

Association of Ellis Class 2 fracture in 13-17 years old children

S. B. Sree Lakshmi,
Lakshimi Lakshmanan

Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

J. Adv. Pharm. Technol. Res.

ABSTRACT

The objective of the study is to evaluate the association of Ellis Class 2 fracture in children aged between 13 and 17 years. This is a descriptive study that was carried out in a university context, using data from patients with Ellis Class 2 fractures between 13 and 17 years from June 2019 to February 2021, which were obtained by analyzing patient records. The records were transferred to the SPSS software for statistical analysis. The association of Ellis Class 2 fracture is common in relation to 11 which is about 29.41% and more common among the age group of 14 years and had a more male prediction. The knowledge of Ellis Class 2 fracture and its association with several parameters are essential in dentistry for various clinical performances. This can be accomplished by increasing awareness through Continuing Dental Education (CDE) programs, demonstrations, and seminars on the clinical regime of Ellis Class 2 fracture.

Key words: Awareness, children, composite restoration, dentin, Ellis fracture

INTRODUCTION

In the overall population, one out of every ten children has dental teeth injury that necessitates dental intervention. Prompt treatment can help save teeth and avoid subsequent injury to the orofacial structures.^[1] Road crashes, battles, and sports injuries are all common causes of dental trauma. Enamel, dentin, and sometimes pulp, as well as other orofacial structures, are usually involved in dental injuries. G. E. Ellis, a pediatric dentist, in 1970, proposed a uniform categorization system for dental injuries, which is currently widely used for traumatic injuries.^[2]

Address for correspondence:

Dr. Lakshimi Lakshmanan,
Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600 077, Tamil Nadu, India.
E-mail: lakshimil.sdc@saveetha.com

Submitted: 18-Apr-2022

Revised: 10-Jun-2022

Accepted: 14-Jun-2022

Published: 30-Nov-2022

Access this article online

Quick Response Code:



Website:

www.japtr.org

DOI:

10.4103/japtr.japtr_125_22

Rasmussen ST *et al.* discovered in 1981 that most children suffer from tooth trauma.^[3] According to their research, 25% of all schoolchildren and 33% of adults have undergone trauma, with the majority of cases occurring before the age of 19.^[4] Many dental practitioners consider an Ellis Class 2 fracture to be a borderline that poses a problem for traditional restoration or alternative therapies such as standard root canal therapy. Cavities are considerably more common in people who have had dental trauma than in people who have not had dental trauma.^[5] Chiang YC *et al.* revealed the appearance of an unfavorable fracture that, when rectified, has limited resistance to labially applied pressure but should have higher resistance to horizontal pulling forces encountered while cutting or peeling food.^[6] For Ellis Class 2 fractures, various treatment techniques are performed, the most prevalent of which are traditional fillings, reattachment of broken segments, and placement of crowns.^[7] Patients with Ellis Class 2 fracture feel sensitivity as a result of the exposure to dentinal tubules and seek treatment from a dentist, thus, it is critical that the dentist has sufficient expertise and clinical experience in treating

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Lakshmi SB, Lakshmanan L. Association of Ellis Class 2 fracture in 13–17 years old children. *J Adv Pharm Technol Res* 2022;13:S26-30.

them.^[8] Our team possesses a plethora of research and experience, resulting in high-standard articles.^[9-28] The goal of the current research is to see if there is a link between Ellis Class 2 fracture and the age range of 13–17 years.

MATERIALS AND METHODS

This recollective research was undertaken in a private institution, in Chennai, India after the institutional review board approval (IHEC/SDC/PEDO/21/272).

Study design

All children aged between 13 and 17 years with the diagnosis of Ellis Class 2 fracture were included in the current study. Other types of Ellis Class fracture and any patients with incomplete records were excluded from the study.

Data analysis

The outpatient records from June 2019 to February 2020 were utilized for the current study's data collection. Overall, data of 150 patients were evaluated. Details on patients' demographics, type of fracture, and tooth number were aggregated. The data were cross-verified by another investigator.

Statistical analysis

The data were imported into the SPSS software 20.0 (IBM, Sydney, Australia). Bar graphs were plotted for categorical variables that were expressed in terms of frequency and percentage. The Chi-square test was used to evaluate the statistical associations, and $P \leq 0.05$ was judged significant.

RESULTS

Figure 1 depicts the association of Ellis Class 2 fracture between different age groups of the patients. There is a high association of Ellis Class 2 fracture in 14 years age group and it was found to be higher in males than females [Figure 2].

Figure 3 shows the association of Ellis Class 2 fractures on different sites [different teeth]. There is a higher association of Ellis Class 2 fracture in 11 (upper right central incisors) than in other upper and lower incisor teeth.

In terms of treatment options, restoration was the choice of treatment for Ellis Class 2 fracture more than root canal treatment, followed by crown [Figure 4].

To be precise, about 14.71% of male and female had a fracture in tooth 11, about 10.78% of male and 4.90% of female had a fracture in tooth 12, about 13.73% of male and 4.90% of female had a fracture in tooth 21, 6.86% of male and 4.90% of female had a fracture in tooth 22, about 5.88% of male and 2.94% of female had a fracture in tooth 31 and 8.82% of male and 6.86% of female had a fracture in tooth 41. However, this is statistically insignificant ($P = 0.765$) [Figure 5].

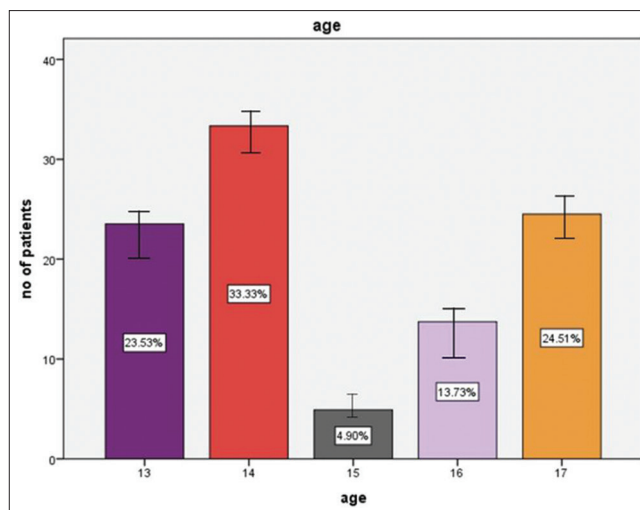


Figure 1: The bar graph depicts the association of Ellis Class 2 fracture between different age groups of the patients. Indigo denotes age group of 13 years which is 23.53%, red denotes age group of 14 years which is 33.33%, black denotes age group of 15 years which is about 4.90%, lavender denotes age group of 16 years which is 13.73%, and yellow denotes age group of 17 years which is 24.51%. There is a high association of Ellis Class 2 fracture in the 14-year-old age group

About 38.24% of male and 24.51% of female had restoration, and about 22.55% of male and 14.71% of female had root canal treatment, followed by crown [Figure 6].

DISCUSSION

The current study indicates that the most common form of oral traumatic injuries seen in dentistry is an Ellis Class 2 fracture. Adolescents under the age of 18 are the most vulnerable age group, with school-going children being the most common.^[29] This is consistent with the research presented by Romeo *et al.* In this study, the most common age group associated with Ellis Class 2 fracture is 14 years which is 33.33%. Oral injuries are most common in children under 10 years of age, and only seldom seen under 30 years, according to their epidemiological study.^[30] Males are more typically impacted by dental trauma than females, according to several research conducted by various practitioners for dental traumatic injuries. Similar results have been obtained from our study where about 60.78% of males are affected. This could be because males are more likely to engage in a wide range of events such as accidents and falls, putting them at a higher risk of trauma.^[31] Visual inspection along with pulp sensibility tests are the most widely utilized diagnostic procedure. During a posttrauma evaluation, most doctors utilize heat and electrical stimuli to establish the pulp's health status.^[32]

The most common tooth affected in Ellis Class 2 fracture is 11 which is about 29.41%. This is since the first tooth to be affected in any fall or hit is the maxillary anterior. Because composite

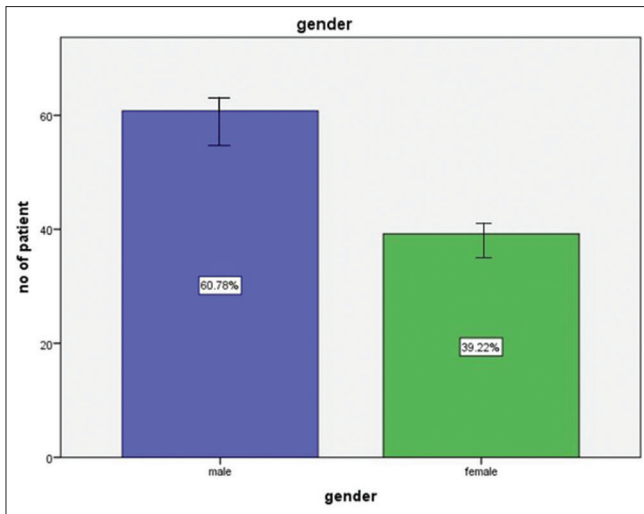


Figure 2: The bar graph depicts the association of Ellis Class 2 fracture between different genders of the patient. Blue denotes male which is 60.78% and green denotes female which is 39.22%. There is a high association of Ellis Class 2 fracture among males

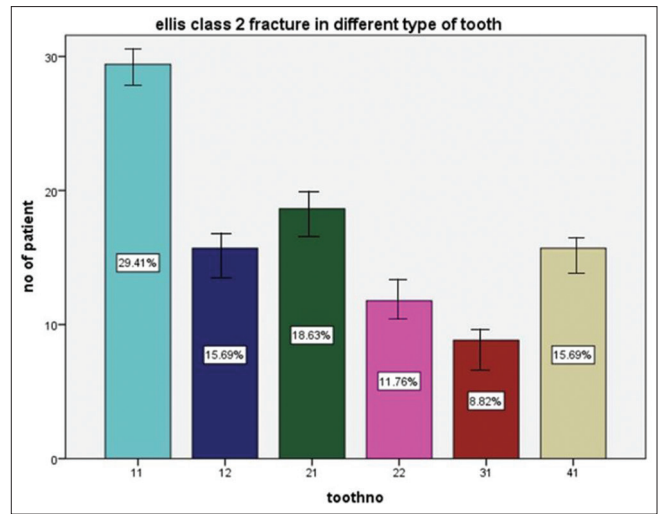


Figure 3: The bar graph depicts the association of Ellis Class 2 fractures on different sites (different teeth). Light blue indicates tooth number 11 which is 29.41%, violet indicates tooth no 12 which is 15.69%, green indicates tooth number 21 which is about 18.63%, pink indicates tooth no. 22 which is 11.76%, red indicates tooth no. 31 which is 8.82%, and yellow indicates tooth no 41 which is 15.69%. There is a high association of Ellis Class 2 fracture in 11

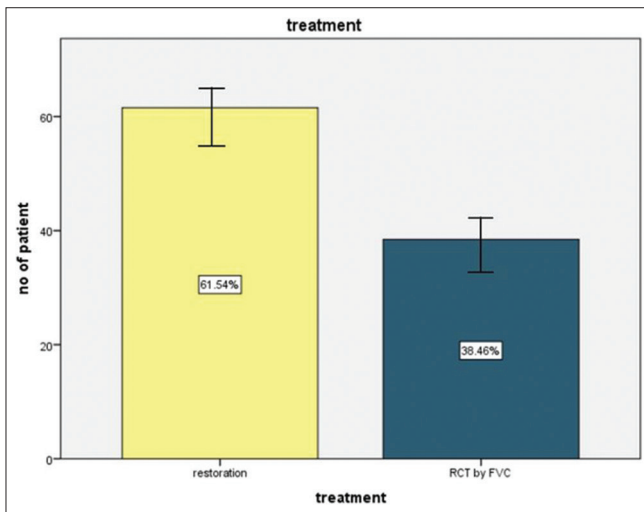


Figure 4: The bar graph depicts the association of treatment options for Ellis Class 2 fracture. Yellow denotes restoration which is 61.54% and green denotes RCT, followed by FVC which is 38.46%. There is a high association of restoration as a treatment option in Ellis Class 2 fracture. RCT: Randomized controlled trial. FVC: Forced vital capacity

restorations are highly developed and provide esthetics and functionality in great detail, traditional restorations are a much more desired treatment choice than other treatment modalities. In this study, about 61.54% of them had restoration as the choice of treatment for Ellis Class 2 fracture. Being a huge success in material science, for the restorative technique, various types of composites are accessible, including microfine, densified, fiber-reinforced, and nanoparticle composites.^[28] Ellis Class 2 fracture is frequently treated with reattachment of the broken tooth fragment. Reattachment of the broken tooth segment is believed to give sufficient esthetics at a low cost according to recent research with a high prognosis.^[32]

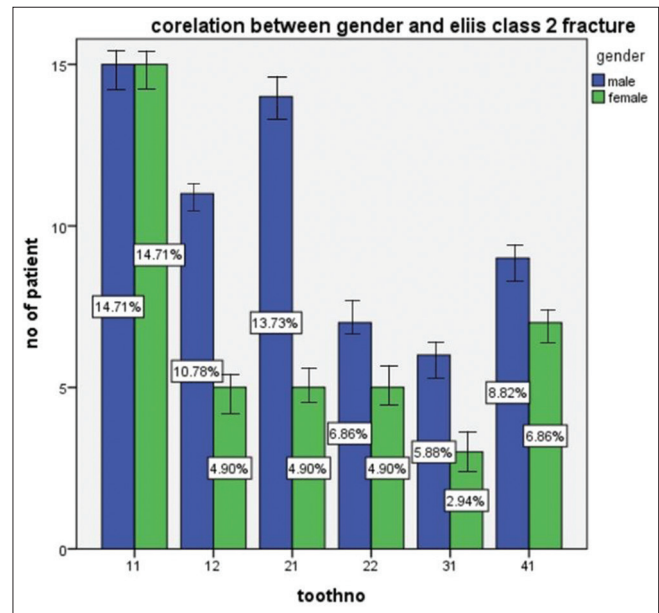


Figure 5: The correlation between the site of Ellis Class 2 fracture between male and female patients is depicted in the graph. Males are denoted in blue and females in green. About 14.71% of male and female had fracture in tooth 11, about 10.78% of male and 4.90% female had fracture in tooth 12, about 13.73% of male and 4.90% of female had fracture in tooth 21, 6.86% of male and 4.90% of female had fracture in tooth 22, about 5.88% of male and 2.94% of female had fracture in tooth 31, and 8.82% of male and 6.86% of female had fracture in tooth 41. There is a high association of Ellis Class 2 fracture in tooth 11. However, this is statistically insignificant (Chi-square test, $P = 0.765$)

The study focused primarily on the South Indian population. Data that were unclear were eliminated, resulting in a smaller sample size. Within the scope of the

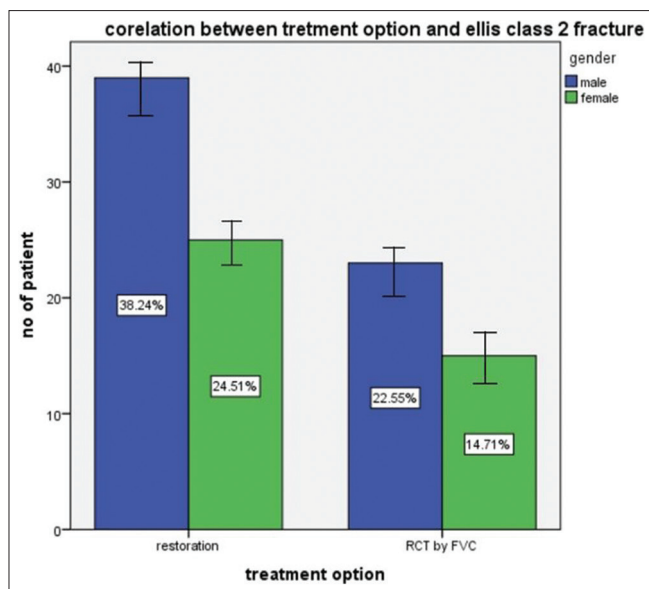


Figure 6: The correlation between the treatment options for Ellis Class 2 fracture between male and female patients is depicted in the graph. Males are denoted in blue and females in green. About 38.24% of male and 24.51% of female had restoration, and about 22.55% of male and 14.71% of female had RCT, followed by FVC. There is a high association of restoration as a treatment option for Ellis Class 2 fracture. However, this is statistically insignificant (Chi-square test, $P = 0.534$). RCT: Randomized controlled trial. FVC: Forced vital capacity

study, it was discovered that the risk of Ellis Class 2 fracture is higher in the 14-year-old age group, with a higher male predisposition. The geographic coverage region of the current research should be expanded to cover all South India to confirm the findings and improve the degree of significance. We can acquire better findings in future by doing a multicentered study with a large geographic area and a diverse population. Establishing the proper diagnosis is a necessary condition for effective treatment for the Ellis Class 2 fracture.^[31] Thus, this knowledge of the association of Ellis Class 2 fracture and correlation with a wide range of parameters is essential for better clinical performance.

CONCLUSION

There is a high association of Ellis Class 2 fracture among male children. Ellis Class 2 fractures are most common in the right central incisors and are most commonly found in 14-year-old children. Based on the different modalities available, these fractures should be treated accordingly.

Acknowledgment

The authors would like to thank the study participants for their participation and kind cooperation throughout the study.

Financial support and sponsorship

The present project is sponsored by:

- Saveetha Institute of Medical and Technical sciences
- Saveetha Dental College and Hospitals
- Saveetha University
- Sudhakar marine products.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Zadik D, Chosack A, Eidelman E. The prognosis of traumatized permanent anterior teeth with fracture of the enamel and dentin. *Oral Surg Oral Med Oral Pathol* 1979;47:173-5.
2. Rasmussen ST, Patchin RE. Fracture properties of human enamel and dentin in an aqueous environment. *J Dent Res* 1984;63:1362-8.
3. Rasmussen ST, Patchin RE, Scott DB, Heuer AH. Fracture properties of human enamel and dentin. *J Dent Res* 1976;55:154-64.
4. Andreasen JO, Bakland LK, Flores MT, Andreasen FM, Andersson L. *Traumatic Dental Injuries: A Manual*. 3rd Edition: John Wiley & Sons; 2011. p. 104.
5. Healy KE. Dentin and enamel. In: *Handbook of Biomaterial Properties*. Springer, New York, 2nd Edition; 1998. p. 24-39.
6. Chiang YC, Lee BS, Wang YL, Cheng YA, Chen YL, Shiau JS, *et al*. Microstructural changes of enamel, dentin-enamel junction, and dentin induced by irradiating outer enamel surfaces with CO₂ laser. *Lasers Med Sci* 2008;23:41-8.
7. Nalla RK, Kinney JH, Ritchie RO. On the fracture of human dentin: Is it stress- or strain-controlled? *J Biomed Mater Res A* 2003;67:484-95.
8. Piemjai M, Arksornnukit M. Compressive fracture resistance of porcelain laminates bonded to enamel or dentin with four adhesive systems. *J Prosthodont* 2007;16:457-64.
9. Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. *Eur J Dent* 2018;12:67-70.
10. Ramadurai N, Gurunathan D, Samuel AV, Subramanian E, Rodrigues SJL. Effectiveness of 2% Articaine as an anesthetic agent in children: Randomized controlled trial. *Clin Oral Investig* 2019;23:3543-50.
11. Ramakrishnan M, Dhanalakshmi R, Subramanian EM. Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry – A systematic review. *Saudi Dent J* 2019;31:165-72.
12. Jeevanandan G, Thomas E. Volumetric analysis of hand, reciprocating and rotary instrumentation techniques in primary molars using spiral computed tomography: An *in vitro* comparative study. *Eur J Dent* 2018;12:21-6.
13. Princeton B, Santhakumar P, Prathap L. Awareness on preventive measures taken by health care professionals attending COVID-19 patients among dental students. *Eur J Dent* 2020;14:S105-9.
14. Saravanakumar K, Park S, Mariadoss AV, Sathiyaseelan A, Veeraraghavan VP, Kim S, *et al*. Chemical composition, antioxidant, and anti-diabetic activities of ethyl acetate fraction of *Stachys riederi* var. *japonica* (Miq.) in streptozotocin-induced type 2 diabetic mice. *Food Chem Toxicol* 2021;155:112374.
15. Wei W, Li R, Liu Q, Devanathadesikan Seshadri V, Veeraraghavan VP, Surapaneni KM, *et al*. Amelioration of oxidative stress, inflammation and tumor promotion by Tin oxide-Sodium alginate-Polyethylene glycol-Allyl isothiocyanate nanocomposites on the 1,2-Dimethylhydrazine induced colon carcinogenesis in rats. *Arab J Chem* 2021;14:103238.
16. Gothandam K, Ganesan VS, Ayyasamy T, Ramalingam S.

- Antioxidant potential of theaflavin ameliorates the activities of key enzymes of glucose metabolism in high fat diet and streptozotocin – Induced diabetic rats. *Redox Rep* 2019;24:41-50.
17. Su P, Veeraraghavan VP, Krishna Mohan S, Lu W. A ginger derivative, zingerone-a phenolic compound-induces ROS-mediated apoptosis in colon cancer cells (HCT-116). *J Biochem Mol Toxicol* 2019;33:e22403.
 18. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. *Clin Oral Investig* 2020;24:3275-80.
 19. Sekar D, Johnson J, Biruntha M, Lakshmanan G, Gurunathan D, Ross K. Biological and clinical relevance of microRNAs in mitochondrial diseases/dysfunctions. *DNA Cell Biol* 2020;39:1379-84.
 20. Velusamy R, Sakthinathan G, Vignesh R, Kumarasamy A, Sathishkumar D, Nithya Priya K, *et al.* Tribological and thermal characterization of electron beam physical vapor deposited single layer thin film for TBC application. *Surf Topogr Metrol Prop* 2021;9:025043.
 21. Aldhuwayhi S, Mallineni SK, Sakhamuri S, Thakare AA, Mallineni S, Sajja R, *et al.* Covid-19 knowledge and perceptions among dental specialists: A cross-sectional online questionnaire survey. *Risk Manag Healthc Policy* 2021;14:2851-61.
 22. Sekar D, Nallaswamy D, Lakshmanan G. Decoding the functional role of long noncoding RNAs (lncRNAs) in hypertension progression. *Hypertens Res* 2020;43:724-5.
 23. Bai L, Li J, Panagal M, Biruntha M, Sekar D. Methylation dependent microRNA 1285-5p and sterol carrier proteins 2 in type 2 diabetes mellitus. *Artif Cells Nanomed Biotechnol* 2019;47:3417-22.
 24. Sekar D. Circular RNA: A new biomarker for different types of hypertension. *Hypertens Res* 2019;42:1824-5.
 25. Sekar D, Mani P, Biruntha M, Sivagurunathan P, Karthigeyan M. Dissecting the functional role of microRNA 21 in osteosarcoma. *Cancer Gene Ther* 2019;26:179-82.
 26. Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of nonoriginal abutments with implants: Evaluation of microgap at the implant-abutment interface, with original and nonoriginal abutments. *Implant Dent* 2019;28:289-95.
 27. Parimelazhagan R, Umapathy D, Sivakamasundari IR, Sethupathy S, Ali D, Kunka Mohanram R, *et al.* Association between tumor prognosis marker visfatin and proinflammatory cytokines in hypertensive patients. *Biomed Res Int* 2021;2021:8568926.
 28. Syed MH, Gnanakkan A, Pitchiah S. Exploration of acute toxicity, analgesic, anti-inflammatory, and anti-pyretic activities of the black tunicate, *Phallusia nigra* (Savigny, 1816) using mice model. *Environ Sci Pollut Res Int* 2021;28:5809-21.
 29. Andreasen JO, Lauridsen E, Gerds TA, Ahrensburg SS. Dental Trauma Guide: A source of evidence-based treatment guidelines for dental trauma. *Dent Traumatol* 2012;28:345-50.
 30. Romeo I, Sobrero F, Roccia F, Dolan S, Laverick S, Carlaw K, *et al.* A multicentric, prospective study on oral and maxillofacial trauma in the female population around the world. *Dent Traumatol* 2022;38:196-205.
 31. Segura-Palleres I, Sobrero F, Roccia F, de Oliveira Gorla LF, Pereira-Filho VA, Gallafassi D, *et al.* Characteristics and age-related injury patterns of maxillofacial fractures in children and adolescents: A multicentric and prospective study. *Dent Traumatol* 2022;38:213-22.
 32. Fu XJ, Li WS, Xiang L, Liao LS. Analysis of 256 pediatric oral and maxillofacial emergency in-patients during the outbreak of COVID-19. *Dent Traumatol* 2022;00:1-7.