International Journal of Early Childhood Special Education (INT-JECSE)
DOI:10.9756/INTJECSE/V14I5.1065 ISSN: 1308-5581 Vol 14, Issue 05 2022

INCIDENCE OF HORIZONTAL UNFAVOURABLE ANGLE FRACTURE OF MANDIBLE

- **Neha N**

Undergraduate Student, Saveetha Dental College and Hospitals,Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162, Poonamallee High Rd, Velappanchavadi, Chennai- 600077,Tamil Nadu, India.

- **Dr. Arun Murugaiyan***

Associate professor Department of Oral SurgerySaveetha Institute of Medical and Technical Sciences,Saveetha University, 162, Poonamallee High Rd, Velappanchavadi, Chennai- 600077,Tamil Nadu, India.

ABSTRACT:

Introduction: Mandibular fractures are the most common traumatic injuries of the maxillofacial region. Different parts of the mandible can get fractured when subjected to trauma; including condyle, body, symphysis, angle, etc. Angle fracture can be of different types and pose a unique challenge to the surgeons, having the highest reported postoperative complication rate.

Aim: This study aims to find the incidence of horizontal unfavourable angle fracture of mandible in the out-patient population of Saveetha Dental College and Hospitals.

Materials and methods: This study was conducted in a private dental institution in Chennai. The OPG of patients who presented with fracture in the oral and maxillofacial region were collected from the hospital management system and analysed to find the incidence of horizontal unfavourable angle fracture of mandible. The data was tabulated in Microsoft Excel sheet and data analysis was performed using SPSS software version 23.

Results: Out of the 206 patients, 70 reported with horizontal unfavourable angle fracture of mandible. A majority of these patients were males and belonged to the age group of 21-30 years. The rest had fractures in the parasymphysis, body of the mandible, ramus, condyle, coronoid process and maxilla . The incidence of horizontal favourable angle fracture was much lesser.

Conclusion: Horizontal unfavourable angle fracture comprised nearly 35% of the fractures of the oral and maxillofacial region.

Keywords: Angle, Fracture, Horizontal, Innovative, Mandible, Unfavourable.

Abbreviations:
OPG: Orthopantomogram

1. INTRODUCTION:

Mandibular fractures account for the most common traumatic injuries of the maxillofacial region. In developed countries, vehicle and sport accidents are main causes of mandibular fractures, while in developing countries and rural areas, violence, gunshot wounds, and falls in foregrounds are the main causes of mandibular fractures (Lee, 2012). The evaluation, diagnosis, and management of these fractures remain challenging despite improved imaging technology and fixation techniques (Serebrakian, Maricevich and Pickrell, 2017). Despite the presence of well established treatment modalities that have been practiced from a longer period, untreated and postoperative complications decrease the patient's quality of life and their satisfaction (Dergin, Emes and Aybar, 2019). The mandibular bone is exposed to many sorts of linear and angular forces underload such as compression and tension, shear, torsion, and bending. External forces cause the mandibular bone to undergo plastic and elastic deformation (Braasch and Omar Abubaker, 2013).

There are many fracture classifications in literature based on the type of fracture, cause of the fracture, reducibility, anatomic site, condition and inter-fragmental situation, and the presence of dentate or edentate segments (Odono, Brady and Urata, 2020). Mandibular fractures are more often described based on their anatomic location; these include fracture of angle, alveolar process, body, condyle, coronoid process, ramus, symphysis/parasymphysis. Symphysis, parasymphysis, the body, and the alveolar bone compose the horizontal section of the mandible. The vertical mandible consists of the angle, ramus, condylar, and coronoid processes (Abotaleb*et al.*, 2018).

The mandibular angle is defined as the angle formed by the intersection of the lower edge of the ramus and the external face of the mandibular body. Mandibular angle fractures occur in a triangular area included between the anterior edge and the postero-superior insertion of the masseter muscle. These fractures are distal to the third molar (Stewart, 2005; Naeem, Gemal and Reed, 2017). The angle is the most frequently involved site in patients with isolated mandibular fractures,

which typically result from personal assault (Gutta*et al.*, 2014). The thinner cross-sectional area of this region of the mandible and the presence of impacted third molars contribute to the higher frequency of fracture in this region (Dodson, 2004). Mandibular angle fractures are some of the most technically demanding and are associated with the highest complication rate of all mandibular fractures (Ellis, 2010). Predisposing causes of mandibular angle fractures are impacted wisdom teeth and conditions leading to a thinning/weakening of the mandible such as lytic lesions (cysts or tumours), osteoporosis, osteomyelitis, congenital hypoplasia, and toothless jaws (Paza, Abuabara and Passeri, 2008).

Fractures of the angle can be classified into horizontal and vertical fractures. Based on muscle action, each can be further classified into favourable and unfavourable fractures. Some fractures may be displaced or held in apposition by the surrounding musculature, which can impede or ameliorate healing respectively (Naeem, Gemal and Reed, 2017). The muscles have some vertical and horizontal forces on fragments. These forces may cause displacement of fragments or may act as a stabilizer for fragments. The temporalis, masseter, and medial pterygoid muscle pull are responsible for vertical displacements of fragments. Horizontal displacements are mainly caused by lateral and medial pterygoid muscle pull (Kumaran and Thambiah, 2011).

Favourable fractures occur when the actions of the surrounding muscles oppose the fracture fragments. When the muscle actions result in displacement of the fracture fragments these are unfavourable fractures. When the fragments are drawn together due to the muscle action, it results in favourable angle fracture(Jain and Rathee, 2021).

Our team has extensive knowledge and research experience that has translated into high quality publications (Felicita and SumathiFelicita, 2018; J *et al.*, 2018; Wahab*et al.*, 2018; Gan*et al.*, 2019; Li *et al.*, 2019; Ma *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Su *et al.*, 2019; Bishir*et al.*, 2020; Chandrasekar*et al.*, 2020; Mudigonda*et al.*, 2020; Sathya*et al.*, 2020; Wan *et al.*, 2020; Zhang *et al.*, 2020; Fan *et al.*, 2021; Narayanasamy *et al.*, 2021; Saravanakumar*et al.*, 2021; Veeraraghavan*et al.*, 2021; Wang *et al.*, 2021; Wei *et al.*, 2021)

This study aims to find the prevalence of unfavourable angle fractures and to compare it with the incidence of favourable angle fracture and other fractures occurring in the mandible.

2. MATERIALS AND METHODS:

This is a retrospective study conducted in Saveetha dental college and Hospitals, Chennai. Outpatient population data from June 2019 to February 2021 was analysed. Patient details and OPG of the patients who reported to the Department of Oral and Maxillofacial Surgery with fracture in the oral and maxillofacial region were collected from the hospital management system. The OPG of 206 patients who fulfilled the inclusion criteria for this study was analysed to find the incidence of horizontal unfavourable angle fracture of the mandible. The data collected was tabulated in MS Excel sheet under four parameters: Name, Age, Gender and the type of fracture. All the case sheets were reviewed and verified by another examiner. Data analysis was performed using SPSS software version 23. Chi square test was performed and the p value obtained was 0.296 (<0.05), which was statistically insignificant.

3. RESULT:

Out of the 206 patients who presented with fracture in the oral and maxillofacial region, 70 patients reported with horizontal unfavourable angle fracture of mandible. These patients were categorized based on age group and gender. Out of the 70, 4 were females and 66 were males; thus the incidence of horizontal unfavourable angle fracture of the mandible was higher in male than female subjects. Maximum number of male patients were of the age group 21-30 years and the least were of the age group of 0-10 years. Females of the age group 31-40 years had a higher incidence when compared to that of other age groups (Figure 1). The incidence of horizontal unfavourable angle fracture of mandible was compared with other fractures of the oral and maxillofacial region; these being, fracture of body, symphysis and parasymphysis, condyle, ramus, coronoid process and fracture in the maxilla. It was observed that the incidence of horizontal favourable fracture of mandible was much lesser than that of unfavorable angle fracture. It was also found that the incidence of fracture of symphysis and parasymphysis was slightly higher than that of horizontal unfavourable angle fracture of mandible.

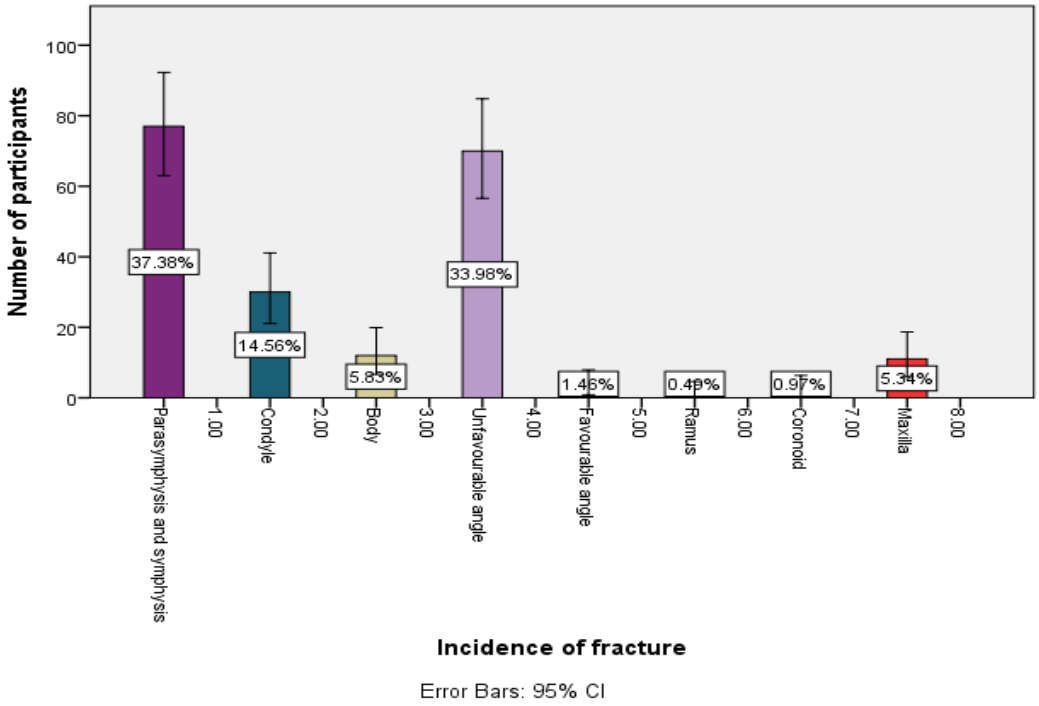

Figure 1: Bar graph showing the incidence of different types of fractures in the oral and maxillofacial region. X axis indicates the type of fracture and Y axis denotes the number of patients. It is observed from the graph that incidence of fracture in symphysis and parasymphysis region was the highest, followed by unfavourable type of angle fracture, condyle, body, maxilla, favourable type of angle fracture, coronoid process and the least was observed in the ramus region.

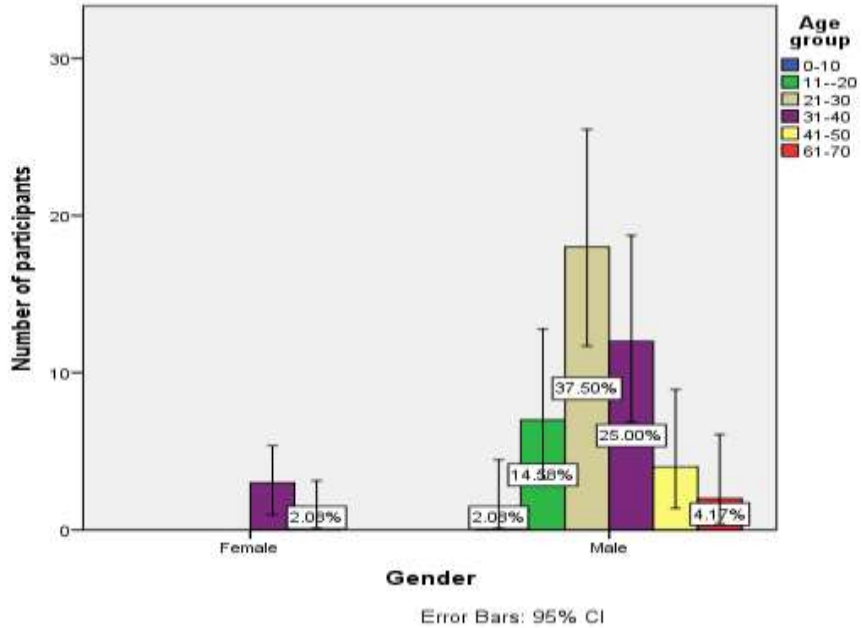

Figure 2: Bar graph showing the association between age group and gender of patients presenting with unfavourable angle fracture of mandible. This association was obtained from SPSS software. Chi square test was performed and the p value obtained was 0.296 (<0.05); which indicates that the results were statistically insignificant. X axis indicates the number of patients and the Y axis denotes the gender of patients. The age group is represented in different colours; 0-10 years (blue), 11-20 years (green), 21-30 years (brown), 31-40 years (purple), 41-50 years (yellow), 61-70 years (red). It is observed from the graph that males had a higher incidence than females and in that, males of age group 21-30 years and females of age group 31-40 years had a higher presentation.

4. DISCUSSION:

Afrooz et.al. in their study analysed mandibular fractures based on location of injury, cause, age group and gender and found that men have four times higher incidence of mandibular fractures with 50% cause to be an assault. On the other hand, women had sustained lesser incidence of mandible fractures and the reported ones were more commonly due to motor vehicle accidents (MVAs) and falls (*Website*, no date).

A similar study was conducted at Lanzhou University, China by Abotaleb et.al. in 2017. They carried out a detailed analysis on the epidemiology, treatment and postoperative complications of mandibular fractures and found that the male: female ratio was 4.1:1 with the third decade having the highest incidence (30.1%). Traffic accidents (43.6%) were the most common etiology followed by falls (31.6%). Symphysis/parasymphysis (26.4%) and condyle (24%) were the most common fracture sites (Abotaleb*et al.,* 2018). These results are corresponding with the current study except that the second most common type of fracture was found to be angle fracture of mandible.

Jung, et.al. studied the incidence, demographic distribution, type and etiology of mandibular fractures in a dental hospital and found that the ratio of male to female patients was 5.45 : 1 and highest incidence was observed in patients between 20 and 29 years (38.1%). The most frequent site was the symphysis, which accounted for a total of 431 fractures, followed by the angle (348), condyle (279), and body (95). It was also observed that the symphysis with angle fracture was the most common combination site of mandibular fracture (Jung *et al.*, 2014).

5. CONCLUSION:

A sound knowledge and perception of the epidemiology of mandibular fractures is clinically important and aids in the diagnosis, treatment planning and prevention of mandibular fractures in the general population.

6. REFERENCES:

1. Abotaleb, B. M. *et al.* (2018) 'A detailed analysis of mandibular fractures epidemiology, treatment and outcomes: A 5-year retrospective study, Gansu Province-China', *Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology*, pp. 197–205. doi: 10.1016/j.ajoms.2017.12.001.
2. Bishir, M. *et al.* (2020) 'Sleep Deprivation and Neurological Disorders', *BioMed research international*, 2020, p. 5764017. doi: 10.1155/2020/5764017.
3. Braasch, D. C. and Omar Abubaker, A. (2013) 'Management of Mandibular Angle Fracture', *Oral and Maxillofacial Surgery Clinics of North America*, pp. 591–600. doi: 10.1016/j.coms.2013.07.007.
4. Chandrasekar, R. *et al.* (2020) 'Development and validation of a formula for objective assessment of cervical vertebral bone age', *Progress in orthodontics*, 21(1), p. 38. doi: 10.1186/s40510-020-00338-0.
5. Dergin, G., Emes, Y. and Aybar, B. (2019) 'Evaluation and Management of Mandibular Fracture', *Trauma in Dentistry*. doi: 10.5772/intechopen.83024.
6. Dodson, T. B. (2004) 'Third molars may double the risk of an angle fracture of the mandible', *Evidence-based dentistry*, p. 78. doi: 10.1038/sj.ebd.6400263.
7. Ellis, E., 3rd (2010) 'A prospective study of 3 treatment methods for isolated fractures of the mandibular angle', *Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons*, 68(11), pp. 2743–2754. doi: 10.1016/j.joms.2010.05.080.
8. Fan, Y. *et al.* (2021) 'Tomentosin Reduces Behavior Deficits and Neuroinflammatory Response in MPTP-Induced Parkinson's Disease in Mice', *Journal of environmental pathology, toxicology and oncology: official organ of the International Society for Environmental Toxicology and Cancer*, 40(1), pp. 75–84. doi: 10.1615/JEnvironPatholToxicolOncol.v40.i1.70.
9. Felicita, A. S. and SumathiFelicita, A. (2018) 'Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor – The sling shot method', *The Saudi Dental Journal*, pp. 265–269. doi: 10.1016/j.sdentj.2018.05.001.
10. Gan, H. *et al.* (2019) 'Zingerone induced caspase-dependent apoptosis in MCF-7 cells and prevents 7,12-dimethylbenz(a)anthracene-induced mammary carcinogenesis in experimental rats', *Journal of biochemical and molecular toxicology*, 33(10), p. e22387. doi: 10.1002/jbt.22387.
11. Gutta, R. *et al.* (2014) 'Outcomes of mandible fracture treatment at an academic tertiary hospital: a 5-year analysis', *Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons*, 72(3), pp. 550–558. doi: 10.1016/j.joms.2013.09.005.
12. Jain, P. and Rathee, M. (2021) 'Mandible Body Fracture', in *StatPearls*. Treasure Island (FL): StatPearls Publishing. Available at: https://www.ncbi.nlm.nih.gov/pubmed/31971758.
13. J, P. C. *et al.* (2018) 'Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study', *Clinical Implant Dentistry and Related Research*, pp. 531–534. doi: 10.1111/cid.12609.
14. Jung, H.-W. *et al.* (2014) 'Retrospective clinical study of mandible fractures', *Journal of the Korean Association of Oral and Maxillofacial Surgeons*, 40(1), pp. 21–26. doi: 10.5125/jkaoms.2014.40.1.21.
15. Kumaran, P. S. and Thambiah, L. (2011) 'Versatility of a single upper border miniplate to treat mandibular angle fractures: A clinical study', *Annals of maxillofacial surgery*, 1(2), pp. 160–165. doi: 10.4103/2231-0746.92784.
16. Lee, K. (2012) 'Global trends in maxillofacial fractures', *Craniomaxillofacial trauma & reconstruction*, 5(4), pp.

213–222. doi: 10.1055/s-0032-1322535.
17. Li, S. *et al.* (2019) 'Restorative Effect of Fucoxanthin in an Ovalbumin-Induced Allergic Rhinitis Animal Model through NF-κB p65 and STAT3 Signaling', *Journal of environmental pathology, toxicology and oncology: official organ of the International Society for Environmental Toxicology and Cancer*, 38(4), pp. 365–375. doi: 10.1615/JEnvironPatholToxicolOncol.2019030997.
18. Ma, Y. *et al.* (2019) 'Sesame Inhibits Cell Proliferation and Induces Apoptosis through Inhibition of STAT-3 Translocation in Thyroid Cancer Cell Lines (FTC-133)', *Biotechnology and bioprocess engineering: BBE*, 24(4), pp. 646–652. doi: 10.1007/s12257-019-0151-1.
19. Mudigonda, S. K. *et al.* (2020) 'Non-suturing microvascular anastomosis in maxillofacial reconstruction- a comparative study', *Journal of Cranio-Maxillofacial Surgery*, 48(6), pp. 599–606. doi: 10.1016/j.jcms.2020.04.005.
20. Naeem, A., Gemal, H. and Reed, D. (2017) 'Imaging in traumatic mandibular fractures', *Quantitative imaging in medicine and surgery*, 7(4), pp. 469–479. doi: 10.21037/qims.2017.08.06.
21. Narayanasamy, R. K. *et al.* (2021) 'Lower pretreatment hemoglobin status and treatment breaks in locally advanced head and neck squamous cell carcinoma during concurrent chemoradiation', *Indian journal of cancer*, 58(1), pp. 62–68. doi: 10.4103/ijc.IJC_656_18.
22. Odono, L. T., Brady, C. M. and Urata, M. (2020) 'Mandible Fractures', *Facial Trauma Surgery*, pp. 168–185. doi: 10.1016/b978-0-323-49755-8.00022-0.
23. Paza, A. O., Abuabara, A. and Passeri, L. A. (2008) 'Analysis of 115 mandibular angle fractures', *Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons*, 66(1), pp. 73–76. doi: 10.1016/j.joms.2007.05.025.
24. Ramakrishnan, M., Dhanalakshmi, R. and Subramanian, E. M. G. (2019) 'Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry – A systematic review', *The Saudi Dental Journal*, pp. 165–172. doi: 10.1016/j.sdentj.2019.02.037.
25. Saravanakumar, K. *et al.* (2021) 'Chemical composition, antioxidant, and anti-diabetic activities of ethyl acetate fraction of Stachysriederi var. japonica (Miq.) in streptozotocin-induced type 2 diabetic mice', *Food and chemical toxicology: an international journal published for the British Industrial Biological Research Association*, 155, p. 112374. doi: 10.1016/j.fct.2021.112374.
26. Sathya, S. *et al.* (2020) 'An in vitro study on hexavalent chromium [Cr(VI)] remediation using iron oxide nanoparticles based beads', *Environmental Nanotechnology, Monitoring & Management*, 14, p. 100333. doi: 10.1016/j.enmm.2020.100333.
27. Serebrakian, A., Maricevich, R. and Pickrell, B. (2017) 'Mandible Fractures', *Seminars in Plastic Surgery*, pp. 100–107. doi: 10.1055/s-0037-1601374.
28. Stewart, M. G. (2005) *Head, Face, and Neck Trauma: Comprehensive Management*. Thieme. Available at: https://books.google.com/books/about/Head_Face_and_Neck_Trauma.html?hl=&id=_Wya18o-MPQC.
29. Su, P. *et al.* (2019) 'A ginger derivative, zingerone-a phenolic compound-induces ROS-mediated apoptosis in colon cancer cells (HCT-116)', *Journal of biochemical and molecular toxicology*, 33(12), p. e22403. doi: 10.1002/jbt.22403.
30. Veeraraghavan, V. P. *et al.* (2021) 'A Comprehensive and Critical Review on Ethnopharmacological Importance of Desert Truffles: Terfeziaclaveryi, Terfeziaboudieri, and Tirmanianivea', *Food Reviews International*, pp. 1–20. doi: 10.1080/87559129.2021.1889581.
31. Wahab, P. U. A. *et al.* (2018) 'Scalpel Versus Diathermy in Wound Healing After Mucosal Incisions: A Split-Mouth Study', *Journal of Oral and Maxillofacial Surgery*, pp. 1160–1164. doi: 10.1016/j.joms.2017.12.020.
32. Wang, H. *et al.* (2021) 'Phyllanthin inhibits MOLT-4 leukemic cancer cell growth and induces apoptosis through the inhibition of AKT and JNK signaling pathway', *Journal of biochemical and molecular toxicology*, 35(6), pp. 1–10. doi: 10.1002/jbt.22758.
33. Wan, J. *et al.* (2020) 'Antiatherosclerotic Activity of Eriocitrin in High-Fat-Diet-Induced Atherosclerosis Model Rats', *Journal of environmental pathology, toxicology and oncology: official organ of the International Society for Environmental Toxicology and Cancer*, 39(1), pp. 61–75. doi: 10.1615/JEnvironPatholToxicolOncol.2020031478.
34. *Website* (no date). doi: 10.1016/j.joms.2015.04.032.
35. Wei, W. *et al.* (2021) 'Amelioration of oxidative stress, inflammation and tumor promotion by Tin oxide-Sodium alginate-Polyethylene glycol-Allylisothiocyanatenanocomposites on the 1,2-Dimethylhydrazine induced colon carcinogenesis in rats', *Arabian Journal of Chemistry*, 14(8), p. 103238. doi: 10.1016/j.arabjc.2021.103238.
36. Zhang, C. *et al.* (2020) 'Vicenin-2 Treatment Attenuated the Diethylnitrosamine-Induced Liver Carcinoma and Oxidative Stress through Increased Apoptotic Protein Expression in Experimental Rats', *Journal of environmental pathology, toxicology and oncology: official organ of the International Society for Environmental Toxicology and Cancer*, 39(2), pp. 113–123. doi: 10.1615/JEnvironPatholToxicolOncol.2020031892.