An Assessment of Complete Denture Changes from Try in to Clinical Insertion- A Retrospective Study

Sai Sandhya.T[1], Mahathi Neralla[2], Suresh Venugopalan[3]

[1]Research Associate, Dental Research Cell, [2]Reader, Department of Prosthodontics,[3]Reader, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, Tamilnadu, India

Abstract

Complete denture is a dental prosthesis that replaces the entire dentition and associated structures of maxilla and mandible. Its Function is to restore esthetics, mastication and speech.Various outcomes in the treatment of complete denture in edentulous patients involve a complex array of different factors which determine the accuracy of complete denture. Due to various reasons complete dentures may encounter changes from trial stage to insertion. This change may occur due to processing or handling .The present study aims to assess the differences in complete denture from try in anterior teeth position to insertion anterior teeth position with regard to midline shift and plane deviation and using chi square test statistical significance was observed. The study was carried out in Saveetha dental college, Chennai, patients data was collected from inhouse digital data bank. The data of documented evidence treated by the undergraduate students were retrieved and analysed for differences. The study reveals that there are incidences which had changes from the try in step to clinical insertion step with regard to anterior teeth.

Key Words: *Complete dentures; anterior plane; facial midline; processing error.*

Introduction

Complete denture deals with the replacement of dentition and its associated structures of maxilla and the mandible.Treating a complete denture patient is an essential resource for general dental practitioners, dental students and laboratory technicians.[1]Various outcomes in the treatment of complete denture in edentulous patients involve a complex array of different factors.[2] Prognosis of the complete denture success depends on developing an occlusion that is compatible with functional movements of the stomatognathic system. Clinically for establishment of ideal occlusion, one of the important factors that help us is the orientation of the occlusal plane. The determination of angulation of the occlusal plane is a vital clinical step in the construction of the complete dentures for the edentulous patients. The correct orientation of the occlusal plane of the complete denture will result in better denture stability. Use of stable complete dentures helps to avoid the transfer of undue stresses to the underlying residual ridges, retardation of their resorption, better aesthetics achievement in natural smile and function of final prosthesis.[3] Midline position of complete dentures is more important and it plays an important role in esthetics.[4] Computer engineered complete dentures are also used.[5] Patient dissatisfaction inadequate retention were the most common complications with computer engineered complete dentures.[6] It is important to establish a harmonious occlusion in a maxillary complete denture opposing natural occlusion.[7] One of the common problems faced in prosthetic dentistry is fracture of maxillary acrylic complete denture.[8] The commonest reason is because

Corresponding Author:
Suresh Venugopalan
Reader, Department of Prosthodontics
Saveetha Dental College and Hospitals
Saveetha Institute of Medical and Technical Sciences (SIMATS). Saveetha University,Chennai, India.
Mail id :suresh@saveetha.com

of great masticatory forces.[9] Poor laboratory techniques, use of porcelain teeth are also other causes for fracture of dentures. [10] The mandibular posture and occlusion should be recorded carefully.[11] At each visit, the soft tissues and the denture fit must be checked.[12] Retention and support of the dentures must be assessed.[13] Before giving for processing , teeth arrangement should be checked properly to avoid deviation.[14] Occlusal stability plays an important role in case of complete dentures , it is obtained by achieving maximum number of tooth contacts during artificial teeth positioning in wax.[15] There are various processing errors that occur during fabrication of complete denture.[16] It includes thickness of denture, separating media, improper ratio of monomer and polymer.[17] Before giving the dentures for processing, the occlusion should be checked.[18] The teeth movement after arrangement should not be present.[19] The movement of teeth during processing of complete dentures disturbs the harmonious occlusal scheme established at the final wax try in stage.There are two main factors responsible for occlusal discrepancies in the processed denture , change in relationship of teeth to master cast during processing as a result of investing procedure, careless packing of acrylic resins in the mould cavity or improper flask closure and wrapage of the denture base due to the inherent strains when the denture is separated from the cast.[20] The aim of the present study is to assess the complete denture from try in anterior teeth position to insertion teeth position.

Materials and Methods

The present study is done by screening the patients digital case sheets. The search for digital case sheets was from june 2019 to february 2020. The records searched close to 4068 reporting to clinics with the complaint of multiple missing teeth in upper and lower arch. The search was narrowed down for edentulous condition in upper and lower arch with documentation evidence at try in stage and insertion stage. The search led to 255 patients' details of both try in and insertion. The digital documentation was evaluated for changes in anterior plane and midline shift from trial stage to insertion stage. The details were screened by 2 expert reviewers. Those undergoing complete denture treatments and with adequate documentation details were involved in the study. This study was done retrospectively to assess at how many instances there are processing errors which tend to deviate from the trial stage. The study included only anterior teeth changes and no other changes with regard to processing error was considered. The scoring was added as try in stage anterior plane or midline shifted as yes or no, and the same parameter with scoring at insertion stage was done. The data was screened and relevant data was subjected to statistical analysis.

Results and Discussion

In the present study , the total sample size obtained is 255 out of which 153 are males and 102 were females i.e. 6 of tl Mor com 241 then ante in 2 inse midl

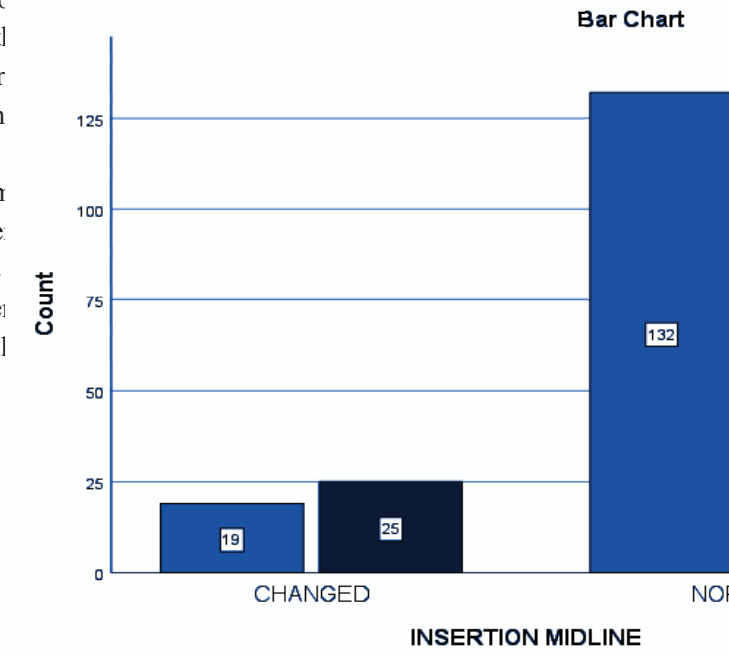

Fig 1- Bar Graph Indicating Changes or Deviation from Trial Stage to Insertion Stage In comparison to Gender. X axis denotes the Presence or absence of changes in denture and Y axis denotes the deviation. Red color represents Female gender and Blue Colour represents Male gender. Chi square association was and found to be statistically significant. Pearson chi square value - 65.392; p value= 0.020; $p<0.05$ which is significant. There are more changes associated with females in comparison to males

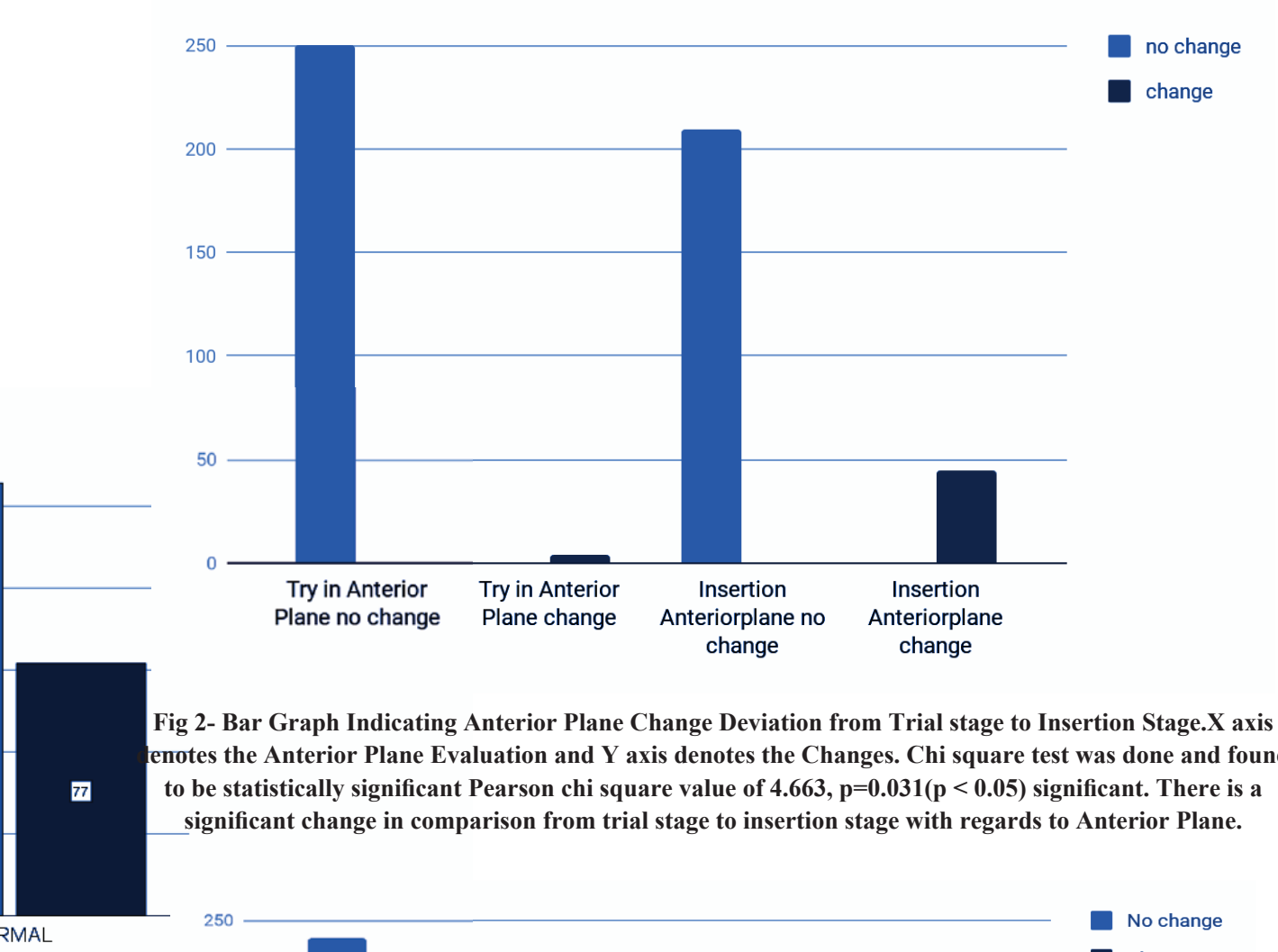

Fig 2- Bar Graph Indicating Anterior Plane Change Deviation from Trial stage to Insertion Stage.X axis denotes the Anterior Plane Evaluation and Y axis denotes the Changes. Chi square test was done and found to be statistically significant Pearson chi square value of 4.663, p=0.031(p < 0.05) significant. There is a significant change in comparison from trial stage to insertion stage with regards to Anterior Plane.

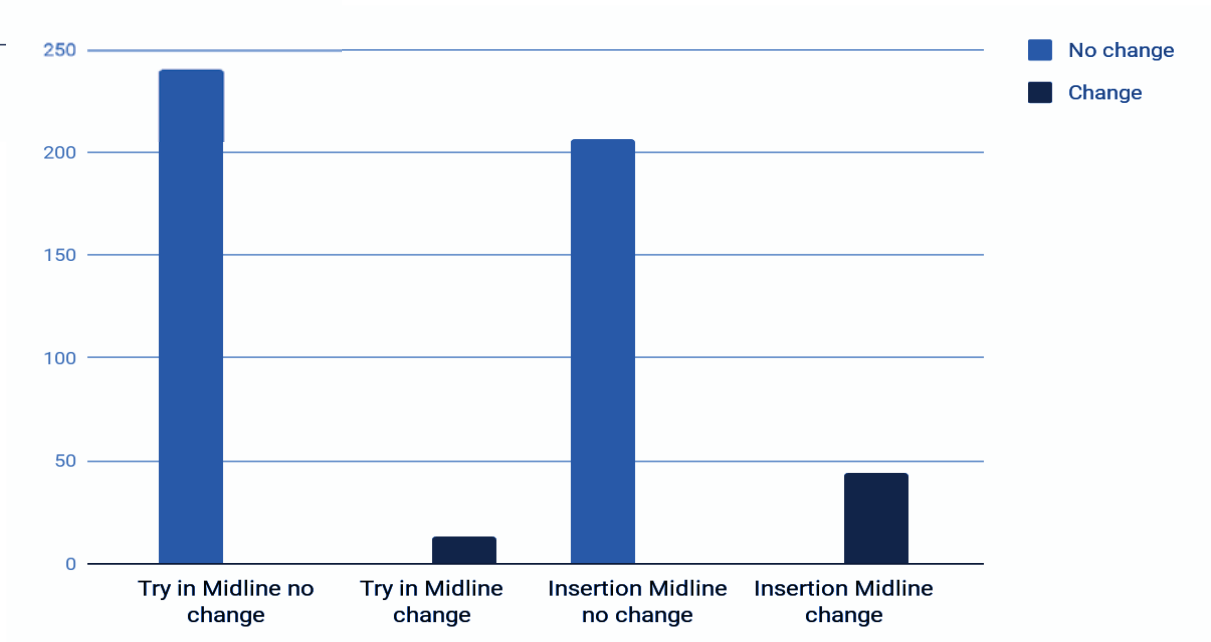

Fig 3- Bar Graph Indicating Mid Line Change Deviation At Trial Stage And At Insertion Stage. X axis denotes the Midline Evaluation and Y axis denotes the Changes. Chi square association was done and found to be significant. Pearson chi square value of 68.815, p= 0.000 (p < 0.05) - significant. Proving that there was a significant change in comparison from trial stage to insertion stage with regard to the Midline.

Komal et al conducted a study on processing induced tooth displacement and occlusal changes in complete denture.In their study, various articles were selected and assessed on the basis of various factors and variables involved in complete denture processing that could contribute to tooth movement.Various factors like flasking and type of investing material used, packing, curing and deflasking , finishing were discussed in the study.[21] Abuzar et al did a study about tooth movement during processing of complete dentures and its relation to palatal form.Tooth movement during processing of acrylic resin complete dentures was investigated in relation to palatal form.Eleven clinical casts were radiographed at four denture processing stages.Seven points were located on each cast. Radiographs were digitized and the images obtained were processed and analysed for precise measurement of tooth movement.A palatal form index was developed with respect to a relationship between tooth movement and palatal form, certain trends were found with varying degree and on the base material and the dimensional changes that occurred during processing.[22] Jamani et al did a study based on the effect of denture thickness on tooth movement during processing of complete dentures.A maxillary cast of a patients was duplicated to obtain 10 identical casts .Base plates were constructed on five casts using 1.25 mm thick wax and other 5 casts by 2.5 mm.Teeth were placed on the ridge of the main cast and TMJ pins was placed vertically upright in each tooth and radiographed before processing.The results showed that there are significant variations in tooth movement between thick and thin dentures.[23] Michelle et al did a study based on the effect of monomer content in monomer polymer ratio on complete denture teeth displacement. In this observation, there were no statistically significant differences between the group with monomer content recommended by the manufacturer groups with 25 % less monomer, in both conventional and microwave polymerisation.[24] Rafael et al did a study based on influence of storage on dimensional changes in maxillary acrylic denture bases and effect on tooth displacement.Thirty maxillary dentures were manufactured and processed using 3 different curing cycles, long , short conventional and microwaved. Distances between fixed points on the teeth were measured and the dentures stored at room temperature for 24 weeks.After storage, the distances are again measured in the dentures then stored in water at 37 degree Celsius for 24 weeks and then reevaluated. Anteroposterior distances demonstrated contraction in all acrylic resins.[25] Emel Dervis did a study about clinical assessment of common patient complaints with complete dentures .The study investigated the relationship between patient complaints with complete dentures and several factors like age, gender, medical status and denture faults.This study included 600 patients who received new dentures were assessed three months after insertion of the denture.Patient complaints were scored according to the answers to the specific questions.It was observed that there is no significant relationship between patient complaints and age, gender and medical status. Statistically significant relationships were observed between denture construction faults or condition of patient's denture bearing mucosa.[26] Van Waas conducted a study based on the influence of clinical variables on patient's satisfaction with complete dentures. It was observed that the effect of the technical quality of complete dentures and the physical condition of the mouth on patients' satisfaction was investigated in 130 patients who received new complete dentures. A moderately positive correlation was found between satisfaction of the patient and quality of the dentures. There was no correlation found between the satisfaction of the patient and the physical condition of the mouth.[27,28] The present study indicates there is an anterior midline shift which is statistically significant $p<0.05$ and aslo anterior plane deviation at insertion in comparison to trial stage, which was statistically significant $p< 0.05$ - chi square test. (Table 1&2) The reasons elicited could vary from packing techniques, excess packing material to curing techniques or even midline shift at trial stage itself. The previous literature cited too gives similar reasons for denture insertion differences. The study gives an insight as to the anterior teeth lateral shift and plane shift seems to be present and that can be more attributed to excess packing material during flasking stages.

Conclusion

The Present retrospective clinical study indicates a definitive change in anterior teeth position from trial stages to insertion stage. The change is associated with complete dentures midline shift and anterior plane and is more commonly observed in female gender.

Acknowledgements : The authors would like to acknowledge the help and support rendered by the department of Prosthodontics and Information Technology of Saveetha Dental College and hospitals for their constant assistance with the research.

Conflict of Interest: None declared.

Source of Funding: Self.

Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

References

1. Driscoll CF, Golden WG. Treating the Complete Denture Patient. John Wiley & Sons; 2020. 312 p.
2. Phoenix RD. Denture base resins: technical considerations and processing techniques. Phillip's Science of Dental Materials 11th ed St Louis. 1996;
3. Raza M, Ayub N, Imran M, Nawaz K, Sami A. Occlusal Plane Evaluation In Dentate Patients For Complete Denture Prosthodontic Practice. J Ayub Med Coll Abbottabad. 2020 Jan;32(1):54–7.
4. Ariga P, Nallaswamy D, Jain AR, Ganapathy DM. Determination of Correlation of Width of Maxillary Anterior Teeth using Extraoral and Intraoral Factors in Indian Population: A Systematic Review [Internet]. Vol. 9, World Journal of Dentistry. 2018. p. 68–75. Available from: http://dx.doi.org/10.5005/jp-journals-10015-1509
5. Jyothi S, Robin PK, Ganapathy D, Others. Periodontal health status of three different groups wearing temporary partial denture. Research Journal of Pharmacy and Technology. 2017;10(12):4339–42.
6. 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 Jun;28(3):289–95.
7. Ganapathy DM, Kannan A, Venugopalan S. Effect of Coated Surfaces influencing Screw Loosening in Implants: A Systematic Review and Meta-analysis [Internet]. Vol. 8, World Journal of Dentistry. 2017. p. 496–502. Available from: http://dx.doi.org/10.5005/jp-journals-10015-1493
8. Subasree S, Murthykumar K, Dhanraj. Effect of Aloe Vera in Oral Health-A Review [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 609. Available from: http://dx.doi.org/10.5958/0974-360x.2016.00116.5
9. Ajay R, Suma K, Ali SA, Kumar Sivakumar JS, Rakshagan V, Devaki V, et al. Effect of Surface Modifications on the Retention of Cement-retained Implant Crowns under Fatigue Loads: An In vitro Study. J Pharm Bioallied Sci. 2017 Nov;9(Suppl 1):S154–60.
10. Ranganathan H, Ganapathy DM, Jain AR. Cervical and Incisal Marginal Discrepancy in Ceramic Laminate Veneering Materials: A SEM Analysis. Contemp Clin Dent. 2017 Apr;8(2):272–8.
11. Ganapathy D, Sathyamoorthy A, Ranganathan H, Murthykumar K. Effect of Resin Bonded Luting Agents Influencing Marginal Discrepancy in All Ceramic Complete Veneer Crowns. J Clin Diagn Res. 2016 Dec;10(12):ZC67–70.
12. Ashok V, Suvitha S. Awareness of all ceramic restoration in rural populations. J Pharm Res [Internet]. 2016; Available from: http://www.indianjournals.com/ijor.aspx?target=ijor:rjpt&volume=9 &issue=10& article= 039 & type=pdf
13. Kannan A, Venugopalan S. A systematic review on the effect of use of impregnated retraction cords on gingiva. Research Journal of Pharmacy and Technology. 2018;11(5):2121–6.
14. Basha FYS, Ganapathy D, Venugopalan S. Oral Hygiene Status among Pregnant Women. Research Journal of Pharmacy and Technology. 2018;11(7):3099–102.
15. Lechner SK, Thomas GA. Changes caused by processing complete mandibular dentures. J Prosthet Dent. 1994 Dec;72(6):606–13.
16. Ashok V, Nallaswamy D, Benazir Begum S, Nesappan T. Lip Bumper Prosthesis for an Acromegaly Patient: A Clinical Report. J Indian Prosthodont Soc. 2014 Dec;14(Suppl 1):279–82.
17. Venugopalan S, Ariga P, Aggarwal P, Viswanath A. Magnetically retained silicone facial prosthesis [Internet]. Vol. 17, Nigerian Journal of Clinical

Practice. 2014. p. 260. Available from: http://dx.doi.org/10.4103/1119-3077.127575

18. Vijayalakshmi B, Ganapathy D. Medical management of cellulitis. J Pharm Res [Internet]. 2016; Available from: http://www.indianjournals.com/ijor.aspx?target= ijor:rjpt& volume= 9& issue=11& article=051
19. Selvan SR, Ganapathy D. Efficacy of fifth generation cephalosporins against methicillin-resistant Staphylococcus aureus-A review. J Pharm Res [Internet]. 2016;
20. Kumar EN, Nanda Kumar E, Suresh V. Assessing the errors during the processing on complete denture [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 2287. Available from: http://dx.doi.org/10.5958/0974-360x.2016.00461.3
21. Ladha K, Tiwari B. Processing-induced Tooth Displacement and Occlusal Changes in Complete Dentures An Overview [Internet]. Vol. 01, Periodontics and Prosthodontics. 2015. Available from: http://dx.doi.org/10.21767/2471-3082.100005
22. Abuzar MAM, Molligoda Abuzar MA, Jamani K, Abuzar M. Tooth movement during processing of complete dentures and its relation to palatal form [Internet]. Vol. 73, The Journal of Prosthetic Dentistry. 1995. p. 445–9. Available from: http://dx.doi.org/10.1016/s0022-3913(05)80073-3
23. Jamani KD, Moligoda Abuzar MA. Effect of denture thickness on tooth movement during processing of complete dentures [Internet]. Vol. 25, Journal of Oral Rehabilitation. 1998. p. 725–9. Available from: http://dx.doi.org/10.1046/j.1365-2842.1998.00300.x
24. Lopes MC, Consani RLX, Mesquita MF, Sinhoreti MAC, Consani S. Effect of monomer content in the monomer-polymer ratio on complete denture teeth displacement. Braz Dent J. 2011;22(3):238–44.
25. Consani RLX, Monteiro VL, Mesquita MF, Consani S. The influence of storage on dimensional changes in maxillary acrylic denture bases and the effect on tooth displacement. Eur J Prosthodont Restor Dent. 2011 Sep;19(3):105–10.
26. Dervis E. Clinical assessment of common patient complaints with complete dentures. Eur J Prosthodont Restor Dent. 2002 Sep;10(3):113–7.
27. van Waas MA. The influence of clinical variables on patients' satisfaction with complete dentures. J Prosthet Dent. 1990 Mar;63(3):307–10.
28. Mousa MA, Lynch E, Kielbassa AM. Denture-related stomatitis in new complete denture wearers and its association with Candida species colonization: a prospective case-series. Quintessence Int. 2020;51(7):554–65.