ellis class-II restoration, the number of male patients were 189 and the number of female patients were 95. The predominant gender was males with the highest frequency. Considering the age groups, group-1(16-25 years) includes 123 patients, group-2 (26-35 years) includes 79 patients and group-3 (36-70 years) includes 82 patients. The predominant age group with the highest prevalence of Ellis class-II restoration is 16-25 years i.e. group-1. From the statistical test, it can be estimated that figure-I indicates the distribution of study population based on age wherein 43% of patients belonged to group-1 with highest frequency and 27% of patients to group-3 with the lowest frequency. Figure-II indicated the distribution of the study population based on gender, wherein 67% of the patients were males with the highest frequency and 33% were females with the lowest frequency. A chi-square association test(chi-square- 9.154;df-1;p-0.037(p<0.05) gives a statistically significant association between gender, age group and the presence of Ellis class-II restoration.

**Keywords:** Anterior Tooth; Composite Resin Restoration; Dentin; Ellis Fractures; Enamel; Fragment Reattachment.

### Introduction

The important criteria of a beautiful smile lies in the alignment, colour of the teeth and the harmony of the lips. This is attributed to the beauty of the face [1]. Factors such as bruxism, dental injuries, erosions and abrasions can wear out the anterior teeth's natural harmony. Recent day innovations in adhesive dentistry have uplifted the utilization of aesthetic restorative procedures

as alternatives of anterior teeth rehabilitation. Several techniques have been advocated for the restoration of fractured teeth, such as resin, ceramic or steel crowns, orthodontic bands, and resin composite restorations with and without pins. There are two types of techniques of using ceramic materials for restoring the esthetics of anterior teeth. They are the direct and indirect techniques [2, 3]. The indirect technique is the perfect choice for re-anatomization of the teeth. It also represents better longevity and color

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maintenance when compared to the direct technique. Indirect technique comprises construction of the restoration outside the oral cavity on a die. Then, it is placed and cemented on the prepared cavity while it's solidified or set. However, this technique requires a greater number of clinical sessions and cost compared to direct techniques. Direct technique comprises application of the material into a prepared cavity while it's in plastic phase for construction of restoration intra-orally. Condensation pressure may be applied. There is good longevity and it is done at a low cost compared to indirect technique [4, 5]. There is a success rate of 85%. Even after years in function, the restorations require only repairs or polishing [6, 7].

Anterior crown fractures are common forms of injuries that mainly affect children and adolescents [8]. Uncomplicated crown fracture to the permanent teeth has an excellent effect not only on the patient's appearance, but also on function and speech. Esthetic restoration of a broken incisal edge of maxillary central incisors is a technique sensitive procedure. Its success depends on the operator's skills and also the operator's problem solving approach. The integrity of the broken or fractured segment is directly proportional to the intensity of difficulty of aesthetic restoration [9]. Several studies have been demonstrated to elicit the prevalence and associated risk factors of crown fractures [10, 11]. Since the anterior teeth fracture is the most frequent type of injury among adolescents and young aged persons, there is a demanding need for an aesthetic restoration. Upto 45% of the young population has been affected due to these traumatic fractures. Uncomplicated tooth fractures consist of fracture lines involving the enamel and dentin of the teeth. However, the complicated fractures include the fracture line extending upto the pulp. According to Ellis and Davey classification, fracture of enamel and dentin falls under class I and class II respectively and fracture of dental pulp falls under class III type of fractures. These coronal attributes are managed by the extent of the crack line, its pattern and their restorability. The restorative material that is used in the aesthetic procedure should be in such a way that it matches the natural harmony of the tooth. The material should also have a good mechanical strength and good durability so that it doesn't break whilst mastication. This is the most important factor that has to be considered while doing the esthetic procedure. Some of the factors to be considered during the procedure are isolation of the fractured tooth or teeth and preparation and contouring of the bevel. Isolating the tooth will avoid contaminants of the tooth from getting into the oral cavity, clear view, reduce salivation of the patient. Beveling will elicit a better marginal integrity of the restoration and its durability. It will also enhance the longevity of the restoration. Finishing and polishing of the restored tooth or teeth will elicit a perfect aesthetic restorative treatment [12-14].

Despite the recent day modifications, the utilisation of the composite resins for the restoration of the anterior tooth fractures pose a lot of drawbacks. Some of the drawbacks include polymerisation shrinkage upon curing, discoloration over an extended period of time and sometimes, may not fully restore the fracture of the intact tooth. These setbacks can lead to limited longevity for big anterior composite restorations. More importantly, there is a lack of well-controlled, independent, long-term, and adequately-powered clinical trials on the restoration of fractured anterior teeth with modern composites and adhesives [15]. Previously our team had conducted numerous clinical trials [16-18], *in vitro* studies [19-21] and surveyed [22-24] and reviewed [25-30] various as-

pects of endodontics and conservative dentistry over the past five years. Now we are focusing on retrospective studies, the idea for which has stemmed from the current interest in our community. The aim of the study is to estimate the prevalence of Ellis class-II restoration in patients above 16 years of age and discuss various treatment modalities. The aim of the study is to estimate the prevalence of Ellis class-II restoration in patients above 16 years of age and discuss various treatment modalities.

## Materials And Methods

### Sampling

Non-probability sampling was collected from June 2019 to March 2020. The case sheets of the patients above 16 years of age who had reported to Saveetha Dental college for the treatment of gingival enlargement were reviewed. The external validity was good, as it is generalisable among patients of the same ethnic origins within the state and country.

### Ethical approval

Ethical approval was obtained from the Institutional Ethical Committee and scientific review board [SRB] of Saveetha Dental College. SDC/SIHEC/2020/DIAS/DATA/0619-0320

### Data Collection

The data collected from June 2019 to March 2020 after screening 86000 records and study subjects were selected. Among the 86000 records, patients with Ellis class I restoration were chosen. The data was obtained by reviewing patients who reported to Saveetha Dental College. The data collected included parameters such as patient's name, age, gender, diagnosis and the type of treatment done. The sample size was 284 patients. Patient data obtained was cross verified with treatment photographs. The data was collected and tabulated in the excel sheet and imported to spss software for statistical analysis.

### Statistical Analysis

The data was imported to spss software by IBM version 25.0 for Windows OS in which the output variables were defined. The independent variables were age and gender whereas the dependent variables were the type of restoration done and the statistical mean value obtained. The statistical test used was the chi-square test to establish the results.

### Methodology

The study patients above 16 years of age restored with Ellis class-II were collected and divided into three groups based on their age. Group 1 includes patients between 16-25 years of age, group 2 includes patients between 26-35 years of age and group 3 includes 36-70 years of age. The most predominant age group and the most predominant gender with the maximum number of restorations was estimated statistically.

## Results

From the study it can be estimated that among 284 patients who

Figure 1: Pie chart showing the distribution of the patients across the three age groups.

Pink color denotes group 1 (16-25 years), red color denotes group 2 (26-35 years), orange color denotes group 3 (36-70 years). Among all the patients who underwent treatment for Ellis class- II restoration, patients belonging to group 1 were found to be predominant (43.31%), followed by group 3(28.87%) and group 2(27.82%).

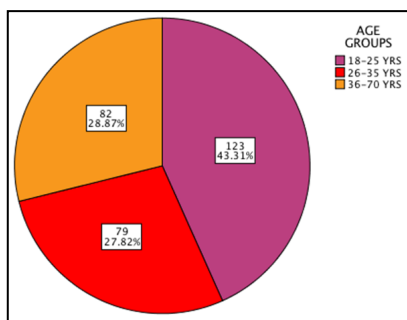


Figure 2: Pie chart showing the distribution of the patients based on gender. Males are denoted by yellow color and females are denoted by black color. From the study, it can be estimated that among 284 patients who have undergone Ellis class-II restoration, the number of male patients were (66.55%) and the number of female patients were (33.45%). The predominant gender was males with the highest frequency.

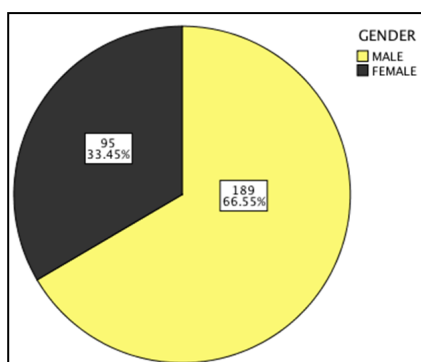
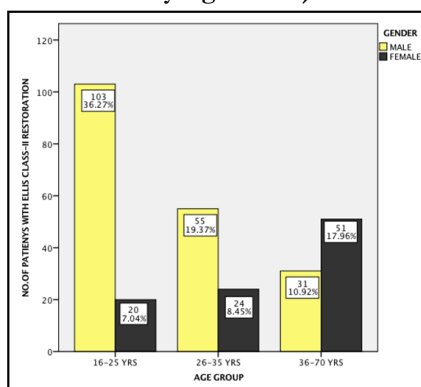


Figure 3: Bar graph showing the association between age group and gender prevalence of Ellis class-II restoration. X axis represents the age group and Y axis represents the number of patients. Males (yellow) had a higher number of Ellis class-II restoration than females (black) in group 1(16-25 years) and group 2(26-35 years) whereas in group 3 (36-70 years) female predominance was observed. In group 1 the number of males (36.21%) were significantly higher than females(7.04%). In group 2 the number of males (19.37%) were significantly higher than females(8.45%) whereas in group 3 the number of females(17.96%) were significantly higher than males(10.92%). (Chi-square value- 9.154, p value-0.03 (p<0.05); hence statistically significant)



have undergone Ellis class-II restoration, the number of male patients were 189 and the number of female patients were 95. The predominant gender was males with the highest frequency. Considering the age groups, group-1(16-25 years) includes 123 patients, group-2 (26-35 years) includes 79 patients and group-3 (36-70 years) includes 82 patients. The predominant age group with the highest prevalence of Ellis class-II restoration is 16-25 years i.e. group-1. From the statistical test, it can be estimated that figure-I indicates the distribution of study population based on age wherein 43% of patients belonged to group-1 with highest frequency and 27% of patients belonged to group-3 with a lowest

frequency. Figure-II indicates the distribution of study population based on gender wherein 67% of the patients were males with the highest frequency and 33% were females with the lowest frequency. A chi-square and 33% test (chi-square - 9.154; df<sup>1</sup>; p-0.037(p<0.05) gives a statistically significant association between gender, age group and the presence of Ellis class-II restoration.

### Discussion

The treatment plan of using direct composite resin restorations for aesthetic restorative procedures is elicited due to their excel-

lent properties and performance. For a better treatment prognosis, dental professionals should consider the type and shade of the composite resin as well as the hybridisation of the tooth structure whether it is elicited as self etching or enamel etching or no etching technique [31]. A study by Jour et al showed the high success rate for the direct method of composite resin restorations, provided they follow the principles of the restoration. There is about an 80-90% success rate for Class I,II and III restorations even after a period of 10 years. There is a psychological impact created on both the parents and in children due to the traumatic injuries. Anterior tooth fracture management still poses a great challenge to the operator from a functional as well as an aesthetic perspective. Treatment phases may alter due to the differences in age, socio-economic status and the intraoral status of the patient. Among different types of tooth injuries, Ellis Class II fracture is maximum in number with a percentage of thirty. Class II fractures are predominant in accidents, falls and sports injuries [32].

Following Ellis Class II fracture, the next most commonly occurring type of fracture is Ellis Class I which is the fracture of enamel only. A study by Zerfowski et al(1998) demonstrated that the majority of crown fractures in permanent dentition had a percentage range between 26-76% while crown root or complicated fractures account for about 0.3-5% only [33]. Law in his study, elicited the fact that there were 75% of fractured teeth occurring between the ages of 7-11 years and 40% were of enamel fractures and 60% included dentinal fractures as well. This shows the prevalence of Ellis class II fracture, which is in correlation with this study [34].

Class IV type of tooth injury or the root fracture cases is minimal as 1%. Type VII tooth fracture, in other words, displacement of the tooth with or without the crown or root fracture is also commonly seen in sports injuries whereas Ellis class VIII fractures are seen in fall injuries. A study by Rajab L.D.(2000) demonstrated that the prevalence of these injuries occur in 15-20 years of age group. Boys were more affected than girls which indicates a male predominance. Therefore, it correlates with this study [35]. Falls were the most predominant type of injuries and the most commonly affected teeth were maxillary central incisors. The peak incidence of injury was 10-12 years of age group [36]. Study by Gojanur S et al., (2015) elicited the prevalence of traumatic injuries of the anterior teeth among 14 children of age group 5-8 years [37]. According to Ellis and Davey's classification, it was observed that Ellis class IX type of fracture was predominant followed by Ellis class I and class II fractures, wherein the most common affected teeth were maxillary central incisors followed by lateral incisors. According to this study, the most common cause of trauma was due to falls(7.1%) followed by bicycle accidents(11.1%), collisions(8.9%), violence(6.7%) and bike accidents(2.2%). The dentist plays a significant role in the management of traumatic injuries such that every possible way of saving a traumatised tooth must be taken into consideration. The remarkable modifications of the adhesive systems and resin bonded composites have enhanced the prognosis of the restorative treatment to the next level. However, these treatments are implemented only when the affected tooth is intact [38].

### Limitations

The data may have discrepancies since it is limited to Ellis class-II fracture confined to a specific geographic location. The study

does not include age groups less than 16 years.

### Future scope

The study gives a broad idea on Ellis classification of traumatic injuries and management of uncomplicated fractures in an effective way.

### Conclusion

Awareness on tooth fractures, its complications, and the need for treatment should be insisted on among parents and young adults. Oral screening must be performed by conducting camps in order to diagnose these fractures at the earliest so that necessary steps can be taken to save the remaining tooth structures. Patients must be instructed on frequent reviews every 6 months to 1 year to check the quality of restoration and prevent restoration failure.

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