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Prevalence of Midline Fracture in Mandibular Complete Denture

Sharon Keziah .V[1], Dhanraj Ganapathy[2], Pradeep Kumar. R[3]

[1]Research Associate, [2]H.O.D and Professor, Department of Prosthodontics, [3]Professor, Department of Public Health Dentistry, Saveetha Dental College and hospitals, Saveetha Institute Of Medical and Technical Science, Saveetha University, Chennai 77

Abstract

Patients wearing complete dentures whether both arches or a single mandibular denture pose a great problem of midline fracture. They are more evident in patients who have retained their natural maxillary teeth. Few reports are available on the incidence of mandibular complete denture and its management. This study aims to evaluate the prevalence of midline fractures in mandibular complete denture .This study was designed as a retrospective clinical study. All the patients with Complete dentures who have been treated at the department of Prosthodontics from June 2019-March 2020 were included in the study. A total of 915 patients wearing complete dentures in the age group 40-80 years were included in the study .Various parameters namely midline fracture , denture age and the arch were evaluated.The data was analysed and results were recorded. In the present study , out of 915 only 11 patients reported with complete denture fractures predominantly within 5 years of denture use. Midline fracture was found to be more prevalent in mandibular complete denture than maxillary complete denture.Patients wearing dentures for less than or equal to 5 years had a higher frequency of denture fracture in both maxilla(0.22%) and mandible(0.66%).The prevalence of midline fracture in mandibular complete denture was found to be 17.2%.

Keyword: *Complete denture, Fracture , Midline , Mandible*

Introduction

Complete or partial edentulism is a result of poor oral hygiene [1] , periodontal diseases [2] and dental caries[3] eventually leading to loss of teeth.[4].Most of the individuals wearing complete dentures are elderly patients and a few who have less remaining natural teeth. Complete dentures serve as an artificial replacement of edntulous patients[5]. It not only provides esthetic function but also phonetics as well as masticatory functions in the complete denture wearers.[6] It has been considered a one of the frequent prostheses fabricated for patients with high levels of satisfaction.[3,7]

Various materials have been used for the fabrication of complete dentures. Wood , ivory, bone and alloys have been used in the ancient times[8]. More recently acrylic dentures are the most widely used prosthesis due to their aesthetic value and ease of manipulation.More advanced technology such as CAD-CAM [9]have been developed over the past few years, where the manufacturing process reduces the chair time. [10]Commonly complete denture final insertion takes at least 5 appointments but computerized complete dentures need two clinical appointments ,clinical data collection and second appointment involved placement of computer-engineered complete denture [6,11,12]. A third day at the clinic could be possible for a trial placement. Acrylic material or

Corresponding author
Dhanraj Ganapathy
H.O.D and Professor, Department of Prosthodontics
Saveetha Dental College, Saveetha Institute Of
Medical and Technical Science, Saveetha University
Chennai 77, Tamil Nadu, India
Email : dhanraj@saveetha.com
Telephone number : +91 98415 04523

polymethacrylate is the most common denture material used for the fabrication of partial or complete denture [13,14], due to good esthetic characteristics[13], low water absorption [15]and,adequate strength [16]easy repair and simple processing technique. Disadvantages include porosity,presence of residual monomer ,increased finishing time, brittle and unevenness.[17]

Over the years of denture usage , they become more resistant to fractures , especially if not maintained properly [16,18]. Some denture wearers do not clean their dentures, use them even at night making it more feeble[19]. Many causes of denture fractures have been identified [20], they can be extraoral like accidents from falling or trauma or accidental dropping.[17,21] Or they can be subjected to areas of stress maximally intraorally, improper occlusion, placement of artificial teeth in the buccal slope of,the ridge or against the palate, pressure from opposing natural teeth, poor retention and stability, and resorption of residual ridge, presence of high,frenal attachments, prominent mid palatine suture, palatal or lingual torus, hard or soft tissue,undercut.[22]

The proposed classification system is as follows.[23,24]

- Class I: The fracture line passes through the midline between the central incisors extending to the posterior extension.
- Class II: The fracture line passes through other than midline in a diagonal direction extending to the posterior extension.
- Class III: The fracture line is moon shape passing through the labial or buccal flange.
- Class IV: The fracture line passes through dentoalveolar structure of the denture, involving two or more teeth.
- Class V: The fracture of a part of artificial tooth or separation of a single tooth from denture

The midline fracture is often a result of flexural fatigue. [25]Other causes that could potentially cause a fracture are defects in the denture that can be due to malaligned laboratory procedure.[26] It can be thin denture base, porosity, air bubbles, deep scratches etc. There proposed classifications for denture fracture are as follows.[27] However we are going to base this study on midline fractures that are class 1. The current study was done with the objective to find the prevalence of midline fracture in mandibular complete denture, so that preventive measures can be undertaken to avoid new incidence and improvement in the prosthesis can be made.

Materials and Methods

This is a retrospective study that aims in determining the prevalence of midline fracture in mandibular complete dentures. All the patients wearing complete dentures who were treated at the Department of Prosthodontics, Saveetha Dental College and Hospital ,Chennai between June 2019 and March 2020 were selected for the study. A total of 915 patients were identified.. The approval for this university setting was obtained from the institution's aesthetics board.Case Sheets that were duplicated, non specific samples and filled with incomplete information were eliminated with the verification of photographs. The study was reviewed by 2 reviewers and was cross verified. Data obtained were chronologically recorded and tabulated in the excel sheet. The dependent variables were age, gender, ethnicity and independent variables were presence of midline fractures in mandibular and maxillary complete denture as well as the denture age. The data obtained were further analyzed using Statistical Package for Social Sciences version 22 (SPSS).Percentile, frequency and correlation and association type of analysis were employed in this study.The results were tabulated.Chi square test was used to detect the significance $P<0.005$ was considered statistically significant.

Results and Discussion

Total number of patients wearing Complete dentures were 915 out of which 11 reported with the complaint of fractured denture. The prevalence of midline fracture was found to be 17.2% and mandibular midline fracture was more common than maxillary fractures.

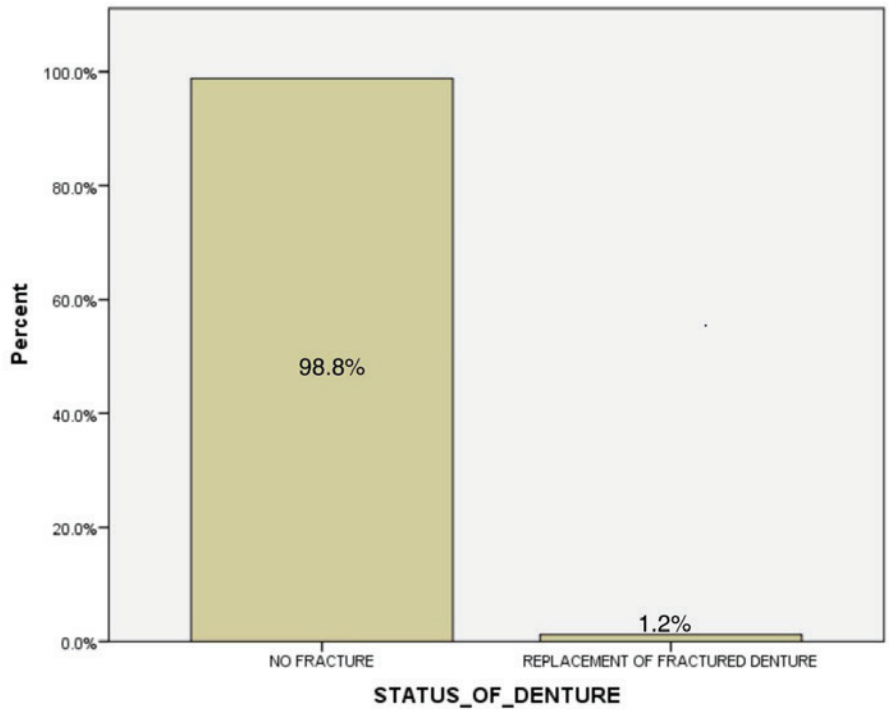

Figure 1 : Represents the status of the complete denture among the edentulous population visiting the hospital. X axis denotes the status of denture as no fracture and replacement of fractures denture and Y axis denotes the percentage .Majority of the patients(98.8%) did not have any complaints with the denture and only a few required replacement of fractured denture(1.2%).

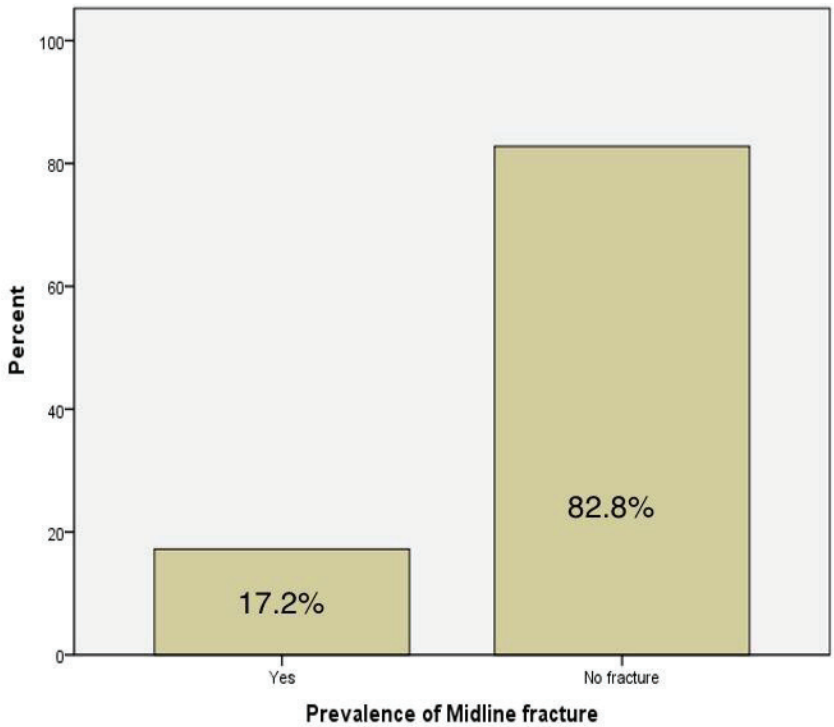

Figure 2 : Shows the prevalence of midline fractures among complete denture wearers. X axis denotes the prevalence of midline fracture and Y axis denotes the percentage . Midline fracture was present in 17.2 % of the population that reported to the hospital .

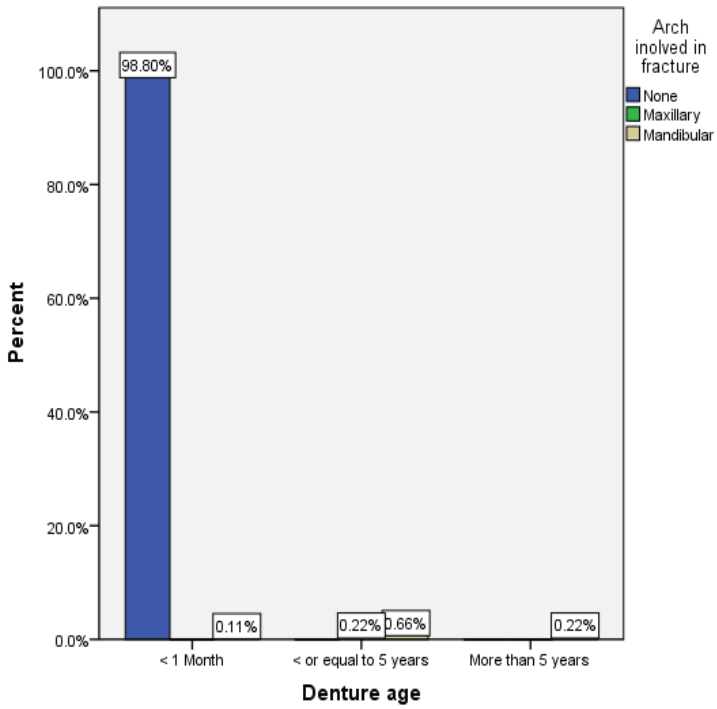

Figure 3: Bar graph represents the association between the Denture age and occurence of midline fracture in maxillary and mandibular denture. X axis represents the Arch of the dentures and Y represents the percentage of denture age worn by the edentulous patients. Blue color indicates that none of the arches were having midline fracture , green and yellow bars represent the maxillary and mandibular arch involving midline fractures respectively. Patients wearing dentures for less than or equal to 5 years had a higher frequency of denture fracture in both maxilla(0.22%) and mandible(0.66%) than those who wore dentures for more than 5 years(mandible, 0.22%) . Chi square test was done and association was found to be statistically significant.P value = 0.001 (<0.05).Mandibular complete denture was found to be more prevalent in the incidence of midline fracture in all the denture age groups.

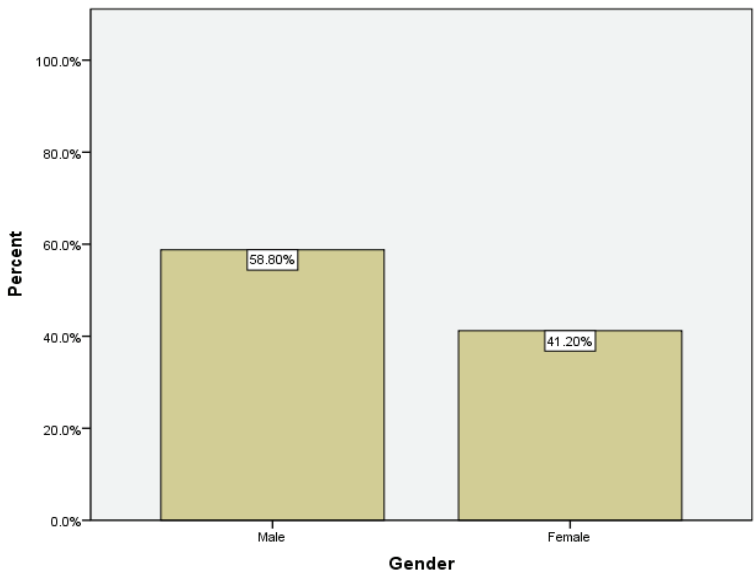

Figure 4: Represents the gender distribution of complete denture wearers. X axis denotes the Gender and Y axis the percentage. Men were more prevalent with 58.8% than women who were 41.2%.

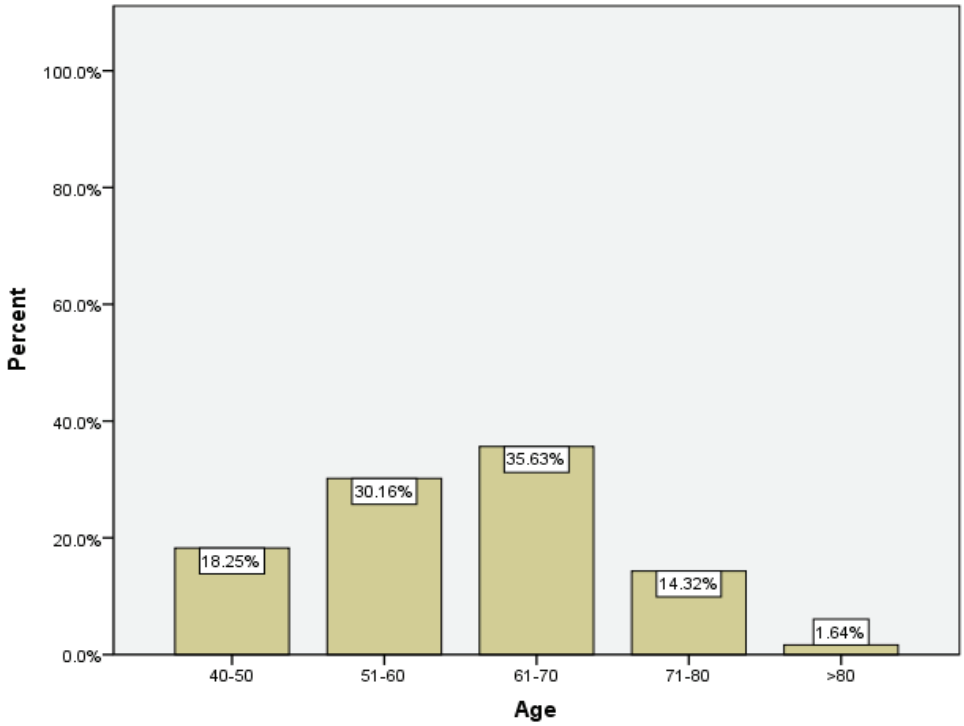

Figure 5: Represents the age distribution of complete denture wearers with X axis representing the age group and Y axis representing the percentage. Most common age groups wearing complete dentures were 61-70 yr olds (35.63%) followed by 51-60(30.16%), 40-50(18.25%), 71-80 (14.32%) and > 80 (1.64%).

Even though many developments have been made in the dental materials, techniques, and fabrication of dentures, fracture of the prosthesis and its incidence still remains as a major problem.Patients who wear complete mandibular denture against maxillary natural teeth or with maxillary complete denture often face the problem of midline fracture in their dentures.[28]

In the present study it reveals that the age group 61-70 years showed the majority of the patients wearing complete dentures reported with midline fractures. However age of the individual does not relate to the occurrence of fractures. Moreover it could be the prevalence of complete denture wearers in that age. According to Raina et al [29]where the demographics of the patients wearing complete denture showed participants > 60 years of age.

Denture age could be an important factor in considering the cause of fractures in complete dentures. In this study , patients wearing complete dentures for less than 5 years were found to be more susceptible to midline fractures. Similar results were obtained from a survey conducted by Ali et al[30] . However ,Shakir et al stated that the majority of the denture fractures occur between 6 to 12 months.[30,311]. Dimensional failures in the laboratory during fabrication of the denture or a weak denture material could be the reason for failure of dentures . It could also be the result of breakdown of the material and fatigue phenomenon.[32]

There was slight male predilection in our study. This result was also similar to the study of Jalil et al , where there was a significant relationship between type of denture fractures with gender P=0.001. The incidence of midline fractures were observed in all of the reported fractures in the mandibular complete dentures and none among the patients wearing maxillary complete dentures. Choudhary et al revealed similar results in their study where class 1(midline fracture)was the most common denture fracture[24].

In the current study, in comparison with maxillary denture, the midline fracture was more prevalent in mandibular complete dentures . The lesser surface area and thickness of the mandibular denture in the

central part could be the reason for the fracture[24,33]. The instability according to Dan et al was the most common cause of lower complete denture midline fractures.[34] On the contrary , Smith has reported maxillary Complete denture midline fracture is usually after 3 years in clinical use. The most commonly affected site could be the incisal notch. It appears that the incisal notch has a significant role in fracture of upper complete denture. Fracture near the midline in the maxillary denture could also contribute to cyclic deformation during masticatory function[33].

Sherry said most of the fractures may be due to accidental dropping the denture. One limitation of this study is the inability to identify the cause of fracture. Poor occlusion , heavy occlusal contact and faulty teeth setting outside the ridge are some of the other causes of denture fracture[35].

Auto Polymerized, heat , light and microwave resins are some of the repairing techniques for fracture of a denture. Auto polymerised resin is considered the most popular due to its easy handling and quick repair due to low cost. Further studies should be conducted to identify the cause of fracture in a larger sample size[36].

Conclusion

This study showed maximum prevalence of midline fracture in mandibular complete denture among the age group 61-70 years. Therefore proper patient education on the handling of newly fabricated dentures should be conducted to reduce accidental mishaps along with definite prosthodontic guidelines and principles should be followed in the construction of the prosthesis to avoid new incidences of midline fractures.

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Conflict of Interest : There is no conflict of interest

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

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