

**INCIDENCE OF INDIRECT SINUS LIFT FOR IMPLANT PLACEMENT IN MAXILLARY POSTERIOR
IN DENTAL COLLEGE IN CHENNAI**

First Author: K. Thirumagal

Saveetha Dental College & Hospital
Saveetha Institute of Medical and Technical Sciences,
Saveetha University
162, Poonamallee High Road
Chennai - 600077

Corresponding author: Dr. Arun Murugaiyan

Senior Lecturer
Department of Oral surgery
Saveetha Dental College & Hospital
Saveetha Institute of Medical and Technical Sciences,
Saveetha University
162, Poonamallee High Road
Chennai - 600077

ABSTRACT

AIM

The aim of the study is to find the Incidence of Indirect sinus lift for implant placement in maxillary posterior in dental college in Chennai

INTRODUCTION

The maxilla is made up of spongy bone and has one of the least dense bones in the oral cavity. Periodontal disease-stimulated teeth loss causes accentuated bone deficiency, both in height and in width by significant resorption of the alveolar bone. Bone remodeling in the region is further complicated by postextrac- tion bone resorption, pneumatization of maxillary sinus, and poor quality of residual alveolar bone. Indirect sinus augmentation is an effective solution for this problem. A thin tissue membrane lines the sinuses- when the sinuses limit the amount of bone available for a dental implant, the sinus membrane can be pushed upward and grafting bone added to increase its volume. This will allow for dental implants to be placed. The indirect technique is used if the bone height is at least 7-8 mm

MATERIALS AND METHODS

A retrospective study was planned with data collection from June 2019 to February 2021 in a university setup. We reviewed the patients records and analysed the data of 86000 patients. The data report includes patient details like gender and treatment. The records were manually verified by 2 reviewers and the data was tabulated in the Excel sheet followed by statistical analysis using SPSS software (Statistical Product and Service Solutions) in IBM and chi-square tests were performed.

RESULTS

In our study total 37 patients who have undergone indirect sinus lift procedure for implant placement. Majority were Females 19 (52.7%). Whereas Males were 17 (47.2%). In that Females majority of them indirect sinus lift procedures have been done for implant placement in tooth number 16 were 22.2% and for Males indirect sinus lift procedures have been done for implant placement in tooth number 26 were 13.8%.

CONCLUSION

Within the limitations of our study, it can be concluded that the majority of females have undergone indirect sinus lift procedure for implant placement compared with males.

KEY WORDS: Bone regeneration, Implant, Maxillary posterior teeth, Indirect Sinus lift, Sinus floor elevation, Innovative

INTRODUCTION

To get Success in implant placement in the maxillary posterior region there is a requirement of adequate training.

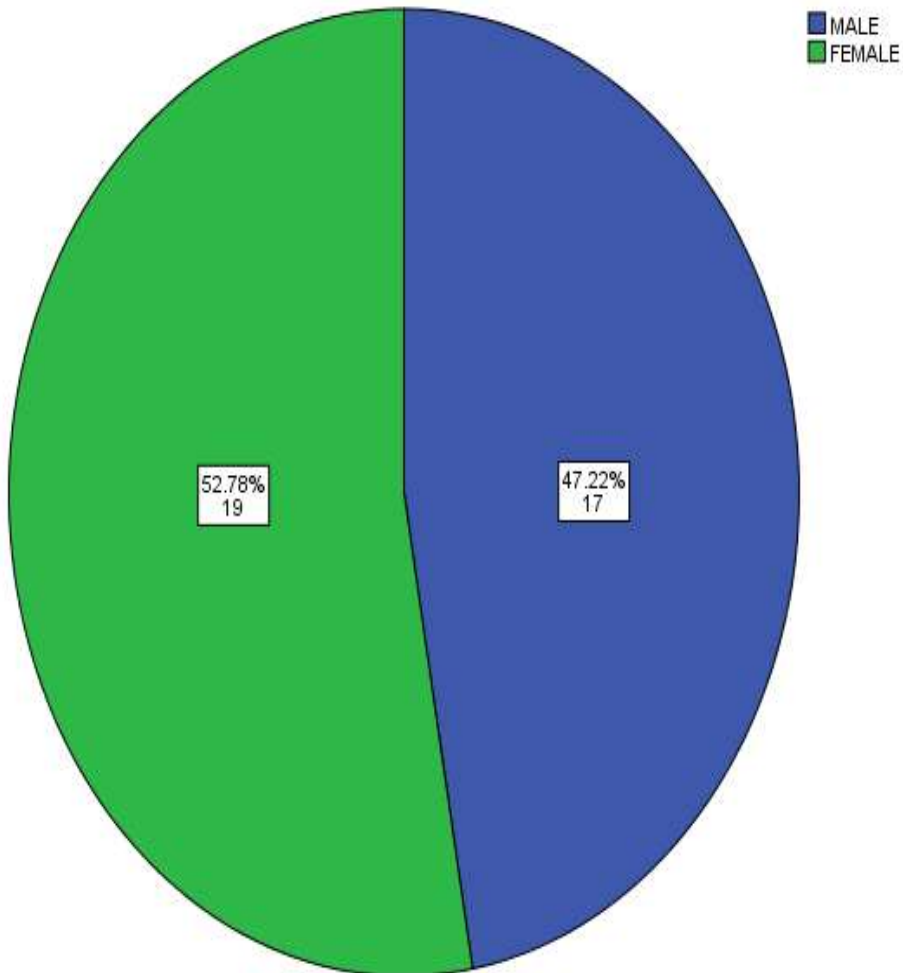
More challenges are faced in that region in order to place the dental implants. The maxillary region is made up of a spongy type of bone and it has less dense bones in the oral cavity (Raja, 2009). Accentuated bone deficiency in height and width is the result of resorption of alveolar bone due to Periodontal disease. Added to that frequent tooth loss also leads to bone loss. Bone remodeling became complicated after tooth extraction because of various factors such as maxillary sinus pneumatization, poor quality of residual alveolar bone and resorption (Kolhatkar, Bhola and Thompson-Sloan, 2011). The pneumatization of maxillary sinus occurs due to hollowing out in the apical region of alveolar process which is mediated by osteoclasts and positive intra-antral pressure get raised (Rocci *et al.*, 2013), (Truhlar *et al.*, 1997). In this kind of situation, poor quality of bone results in compromised placement of implants in the posterior maxilla region (Starch-Jensen *et al.*, 2020). After the extraction of the maxillary posterior region of the tooth that compromised the implant placement because of the maxillary sinus floor which is present above the maxillary alveolar bone. In this condition there is more chance for the dental implant to penetrate to the sinus lining and complicate the successful osseointegration of the implant. For treating this condition they developed various methods in order to elevate the sinus floor and the lining in order to increase the height and primary stability for the implant's placement. There are two techniques which are widely used. One is sinus floor elevation by lateral window approaches (Hatano, Shimizu and Ooya, 2004). Where the amount of bone is increased in the atrophic maxilla region by sinus lift procedure and subantral augmentation procedure are done. It was introduced in the mid 1970's (Jensen and Sindet-Pedersen, 1991). The other method was crestal bone approaches (Jensen, 1999), (Mazor, 2018). This technique was used most commonly for lifting the maxillary sinus floor through a lateral window. This technique was first presented by tatum in the year 1977 and it was first published by boyne and james in the year 1980 (Emmerich, Att and Stappert, 2005). Here the bone augmentation procedure is considered as the invasive, time consuming as well as expensive procedure when it is compared with the minimally invasive methods. The minimum aggressive procedure for sinus floor elevation with immediate placement of implant known as the osteotomy sinus floor elevation (OSFE) was introduced by Summers in the year 1994 (Shulman and Jensen, 1998). Crestal approach was used more widely than lateral window approach followed by osteotome procedure for elevation of the membrane and floor of the sinus and immediate placement of the implant. Even the graft may or may not be required. This procedure is considered as less invasive than lateral window approach because of less time consuming, less injury to the underlying structures and postoperative complications. But the prognosis of the treatment is the same as usual conventional technique (Raghoobar *et al.*, 2001). The aim of the study is to find the Incidence of Indirect sinus lift for implant placement in maxillary posterior in dental college in Chennai. Like this various study have been done (J *et al.*, 2018), (Wahab *et al.*, 2018), (Mudigonda *et al.*, 2020), (Narayanasamy *et al.*, 2021), (Gan *et al.*, 2019; Li *et al.*, 2019; Ma *et al.*, 2019; Bishir *et al.*, 2020; Zhang *et al.*, 2020; Fan *et al.*, 2021; Saravanakumar *et al.*, 2021; Veeraraghavan *et al.*, 2021; Wang *et al.*, 2021; Wei *et al.*, 2021) (Sathya *et al.*, 2020), (Felicita and Sumathi Felicita, 2018; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Chandrasekar *et al.*, 2020), (Su *et al.*, 2019; Wan *et al.*, 2020).

MATERIALS AND METHODS

The study was conducted in the outpatient of Dental College and Hospital. The study consisted of 37 patients. This is because the available data with similar ethnicity was collected from the particular geographic location. The trends in the other location were not assessed in the study setting. Ethical approval was done by the universal ethical committee before the start of the study. The approval number given was [SDC/SIHEC/2020/DIASDATA/0619-0320]. The data was reviewed and analysed from the total number of 86000 patients between June 2019- March 2020. The case sheet was manually reviewed and cross verified in order to avoid errors. To minimise the sampling bias all available data was included and the sorting process was done. All the samples where indirect sinus lift were done for implant placement was included. This particular time was considered as internal validity and a prescriptive pattern was followed to analyse external validity. All the data like the patient's name, gender and their tooth number value was included in the study. The data which are obtained were entered in the excel sheet and Tabulated and finally SPSS imported was done including the chi square test.

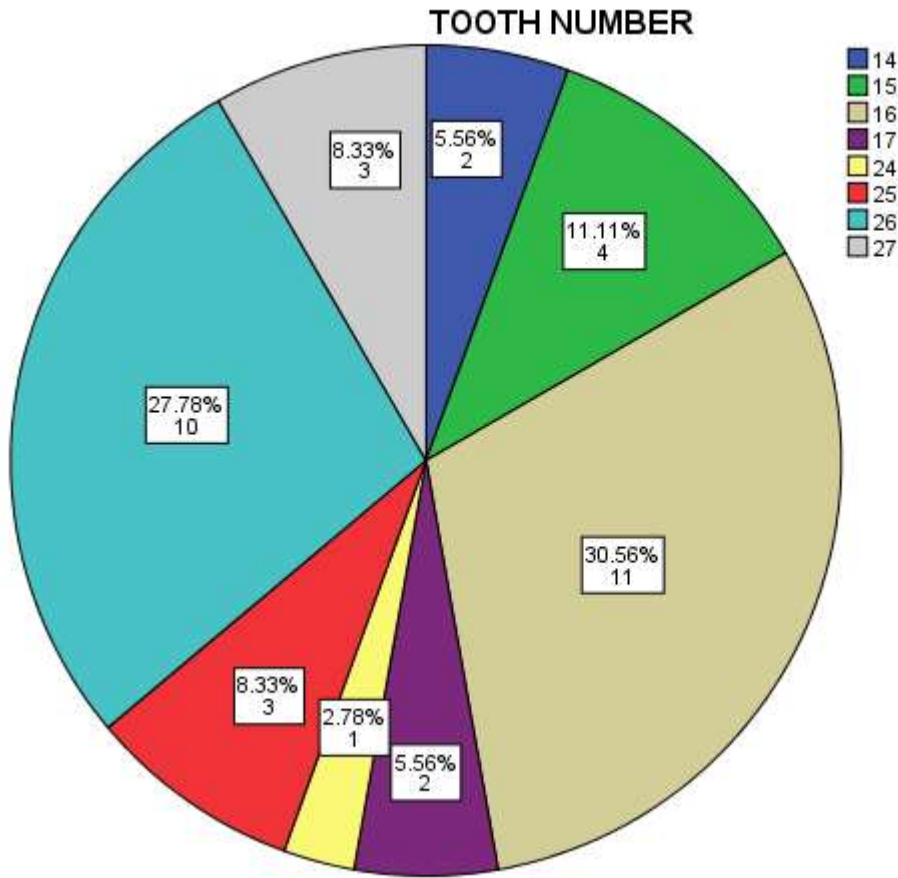
GRAPH 1

GENDER



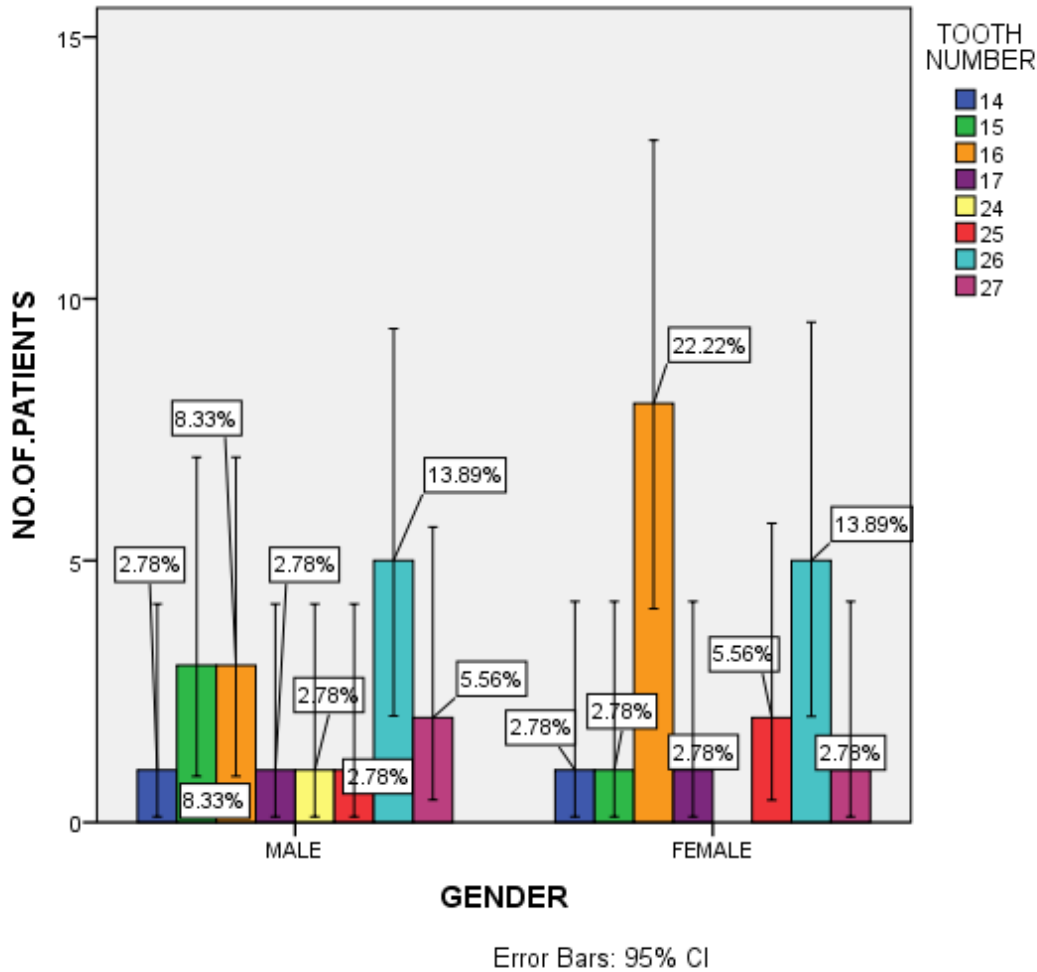
Graph 1 shows that in the total 37 patients who have undergone indirect sinus lift procedure for implant placement. Majority were Females 19 (52.7%). Whereas Males were 17 (47.2%).

GRAPH 2



Graph 2 shows that the majority of indirect sinus lift procedures have been done for implant placement in tooth number 16 followed by 26 regions.

GRAPH 3



Graph 3 Bar graph represents that there is association between the gender and tooth number. X- axis represents the gender and Y- axis represents the tooth number. Chi-square test was done and association was not found to be statistically significant [Pearson’s Chi Square value:0.679, DF: 7, p value: 0.679 ($p>0.05$)]. Even Though it is statistically insignificant, for Females majority of them indirect sinus lift procedures have been done for implant placement in tooth number 16 were 22.2% and for Males indirect sinus lift procedures have been done for implant placement in tooth number 26 were 13.8%.

DISCUSSION

In our study the total patients were 37 who have undergone indirect sinus lift procedure for implant placement. Majority were Females 19 (52.7%).Whereas Males were 17 (47.2%). We compared gender with tooth number and found that the majority of Females indirect sinus lift procedures have been done for implant placement in tooth

number 16 were 22.2% and for Males indirect sinus lift procedures have been done for implant placement in tooth number 26 were 13.8%. Whereas in other studies 197 implants were placed and the mean age of the group was 40.2 ± 10.7 years. In that they found male predilection (54.3%). The bone height expressed in percentage after a year was 134.6%. And they compared the length of residual alveolar bone (RAB) at the beginning and end of study, ISAT had a mean preoperative height was found to be 7.88 mm. And postoperative height was found to be 13.22 mm. And DSAT, the mean height at the beginning of treatment was 3.94 mm and at the end it was found to be 10.13 mm. The mean increase in height was 6.19 mm. For both cases. And the P value was 0.000. This shows a significant difference between (ISAT) and (DSAT) (Balaji, 2013). In Graziani F et al. study, they did sinus augmentation either by standard DSAT or ISAT as a single step procedure. And they found that there are no significant complications found during and after placements of dental implants, no significant complications were reported (Graziani *et al.*, 2005). In another study they compared implant survival rate by sinus floor augmentation and estimated the survival rate between 75 and 100% both for non augmented and augmented areas. (Buser, Chen and Wismeijer, 2019). In Rawat et al study they found successful osseointegration without bone graft by using osteotome sinus floor elevation without bone graft. Simultaneously new bone formation found followed by implants placed using indirect sinus lift. (Rawat, Thukral and Jose, 2019). In Trinh et al study the total patients were 30 and their age ranged 40 to 60 years. After sinus lift procedure, the patients were randomly divided into blood clot control and acemannan sponge graft groups. Then implant placement was done simultaneously. CBCT was taken immediately after 3-6 months after implant placement. And they evaluated bone formation by the radiographic endo-sinus bone gain percentage around the implant. Compared with the control group, they found the acemannan-treated group had a significantly increased bone gain percentage of 2.4- and 2-fold. And the p value obtained was < 0.05 in the chi square test. The biomaterial Acemannan with indirect sinus augmentation and simultaneous implant placement increases the formation of bone at the time duration of 3 and 6 months after surgery (Trinh *et al.*, 2019).

CONCLUSION

Within the limitations of our study, it can be concluded that the majority of females have undergone indirect sinus lift procedure for implant placement compared with males.

LIMITATIONS

There are few limitations in our survey. There is a small sample size used for our survey which cannot be generated for a large population. And the survey doesn't represent the ethnic group and population.

FUTURE SCOPE

The survey should be done in a larger population. Multicentered surveys should be done including other criterias.

ACKNOWLEDGEMENT

The author would like to acknowledge the help and support by the Department of Information Technology of Dental College and Hospital and the management for their constant assistance with the research

Author contribution

Data collection: K.Thirumagal

Data analysis: K.Thirumagal

Drafting the article: K.Thirumagal

Critical revision of the article: Dr. Arun Murugaiyan

Final approval of the version to be published: Dr. Arun Murugaiyan

Conflict of interest

No potential conflict of interest relevant to this article was reported

Source of Funding

The present study was supported by the following agencies,

- Saveetha Dental College and Hospital
- Saveetha Institute of Medical and Technical Sciences
- Saveetha University
- Funding organization name : JK GOOD LUCK ENTERPRISES

REFERENCE

- Balaji, S. M. (2013) 'Direct v/s Indirect sinus lift in maxillary dental implants', *Annals of maxillofacial surgery*, 3(2), pp. 148–153.
- Bishir, M. *et al.* (2020) 'Sleep Deprivation and Neurological Disorders', *BioMed research international*, 2020, p. 5764017.
- Buser, D., Chen, S. and Wismeijer, D. (2019) *Implant Therapy in the Esthetic Zone: Current Treatment Modalities and Materials for Single-Tooth Replacements*. Quintessenz Verlag.
- 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.
- Emmerich, D., Att, W. and Stappert, C. (2005) 'Sinus Floor Elevation Using Osteotomes: A Systematic Review and Meta-Analysis', *Journal of Periodontology*, pp. 1237–1251. doi: 10.1902/jop.2005.76.8.1237.
- 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.
- Felicita, A. S. and Sumathi Felicita, 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.
- 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.
- Graziani, F. *et al.* (2005) 'Maxillary Sinus Augmentation with Platelet-Rich Plasma and Fibrinogen Cryoprecipitate: A Tomographic Pilot Study', *Implant Dentistry*, pp. 63–69. doi: 10.1097/01.id.0000156387.35521.bf.
- Hatano, N., Shimizu, Y. and Ooya, K. (2004) 'A clinical long-term radiographic evaluation of graft height changes after maxillary sinus floor augmentation with a 2 : 1 autogenous bone/xenograft mixture and simultaneous placement of dental implants', *Clinical Oral Implants Research*, pp. 339–345. doi: 10.1111/j.1600-0501.2004.00996.x.
- Jensen, J. and Sindet-Pedersen, S. (1991) 'Autogenous mandibular bone grafts and osseointegrated implants for reconstruction of the severely atrophied maxilla: a preliminary report', *Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons*, 49(12), pp. 1277–1287.
- Jensen, O. T. (1999) *The Sinus Bone Graft*. Quintessence Publishing (IL).
- 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.
- Kolhatkar, S., Bhola, M. and Thompson-Sloan, T. N. (2011) 'Sinus floor elevation via the maxillary premolar extraction socket with immediate implant placement: a case series', *Journal of periodontology*, 82(6), pp. 820–828.
- Li, S. *et al.* (2019) 'Restorative Effect of Fucoxanthin in an Ovalbumin-Induced Allergic Rhinitis Animal Model through NF- κ B 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.
- 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.
- Mazor, Z. (2018) 'Reconstruction of Posterior Maxillary Deficiency with Implants using Osseodensification for Subcrestal Sinus Augmentation', *Treatment Planning Steps in Oral Implantology: A Color Atlas*, pp. 267–267. doi: 10.5005/jp/books/14127_52.
- 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.
- 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.
- Raghoobar, G. M. *et al.* (2001) 'Maxillary bone grafting for insertion of endosseous implants: results after 12-124 months', *Clinical oral implants research*, 12(3), pp. 279–286.
- Raja, S. V. (2009) 'Management of the Posterior Maxilla With Sinus Lift: Review of Techniques', *Journal of Oral and Maxillofacial Surgery*, pp. 1730–1734. doi: 10.1016/j.joms.2009.03.042.
- 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.

Rawat, A., Thukral, H. and Jose, A. (2019) 'Indirect Sinus Floor Elevation Technique with Simultaneous Implant Placement without Using Bone Grafts', *Annals of maxillofacial surgery*, 9(1), pp. 96–102.

Rocci, A. *et al.* (2013) 'Immediate Loading of Brånemark System TiUnite and Machined-Surface Implants in the Posterior Mandible, Part II: A Randomized Open-Ended 9-Year Follow-up Clinical Trial', *The International Journal of Oral & Maxillofacial Implants*, pp. 891–895. doi: 10.11607/jomi.2397.

Saravanakumar, K. *et al.* (2021) '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 and chemical toxicology: an international journal published for the British Industrial Biological Research Association*, 155, p. 112374.

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.

Shulman, L. B. and Jensen, O. T. (1998) 'Sinus Graft Consensus Conference. Introduction', *The International journal of oral & maxillofacial implants*, 13 Suppl, pp. 5–6.

Starch-Jensen, T. *et al.* (2020) 'Maxillary Sinus Floor Augmentation with Autogenous Bone Graft Alone Compared with Alternate Grafting Materials: a Systematic Review and Meta-Analysis Focusing on Histomorphometric Outcome', *Journal of Oral and Maxillofacial Research*. doi: 10.5037/jomr.2020.11302.

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.

Trinh, H. A. *et al.* (2019) 'Indirect Sinus Augmentation With and Without the Addition of a Biomaterial: A Randomized Controlled Clinical Trial', *Implant dentistry*, 28(6), pp. 571–577.

Truhlar, R. S. *et al.* (1997) 'Distribution of Bone Quality in Patients Receiving Endosseous Dental Implants', *Journal of Oral and Maxillofacial Surgery*, pp. 38–45. doi: 10.1016/s0278-2391(16)31196-x.

Veeraraghavan, V. P. *et al.* (2021) 'A Comprehensive and Critical Review on Ethnopharmacological Importance of Desert Truffles: *Terfezia clavaryi*, *Terfezia boudieri*, and *Tirmania nivea*', *Food Reviews International*, pp. 1–20.

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.

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.

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.

Wei, W. *et al.* (2021) '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', *Arabian Journal of Chemistry*, 14(8), p. 103238.

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.