

## PalArch's Journal of Archaeology of Egypt / Egyptology

### ASSESSMENT OF ORAL HEALTH STATUS IN SUBJECTS WITH DENTAL ARCH CROWDING - A RETROSPECTIVE STUDY

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**Suhas Manoharan, Aravind Kumar S. ASSESSMENT OF ORAL HEALTH STATUS IN SUBJECTS WITH DENTAL ARCH CROWDING - A RETROSPECTIVE STUDY--PalArch's Journal Of Archaeology Of Egypt/Egyptology 17(7), 3182-3190. ISSN 1567-214x**

**Keywords: Crowding; oral hygiene; orthodontics**

#### ABSTRACT

The aim of the study was to assess the oral health status in patients with crowding. A retrospective study was conducted amongst 705 patients who reported to the Orthodontics department with a complaint of upper or lower anterior crowding from June 2019 to March 2020 in a dental hospital. Patients with crowding in relation to upper and lower anteriors were selected for the study. Out of 705 patients records, patients in the age group of 10-35 were selected. The number of patients with crowding in age group included in the study was found to be 536 which consisted of 359 males and 176 females. The oral health status of these patients was assessed by oral hygiene index scores. Retrieved data was analysed using IBM SPSS Software Version 20.0. Descriptive statistics and tests of association were done by Chi square tests and results were obtained. P value > 0.05 was considered statistically not significant. The association between gender of patients with crowding and their oral hygiene status was not significant since both males and females had good to fair oral hygiene (p value > 0.05). Out of the male population (359), oral hygiene status was good in 185, fair in 155 and poor in 39 and in the females (176), it was good in 93, fair in 71 and poor in 12. Most patients with crowding had OHIS scores of 0.4 to 3.2. Hence Good to fair oral hygiene status was mostly predominant seen in patients with crowding. Within the limits of the study most patients with crowding showed good to fair oral hygiene status and no gender difference in oral hygiene among patients with crowding was noted.

## INTRODUCTION

Oral cavity of humans is a harbour for microorganisms which if not maintained regularly may cause a lot of harm. It may lead further to dental caries or periodontal disease that causes physical, mental and social impact. The decreased quality of life can affect various aspects of life such as appearance, relationships and oral function. (Bishara *et al.*, 1996) Periodontitis can be understood as a term explaining a number of degenerative and inflammatory diseases. It has been said that there is a relationship between crowding and periodontitis but there are lots of conflicting studies too. A variety of other factors also affect the results of such literature like patient motivation, age range, ethnicity, gender, experimental analysis, oral hygiene habits and diagnostic criteria.

Dental crowding is a condition where teeth of an arch are not in the ideal arrangement. This condition is commonly seen in permanent dentition but is not commonly in primary dentition. (Bansal *et al.*, 2013) Crowding occurs when there is disproportion in arch length, size and tooth dimensions. Problems due to crowding is mostly food and debris accumulation leading to increased incidence of caries and calculus (Fejerskov and Kidd, 2009; Majid and Abidia, 2015). Periodic maintenance of oral hygiene is vital to maintain good oral health in patients with crowding. Regular dental visits every 6 months are needed to diagnose any condition early. Plaque and calculus in inaccessible areas can be removed by scaling, however orthodontic management will be a comprehensive solution to improve oral hygiene in patients with crowding (Barnes *et al.*, 2005). In the 1980s, a comprehensive approach to study the psychological impact of oral disease was growing (Prasad and Hassan, 2011) (Laskin, 1971) (Lindauer *et al.*, 2007) Since then, there has been growing recognition of quality of life and oral health as an integral part of health. (Lindauer *et al.*, 2007; Tüfekçi *et al.*, 2009) In order to facilitate further research a study was conducted to assess the oral health status of patients reporting with generalised crowding of teeth. In patients with crowding, maintaining a complete oral hygiene is a challenge due to a common problem of lack of accessibility to clean interproximally. Crowding also leads to food accumulation and impaction at certain areas leading to poor oral hygiene.

It was also claimed that in patients with severe to moderate crowding, there was a significant increase in plaque index and gingival index scores (6). It was proved that the odds of caries in patients with crowding was higher when compared to patients with ideal dentition with regular oral hygiene habits (Hafez *et al.*, 2012) (Ingervall, Jacobsson and Nyman, 1977). Previously our team had conducted numerous clinical trials (Sivamurthy and Sundari, 2016; Felicita, 2017a, 2018; Samantha *et al.*, 2017; Felicita and Sumathi Felicita, 2018), lab studies (Kumar *et al.*, 2011; Dinesh *et al.*, 2013; Kamisetty *et al.*, 2015; Krishnan, Pandian and Kumar S, 2015; Rubika, Sumathi Felicita and Sivambiga, 2015; Viswanath *et al.*, 2015; Felicita, 2017b; Vikram *et al.*, 2017) and other studies (Felicita, Chandrasekar and Shanthasundari, 2012; Jain, Kumar and Manjula, 2014) over the past 5 years. A study also claimed increased plaque index in patients with dental crowding (Szyszka-Sommerfeld and Buczkowska-Radlińska, 2010). In this area research evidence is sparse

and most studies were done 4-5 years back so we sought to conduct this study. The aim of the study was to assess the oral health status in patients with crowding of the dental arches.

## **MATERIALS AND METHODS**

### ***Study design:***

This retrospective study was conducted in a university setting to evaluate the oral health status of patients crowding for a period of 10 months from June 2019 to March 2020. The retrospective study was carried out with help of digital case records of 705 patients who reported to the department for orthodontic therapy. Oral hygiene status of patients were calculated based on oral hygiene index scores. According to the index, scores of 0-1.2 were interpreted as good, 1.2-3 as fair and  $>3$  as poor. Since it is a retrospective study, carried out using digital case records, no informed consent was required from the patient. Ethical clearance to conduct this study was obtained from the Institutional Review Board of the hospital with the following ethical approval number - SDC/SIHEC/2020/DIASDATA/0619-0320.

### ***Inclusion and exclusion criteria:***

The inclusion criteria was all patients who reported with crowding as a chief complaint. The exclusion criteria was any incomplete data that wasn't recorded properly. The patient records were reviewed and analysed. Patients of all age groups were included in this study. Collected data was cross verified using photos and case sheets. All data was collected and tabulated methodically.

### ***Data Tabulation:***

**Records of 705** patients who reported for orthodontic treatment were analysed. From these records the records of patients with crowding were then segregated. Only patients between the age of 10-35 were included in the study. The final sample consisted of 536 patients who had crowding of which 359 were males and 176 were females. The parameters tabulated include, age, gender, presence of crowding and oral hygiene status of the patients.

### ***Statistical Analysis***

The collected data was validated, tabulated and analysed with IBM SPSS software [Version 20: IBM Corporation NY USA] and results were obtained. Descriptive statistics was done to calculate the oral health status of patients with crowding. Chi Square tests were carried out using age and gender as independent variables and oral hygiene index scores as Dependent variables. P value  $>0.05$  was considered statistically not significant. Pearson chi square test was used to identify any significant level of association, significance level was set at 0.05

## **RESULTS AND DISCUSSION**

Among the study population, 67.1% of the patients were males and 32.9% patients were females (Figure 1). In this study, a total of 536 patients were studied out of which majority of the patients belonged to 20-25 years of age that is around 30.84% followed by 23.74% of patients belonged to the age group of 25-30 (Figure 2). Chi square tests were done to analyse the gender

and age association of patients with crowding and their oral hygiene status. Gender association of patients with crowding and their oral hygiene status showed both males and females to have good to fair oral hygiene.  $p$  value -0.182. Out of the male population (359), oral hygiene status was good in 185, fair in 155 and poor in 39 and in the females (176), was good in 93, fair in 71 and poor in 12. (Figure 3). Age association of patients with crowding and their oral hygiene status shows that in the age group of 15-20 years, the percentage of the population with good oral hygiene was relatively less than all other age groups.  $p$  value - 0.031. Good to fair status was mostly predominant in patients with crowding and the difference between various age groups was statistically significant. (Figure 4).

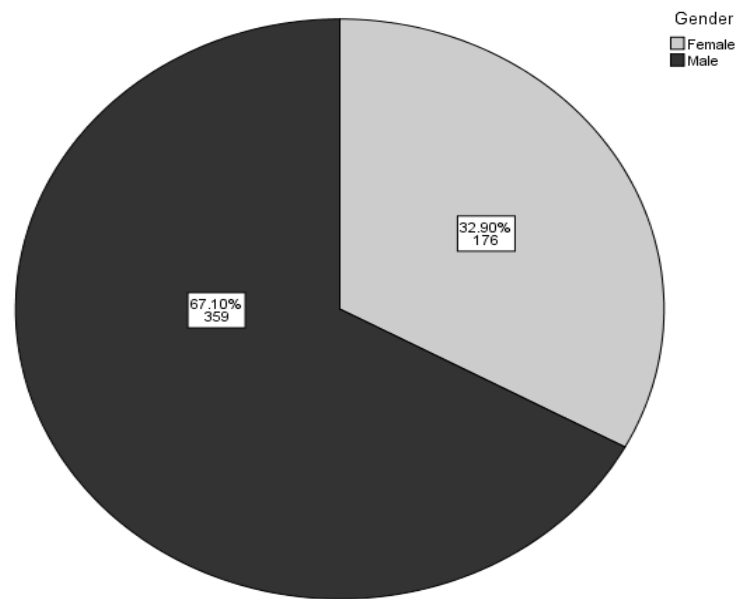
From the results of the study, it can be inferred that most of the patients tend to have a fair oral hygiene status which is most commonly due to improper access while brushing in certain areas. This over a period of time may lead to further periodontal implications with age. According to Mangoury et al (El-Mangoury, Gaafar and Mostafa, 1987), a sample of patients with crowding was assessed before and after prophylaxis. Based on the results following conclusions were made. Increased gingival and plaque index scores were seen in the presence of crowding and these scores failed to come back to its original value before prophylaxis. Radinska et al (Buczkowska-Radlinska, Szyszka-Sommerfeld and Wozniak, 2012) claimed most patients had poor oral hygiene due to crowding, also claimed that they are more susceptible to dental caries and plaque accumulation owing to the difficulty in cleaning the teeth. Apart from the studies like this, there are certain studies that oppose the result that crowding does not predispose to poor oral health.

Hafez et al (Hafez *et al.*, 2012) and Szyszka et al (Szyszka-Sommerfeld and Buczkowska-Radlińska, 2010) claimed that there was no concrete evidence linking poor health to dental crowding. Hence, a variety of articles regarding this topic give mixed conclusions. Results of the current study show fair oral hygiene status among patients with crowding probably due to areas of inaccessibility. Similar to most earlier studies there was increased plaque and debris deposition however poor oral hygiene wasn't common as seen in certain studies (Buczkowska-Radlinska, Szyszka-Sommerfeld and Wozniak, 2012; Hafez *et al.*, 2012). Being a highly debated topic, there is no clear consensus regarding whether crowding pre-disposes to poor oral health.

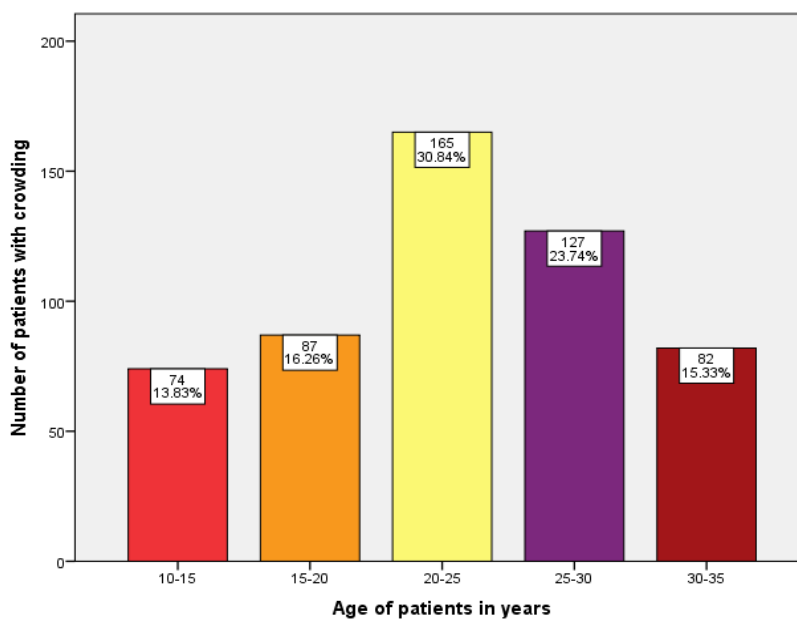
The main limitation of the study is that since it's a single center study it doesn't represent all the different ethnic groups of the society and hence it cannot be generalised for a large population. Conducting this study on a more diverse population may lead to a better understanding of the topic.

#### ***Future scope :***

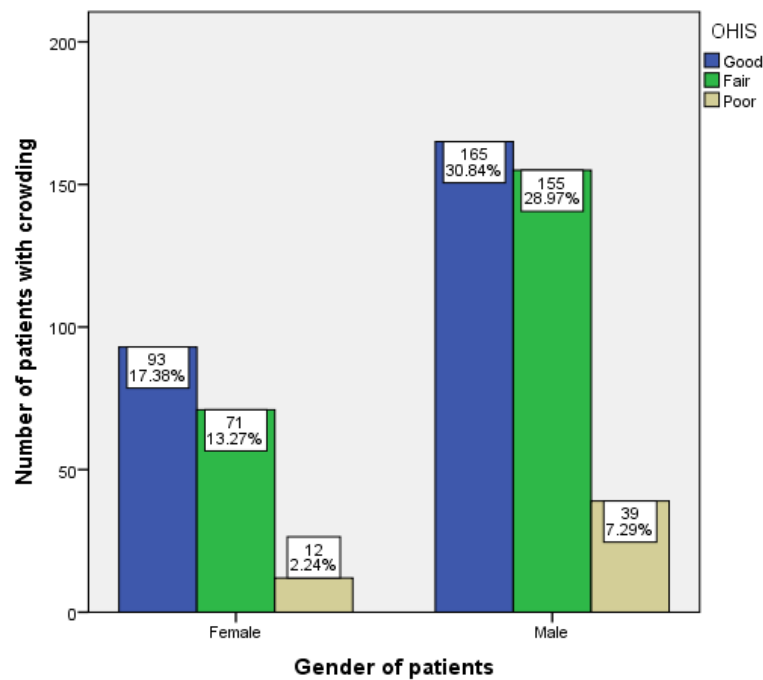
The study can provide more efficient clinical diagnosis and treatment planning in order to improve the quality care provided to patients.



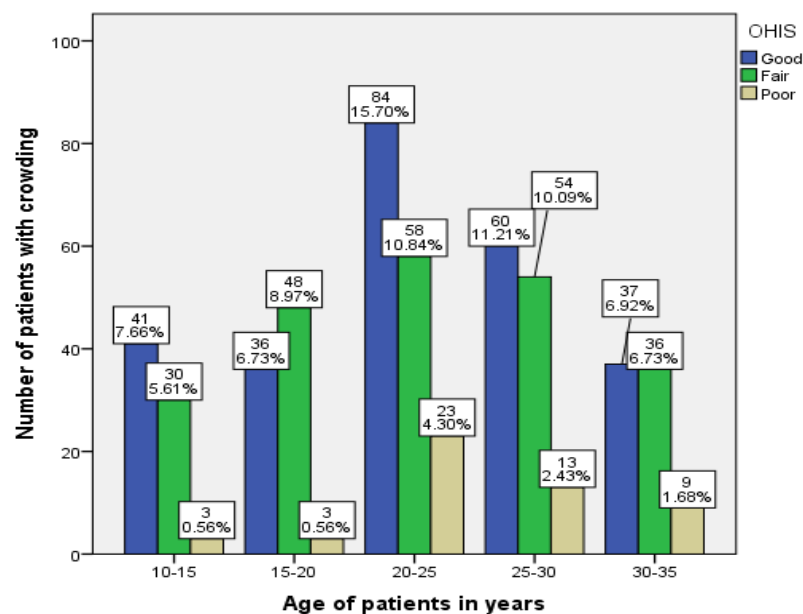
**Figure 1:** Pie chart depicting the gender distribution in patients with crowding. Majority of the patients (67.1%) were males and only 32.9% patients were females. This could also be attributed to the unequal distribution of the sample population.



**Figure 2:** Bar chart depicting the age distribution of patients with crowding. X axis represents the age of patients in years. Y axis represents the number of patients with crowding. Majority of the patients (30.84%) belonged to 20-25 years and the least numbers (13.83%) were noted in the age group of 10-15 years.



**Figure 3:** Bar chart depicting the gender association between oral hygiene status in patients with crowding. The X axis depicts the gender Y axis represents the number of patients with crowding. Good (Blue) to fair (Green) status was mostly predominant seen in patients with crowding. (Chi-square test p value - 0.182 ( $>0.05$ , hence statistically not significant)).



**Figure 4:** Bar chart depicting the age association between oral hygiene status in patients with crowding. X axis depicts age groups. Y axis represents the number of patients with crowding. A Good oral hygiene status was mostly predominant in patients with crowding and the difference between various age groups was statistically significant. (Chi-square test p value - 0.031 ( $<0.05$ , hence statistically significant)).

## CONCLUSION

Within the limitations of the study, the oral hygiene status was good to fair in patients with crowding. Association between gender and oral hygiene status in patients with crowding was not significant. In the age group of 20-25 years, the percentage of the population with good oral hygiene was more than all other age groups. Motivating the patients with adequate information about oral hygiene maintenance and the need for correction of crowding in moderate to severe cases can aid in maintaining the oral health of the individual.

## CONFLICT OF INTEREST

The authors have no conflict of interest.

## AUTHOR CONTRIBUTIONS

Suhas Manoharan carried out the retrospective study, planning the study design, collection and analysis of data and drafted the manuscript. Aravind Kumar S aided in conception of the topic, supervision and appraisal of the manuscript.

## ACKNOWLEDGEMENT

The study was supported by Saveetha Dental College and Hospitals who provided insights and expertise that greatly assisted the study.

## REFERENCES

- Bansal, V. et al. (2013) 'Tooth size in crowded and spaced dentition among western Uttar Pradesh population: a biometric study', *International Journal of Scientific Study*, 1(03), pp. 81–88.
- Barnes, C. M. et al. (2005) 'Comparison of irrigation to floss as an adjunct to tooth brushing: effect on bleeding, gingivitis, and supragingival plaque', *The Journal of clinical dentistry*, 16(3), pp. 71–77.
- Bishara, S. E. et al. (1996) 'Changes in the dental arches and dentition between 25 and 45 years of age', *The Angle orthodontist*. angle.org, 66(6), pp. 417–422.
- Buczkowska-Radlinska, J., Szyszka-Sommerfeld, L. and Wozniak, K. (2012) 'Anterior tooth crowding and prevalence of dental caries in children in Szczecin, Poland', *Community dental health*. cdhjournal.org, 29(2), pp. 168–172.
- Dinesh, S. P. S. et al. (2013) 'An indigenously designed apparatus for measuring orthodontic force', *Journal of clinical and diagnostic research: JCDR*, 7(11), pp. 2623–2626.
- El-Mangoury, N. H., Gaafar, S. M. and Mostafa, Y. A. (1987) 'Mandibular anterior crowding and periodontal disease', *The Angle orthodontist*, 57(1), pp. 33–38.
- Fejerskov, O. and Kidd, E. (2009) *Dental Caries: The Disease and Its Clinical Management*. John Wiley & Sons.
- Felicita, A. S. (2017a) 'Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction--A case report', *The Saudi dental journal*. Elsevier, 29(4), pp. 185–193.

- Felicita, A. S. (2017b) 'Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach', *Dental press journal of orthodontics*. SciELOBrasil, 22(5), pp. 47–55.
- Felicita, A. S. (2018) 'Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor--The sling shot method', *The Saudi dental journal*. Elsevier, 30(3), pp. 265–269.
- Felicita, A. S., Chandrasekar, S. and Shanthasundari, K. K. (2012) 'Determination of craniofacial relation among the subethnic Indian population: a modified approach - (Sagittal relation)', *Indian journal of dental research: official publication of Indian Society for Dental Research*. *ijdr.in*, 23(3), pp. 305–312.
- 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.
- Hafez, H. S. et al. (2012) 'Dental crowding as a caries risk factor: a systematic review', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*. Elsevier, 142(4), pp. 443–450.
- Ingervall, B., Jacobsson, U. and Nyman, S. (1977) 'A clinical study of the relationship between crowding of teeth, plaque and gingival condition', *Journal of clinical periodontology*, 4(3), pp. 214–222.
- Jain, R. K., Kumar, S. P. and Manjula, W. S. (2014) 'Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch', *Journal of clinical and diagnostic research: JCDR*. *ncbi.nlm.nih.gov*, 8(7), pp. ZC21–4.
- Kamisetty, S. K. et al. (2015) 'SBS vs Inhouse Recycling Methods-An Invitro Evaluation', *Journal of clinical and diagnostic research: JCDR*. *ncbi.nlm.nih.gov*, 9(9), pp. ZC04–8.
- Krishnan, S., Pandian, S. and Kumar S, A. (2015) 'Effect of bisphosphonates on orthodontic tooth movement-an update', *Journal of clinical and diagnostic research: JCDR*. *ncbi.nlm.nih.gov*, 9(4), pp. ZE01–5.
- Kumar, K. R. R. et al. (2011) 'Depth of resin penetration into enamel with 3 types of enamel conditioning methods: A confocal microscopic study', *American Journal of Orthodontics and Dentofacial Orthopedics*, pp. 479–485. doi: 10.1016/j.ajodo.2010.10.022.
- Laskin, D. M. (1971) '9 Evaluation of the Third Molar Problem', *The Journal of the American Dental Association*. Elsevier, 82(4), pp. 824–828.
- Lindauer, S. J. et al. (2007) 'Orthodontists' and surgeons' opinions on the role of third molars as a cause of dental crowding', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*. Elsevier, 132(1), pp. 43–48.
- Majid, Z. S. A. and Abidia, R. F. (2015) 'Effects of malocclusion on oral health related quality of life (OHRQoL): A critical review', *European Scientific Journal*. *European Scientific Journal*, 11(21).
- Prasad, K. and Hassan, S. (2011) 'Influence of third molars on anterior crowding-Revisited', *J Int Oral Health*. *ispcd.org*, 3(3), pp. 37–40.



- Rubika, J., Sumathi Felicita, A. and Sivambiga, V. (2015) 'Gonial Angle as an Indicator for the Prediction of Growth Pattern', *World Journal of Dentistry*, pp. 161–163. doi: 10.5005/jp-journals-10015-1334.
- Samantha, C. et al. (2017) 'Comparative Evaluation of Two Bis-GMA Based Orthodontic Bonding Adhesives - A Randomized Clinical Trial', *Journal of clinical and diagnostic research: JCDR*. [ncbi.nlm.nih.gov](https://ncbi.nlm.nih.gov), 11(4), pp. ZC40–ZC44.
- Sivamurthy, G. and Sundari, S. (2016) 'Stress distribution patterns at mini-implant site during retraction and intrusion—a three-dimensional finite element study', *Progress in orthodontics*. Springer, 17(1), p. 4.
- Szyszkka-Sommerfeld, L. and Buczkowska-Radlińska, J. (2010) 'Influence of tooth crowding on the prevalence of dental caries. A literature review', in *Annales Academiae Medicae Stetinensis*. [europepmc.org](https://europepmc.org), pp. 85–88.
- Tüfekçi, E. et al. (2009) 'Opinions of American and Swedish orthodontists about the role of erupting third molars as a cause of dental crowding', *The Angle orthodontist*. [angle.org](https://angle.org), 79(6), pp. 1139–1142.
- Vikram, N. R. et al. (2017) 'Ball Headed Mini Implant', *Journal of clinical and diagnostic research: JCDR*. [ncbi.nlm.nih.gov](https://ncbi.nlm.nih.gov), 11(1), pp. ZL02–ZL03.
- Viswanath, A. et al. (2015) 'Obstructive sleep apnea: awakening the hidden truth', *Nigerian journal of clinical practice*, 18(1), pp. 1–7.