

Analysis of Periodontal Splinting Done in Patients Visiting a Private Dental Institution

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ABSTRACT:

The principle of tooth luxation splinting have been changed since animal and human tests conducted in the early 1970s showed that masticatory stimulus promotes healing of luxated teeth and normally exerted occlusal forces are able to prevent and eliminate resorption cavities on the root surface. It has also been shown that fixation of only one week is enough to achieve the clinical healing of repositioned teeth. Apart from esthetic and hygienic components, present-day demands on tooth fixation techniques also include ease of construction and removal and the use of devices which allow slight movement of the fixed teeth. The study has an institutional study which was conducted in a private institution. The sample size for this study taken was 243 patients. Data regarding all the cases completed between June 2019 to March 2020 were retrieved from the case records of a private dental institution. Data that was retrieved were cross-verified by two reviewers. Data evaluation was done by assessing dental records of various wire and composite splinting done . The data collected was analysed using a Chi-square test, the data was tabulated in excel and the statistics were done in SPSS V20. In medically compromised patients, in patients with hypertension, the most common type of splinting includes provisional followed by temporary and permanent. In systemically healthy patients, most common type of splinting include provisional followed by temporary and permanent splinting, which was most commonly done for the lower anteriors. The most common type of splinting done was found to be provisional splinting done for both medically compromised and systemically healthy patients, which used to stabilise the lower anteriors.

KEYWORDS:Splinting, Wire, Composite, Provisional, Permanent.

INTRODUCTION:

Periodontitis is an inflammatory disease induced by bacterial biofilms that accumulate in the gingival margin and characterized by gingival inflammation, loss of connective tissue attachment and alveolar bone(1). Removal of plaque, calculus, elimination of deep periodontal pockets and occlusal adjustment are treatment options and result in healthy periodontium(2). If left untreated, the continuous loss of the supporting tissues during periodontal disease progression may result in increased tooth mobility, ultimately yielding to tooth drifting and exfoliation (3). Tooth mobility can also be a consequence of occlusal trauma in addition to the periodontal inflammation and attachment loss. From the clinical point of view, it is important to clarify the reason for increased tooth mobility as a result of widened periodontal ligament, reduced height of the supporting tissues or their combination. Tooth mobility is a result of intra-alveolar displacement of the root and usually assessed by exposing the crown of the tooth to a certain force and determining the distance that the crown can be displaced in buccal and/or lingual direction (4).

Assessment of tooth mobility can be performed manually/digitally or with the help of instruments such as periodontometer, periotest, laser vibrometry and photogrammetric measurement method (5). A commonly used device, periotest, measures the reaction of the

periodontium to a defined percussion force that is applied to the tooth and delivered by a tapping instrument. The Periotest values range from -8 to $+50$ where the firm teeth demonstrate values ranging from -8 to $+9$ and mobile ones at a range of 30 to 50 (6). The mobility of a tooth in the horizontal direction is closely dependent on the height of the surrounding supporting bone, the width and quality of the periodontal ligament, and the shape and number of roots present. Mobility could cause occlusal instability, discomfort or pain during function. Occlusal instability could have negative consequences on tooth tissue relationship, including the relationship of the teeth to the opposing dentition that could lead to excessive occlusal forces (7).

The most common indication for periodontal splinting is to improve the prognosis of mobile teeth and patient comfort and provide better control of the occlusion if the anterior teeth are mobile (8). The purpose of dental splinting is to stabilise the tooth for as long as required to ensure that there is no further injury and to protect the attachment apparatus in order to allow the periodontal fibres to regenerate. The requirements of modern tooth splinting state that splints should be capable of direct application without traumatising the teeth and they should help to regain the original position and bring about adequate fixation for the whole immobilization period. Dental splints should neither damage the gingival tissues nor increase the risk of caries. Splints ought to be easy to maintain, they should be aesthetic and not interfere with the occlusion. Periodontal splinting can be done for stabilizing mobile teeth during periodontal surgical therapy, for stabilizing periodontally compromised teeth when any other definitive treatment is not possible for the patients, splinting during or following periodontal therapy can be beneficial for controlling the effects of secondary trauma from occlusion. Patient's psychological and physical well-being can be restored by stabilization of mobile teeth, also it improves the patient's overall comfort and function. Various studies have been conducted under our institution, like in vitro studies (9,10), surveys (11), clinical trials (12–19) and review (20–23). We are focusing now on retrospective studies. The aim of the study is to analyse the wire and composite periodontal splinting done in patients visiting a private dental institution.

MATERIALS AND METHODS:

Study design

The current retrospective study is an institutional based study performed at a private dental institution, in Chennai, India. We analysed the wire and composite periodontal splinting done in patients.

Ethicals

Before scheduling the study, official permission was obtained from the university. The necessary approvals were obtained from the institutional ethical board committee (ethical approval number - SDC/ SIHEC/ 2020/ DIASDATA/ 0619-0320).

Data collection

Inclusion criteria involved both male and female patients under the age group of 17 to 75 years, presence of chronic periodontitis, patients who had undergone wire and composite periodontal splinting, medically compromised as well as systemically healthy patients were included for this study. Exclusion criteria includes patients who had undergone fiber-reinforced composite periodontal splinting. Data collection includes various parameters such as age, gender (male or female), medical history, periodontal diagnosis/type of periodontal disease, type of splints, splinting site. Based on the severity of periodontal disease the patients were categorised into generalised chronic periodontitis and localised chronic periodontitis. Type of splinting was categorised as permanent, temporary and provisional. Splinting site was categorised as maxillary anteriors, mandibular anteriors, both maxillary and mandibular anteriors. The final sample size for this study was 243 patients. The samples were collected from June 2019 to March 2020. All the data was obtained from the Department of Periodontology. All the records in the above mentioned period were verified. All the data collected was verified by a cross examiner to avoid any missing case records. Cases with incomplete data where the patients had not reported back were verified from the concerned patient case sheets or the department and excluded from the study.

Statistical analysis

The data collected was tabulated in Excel and imported to SPSS software. All the data was analysed using SPSS V20, after entering the data in the SPSS software the variables were verified and association was done between the age groups, gender, splinting site and types of splinting. Descriptive statistics were done and test proportion was done. Chi square test was done to assess the association between the variables. P value less than 0.05 was considered to be statistically significant. The results were demonstrated in the form of bar graphs.

RESULTS AND DISCUSSION:

The results of the study are as follows, between the age groups of 51-60 years, around 34.16% of the patients had undergone splinting followed by the age groups of 31-50 years which accounted for 32.92% of the total population study. The age groups of 61-75 years and 17-30 years accounted for 18.11% and 14.81% of the total population study (Figure 1). More males participated in this study (142) accounting for 58.44% of the total population size, whereas females (101) accounted for 41.56% of the total population (Figure 2). In medically compromised patients, the most common medical problem was found to be diabetes (10.29%) followed by hypertension (5.76%). Rest of the patients (83.95%) were diagnosed to be systemically healthy patients with no medical history (Figure 3). Patients in whom maximum splinting was done were most commonly diagnosed as generalised chronic periodontitis accounting for 93.42% of the total population size. The remaining patients were diagnosed as localised chronic periodontitis accounting for 6.58% of the total population size (Figure 4). Most common type of splinting done was found to be provisional (63.37%), followed by temporary (30.45%) followed by

permanent (6.17%) (Figure 5) (24). Splinting was most commonly done in the mandibular anteriors (67.9%) followed by the maxillary anteriors (30.86%) and in both the maxilla and the mandible (1.23%) (Figure 6)(25) .

Figure 7 shows the association between the types of splinting and different age groups. In the age group of 17-30, the most common type of splinting done was provisional(8.23%) followed by temporary (4.53%). In the age group of 31-50 years, the most common type of splinting done was found to be provisional (22.22%) followed by temporary (9.47%). In the age group of 51-60 years, the most common type of splinting done was found to be provisional (22.22%) followed by temporary (9.47%). In the age group of 61-75 years, the most common type of splinting done was found to be provisional (8.23%) followed by temporary (4.53%) (26).

Figure 8 shows the association between types of splinting and gender groups. In females, the most common type of splinting done was found to be provisional (25.57%) followed by temporary (10.29%) and permanent (3.70%). In males, the most common type splinting done was found to be provisional (35.8%) followed by temporary (20.16%) and permanent (2.47%)(27).

Figure 9 shows the association between types of splinting and the splinting site. Periodontal splinting was most commonly done for the mandibular anteriors. The provisional type of splinting was commonly done in the mandibular (42.8%) and the maxillary anteriors (19.75%). In cases of splinting involving both the maxillary and mandibular anteriors, the most common type of splinting was found to be permanent (1.23%) followed by temporary(0.41%) (28).

Tooth mobility is a common sequel to trauma from occlusion and periodontitis. Since teeth are not anchored and connected to the bone by collagenous fibers, they present physiologic mobility. In periodontally healthy teeth, two factors determine mobility namely, the height of supporting tissues and the width of periodontal ligament. Following successful non-surgical and/or surgical periodontal treatment, persistent mobility is regarded as pathological. However, when the remaining periodontal tissues are reduced but the width of the periodontal ligament remains the same as periodontally healthy tooth, it is considered as physiological tooth mobility. Tooth mobility can be reduced by occlusal adjustment and by splinting. Splinting is indicating when increased tooth mobility due to reduced height of periodontal support, is accompanied by chewing discomfort and masticatory dysfunction. From the clinical point of view, the success of supportive periodontal treatment is directly related with personal oral hygiene standard(29). Due to this reason periodontal splinting could greatly improve the chewing comfort, oral hygiene, prognosis and outcome for a patient with severe generalized chronic periodontitis. Another important reason is establishing a stable occlusion that promotes tooth retention and the maintenance of periodontal health (30).

In our study we found that the most common type of splinting was provisional splinting followed by temporary and permanent. Provisional splints are those used for months to several years with a definitive end to the splint therapy. Provisional splints are done to absorb occlusal forces and help to stabilize the teeth for a limited period of time. Temporary splints are usually worn for periods of less than 6 months and it may not be followed by any additional splint therapy. Permanent splints maintain long-term stability of tooth and are usually worn indefinitely and it may be either of removable or fixed types.

In generalised chronic periodontitis patients, the most common type of splinting used was found to be provisional followed by temporary followed by permanent. In localised chronic periodontitis patients, the most common type of splinting was found to be provisional followed by temporary followed by permanent.

In medically compromised patients, in patients with diabetes, the most common type of splinting includes temporary followed by provisional followed by permanent (24). In systemically healthy patients, the most common type of splinting includes provisional followed by temporary and permanent. Splinting was most commonly done for the mandibular anteriors (31).

We compared the association between the age groups, gender, splinting site and types of splinting, we infer that the provisional type of splinting was found to be more in males than in females. Temporary type of splinting was found to be done in more males than females. In males and females, the most common type of splinting done was provisional, followed by temporary and permanent.

Splinting was mainly done for generalised chronic patients and less commonly done in cases of localised chronic periodontitis.

The provisional type of splinting was commonly done in the mandibular anteriors and the maxillary anteriors. In both the mandibular and maxillary anteriors, the most common type of splinting was found to be permanent followed by temporary and permanent which was in consensus with studies that showed that splinted teeth were not significantly at higher risk of tooth than non- splinted teeth, while splinting does not improve the prognosis of periodontally affected teeth, it can assist their retention by reducing their mobility.

In a previous clinical study, periodontal outcome of stabilized mobile teeth with an E-glass fiber (Fiber-Kor) was assessed. In that study, 56 patients were enrolled and results after 10 months were presented where PD values were decreased after the splinting procedure (32). In another clinical study, unidirectional E-glass fiber-reinforced composite resin splints were applied and splinting had a positive effect on PD reduction . In this study, PD values were not changed and this result could be explained by lower baseline PD values (33).

Different methods were described in the literature for measuring tooth mobility. The most commonly used method for mobility and splint stability is the Periotest method. In this study, in order to assess the effect of tooth mobility on splint stability, mobility was measured by Periotest at baseline, immediately splinting, after 6 and 12 months. Also, the intention was to assess the highest limit value of mobility where failure would not occur after splinting (34). Typically, Periotest value changes when measurements are made at different distances from the gingival margin. The overall consensus agrees with the findings of the study. The only study limitations were that it could not be generalised to a larger population. They are usually done in a small sample size. The future scope is to study a larger population. The clinical performance has to be evaluated.

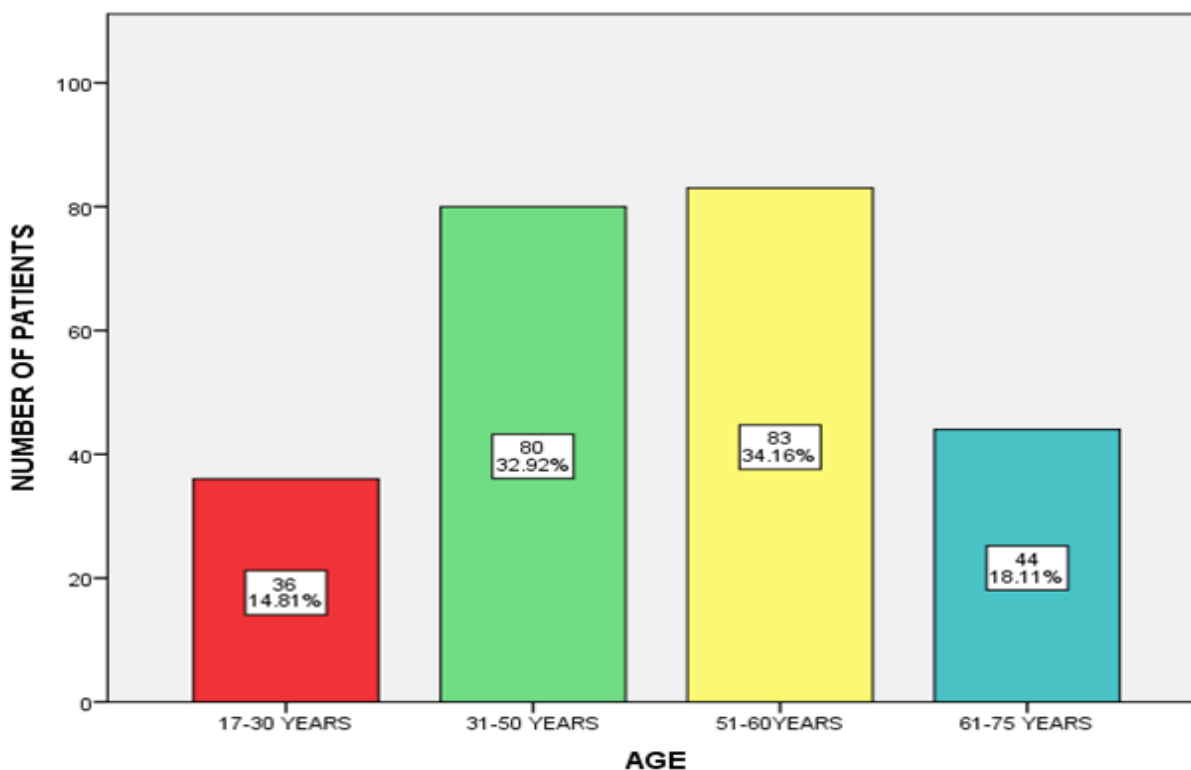


FIGURE 1: This figure shows the age groups of patients who had undergone splinting. Between the age groups of 50-60 years, around 34.16% of the patients had undergone splinting followed by the age groups of 31-50 years which accounted for 32.92% of the total population study. The age groups of 60-75 years and 17-30 years accounted for 18.11% and 14.81% of the total population study.

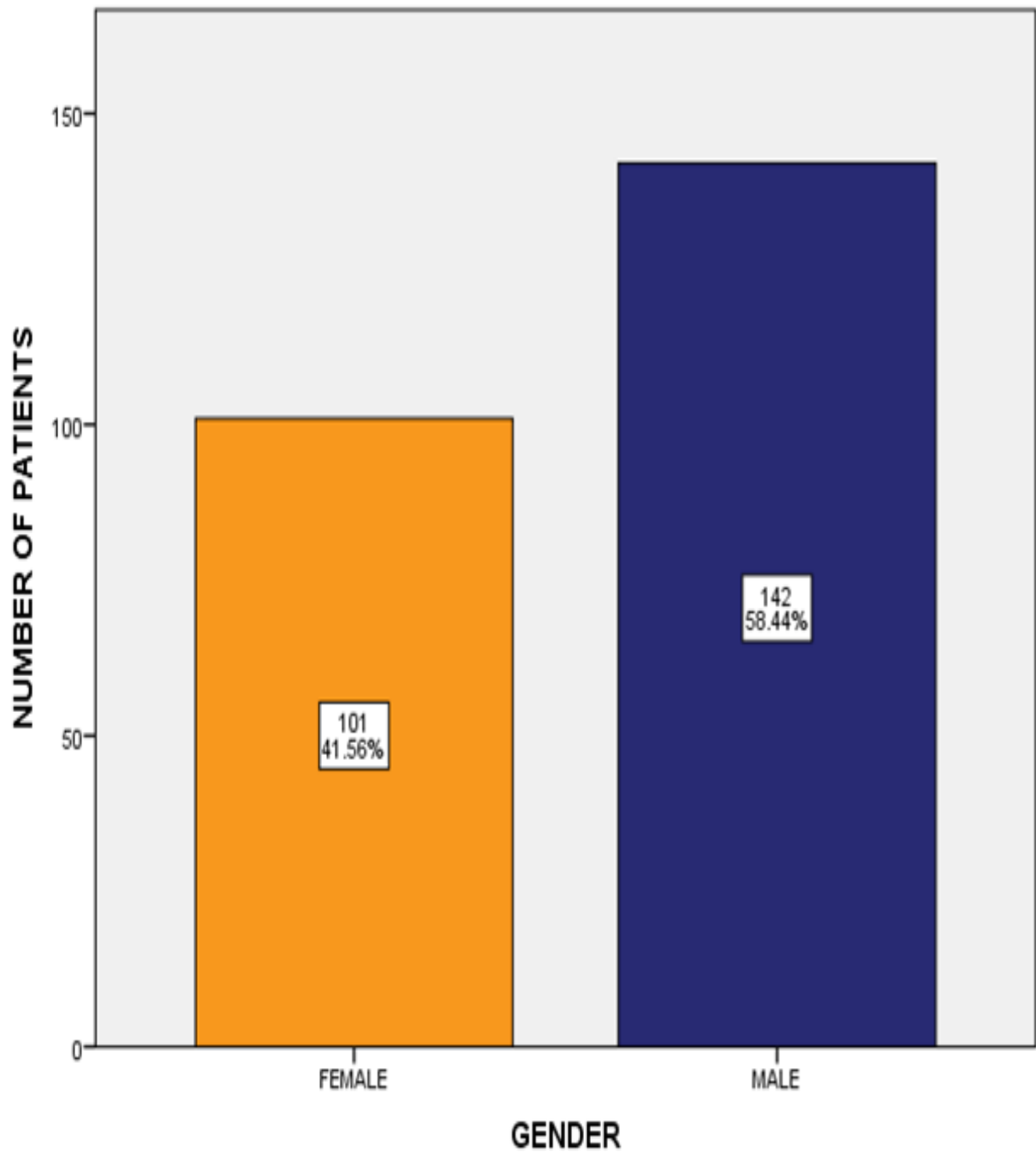


FIGURE 2: This figure shows the gender of patients who had undergone splinting. More males participated in this study (142) accounting for 58.44% of the total population size, whereas females (101) accounted for 41.56% of the total population.

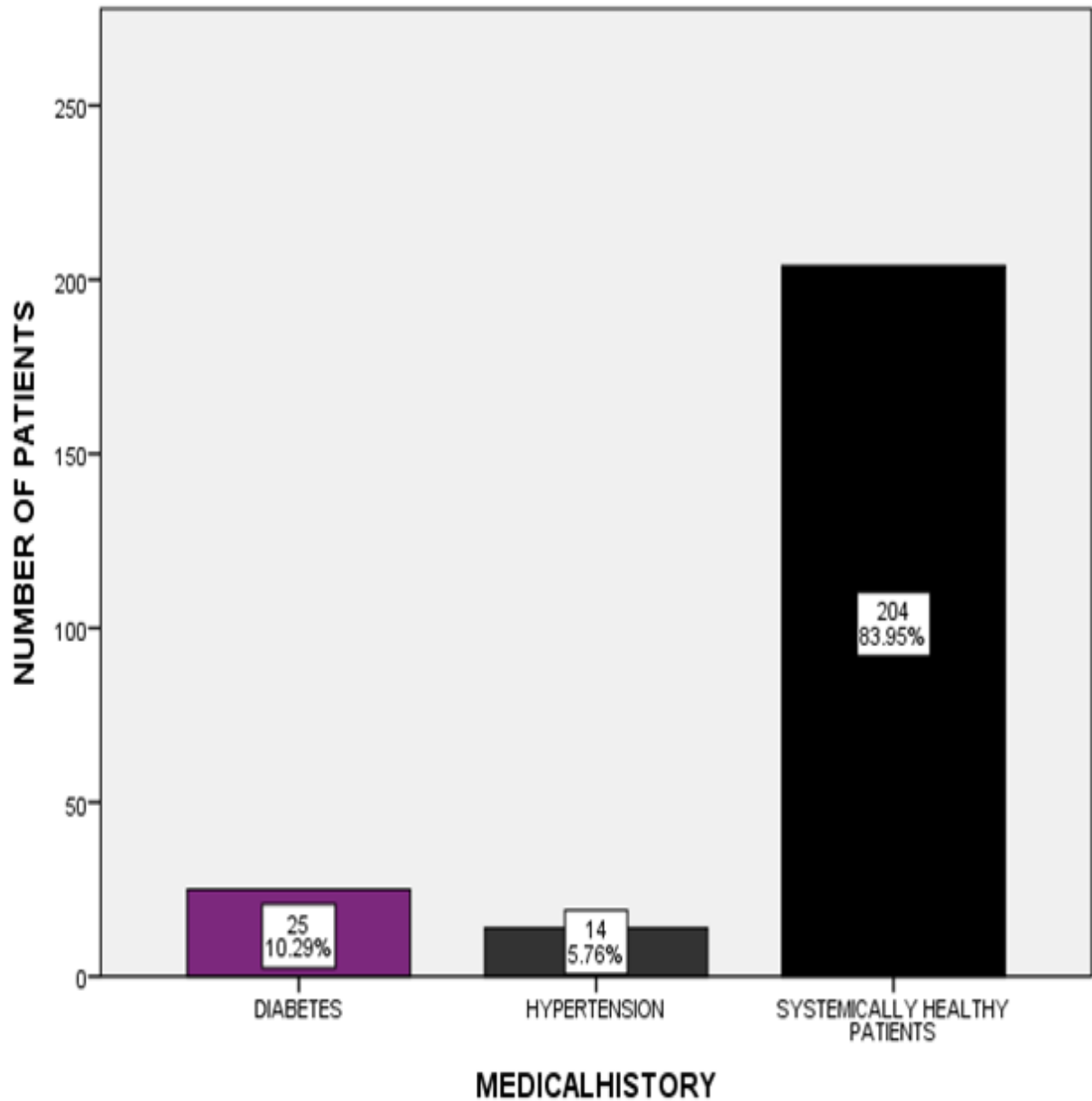


FIGURE 3: This figure shows the medical history of patients who had undergone splinting. In medically compromised patients, the most common medical problem was found to be diabetes (10.29%) followed by hypertension (5.76%). Rest of the patients (83.95%) were diagnosed to be systemically healthy patients with no medical history.

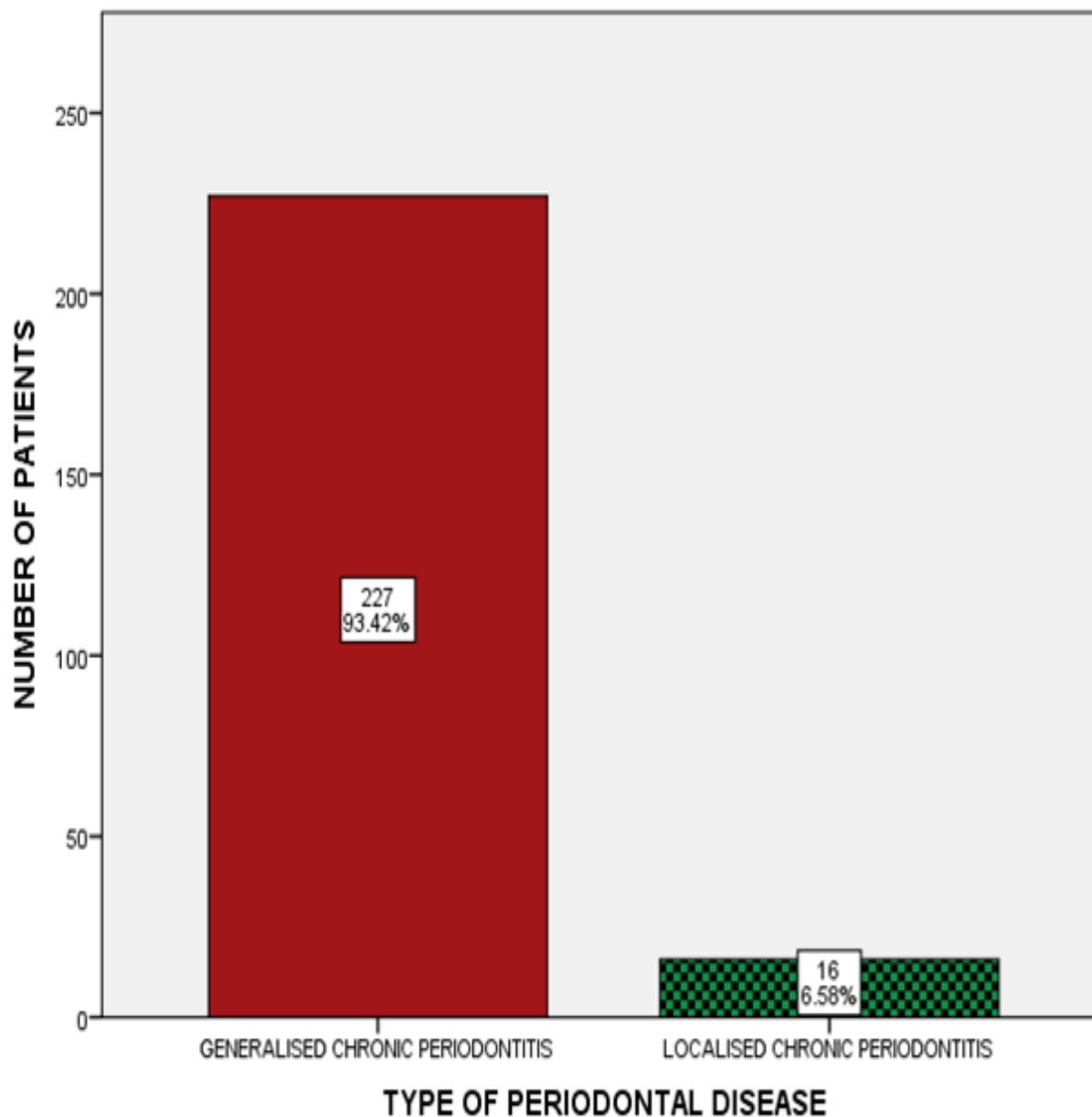


FIGURE 4: This figure shows the type of periodontal disease among patients who have had splinting done. Patients in whom maximum splinting was done were most commonly diagnosed as generalised chronic periodontitis accounting for 93.43% of the total population size. The remaining patients were diagnosed as localised chronic periodontitis accounting for 6.58% of the total population size.

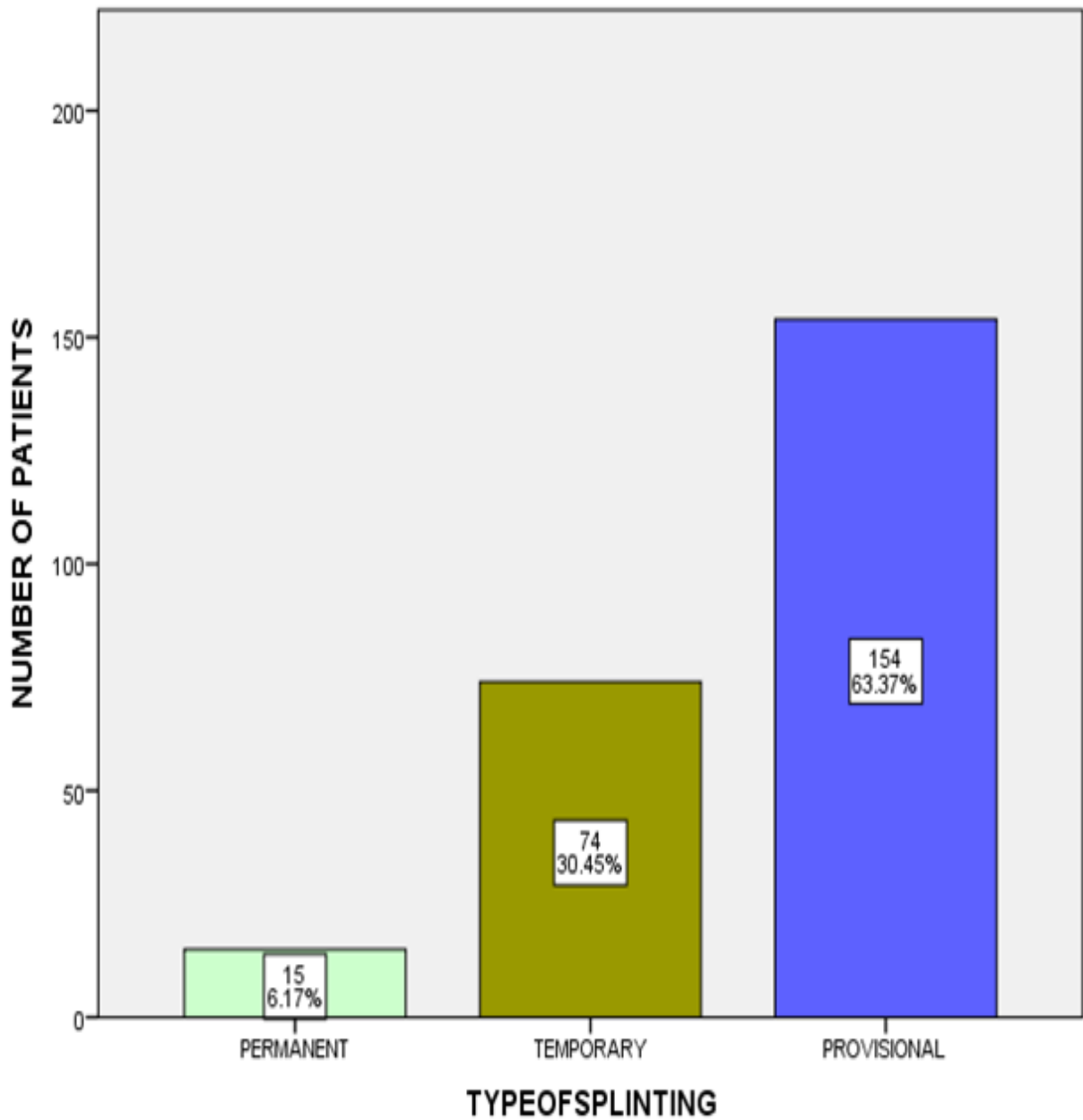


FIGURE 5: This figure shows the type of splinting done in patients. Most common type of splinting done was found to be provisional (63.37%), followed by temporary (30.45%) followed by permanent (6.17%).

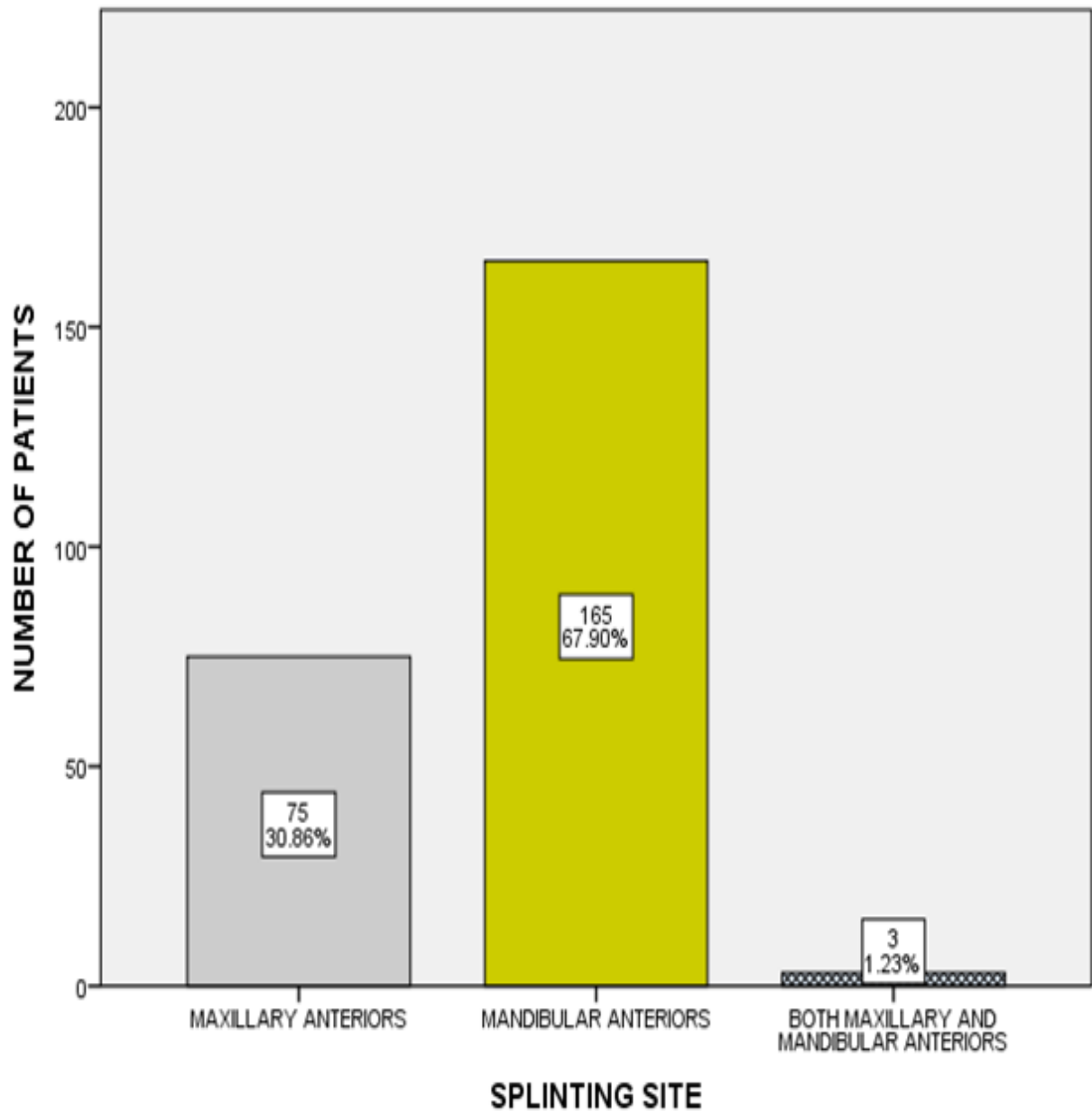


FIGURE 6: This figure shows the splinting site. Splinting was most commonly done in the mandibular anteriors (67.9%) followed by the maxillary anteriors (30.86%) and in both the maxillary and the mandibular anteriors (1.23%).

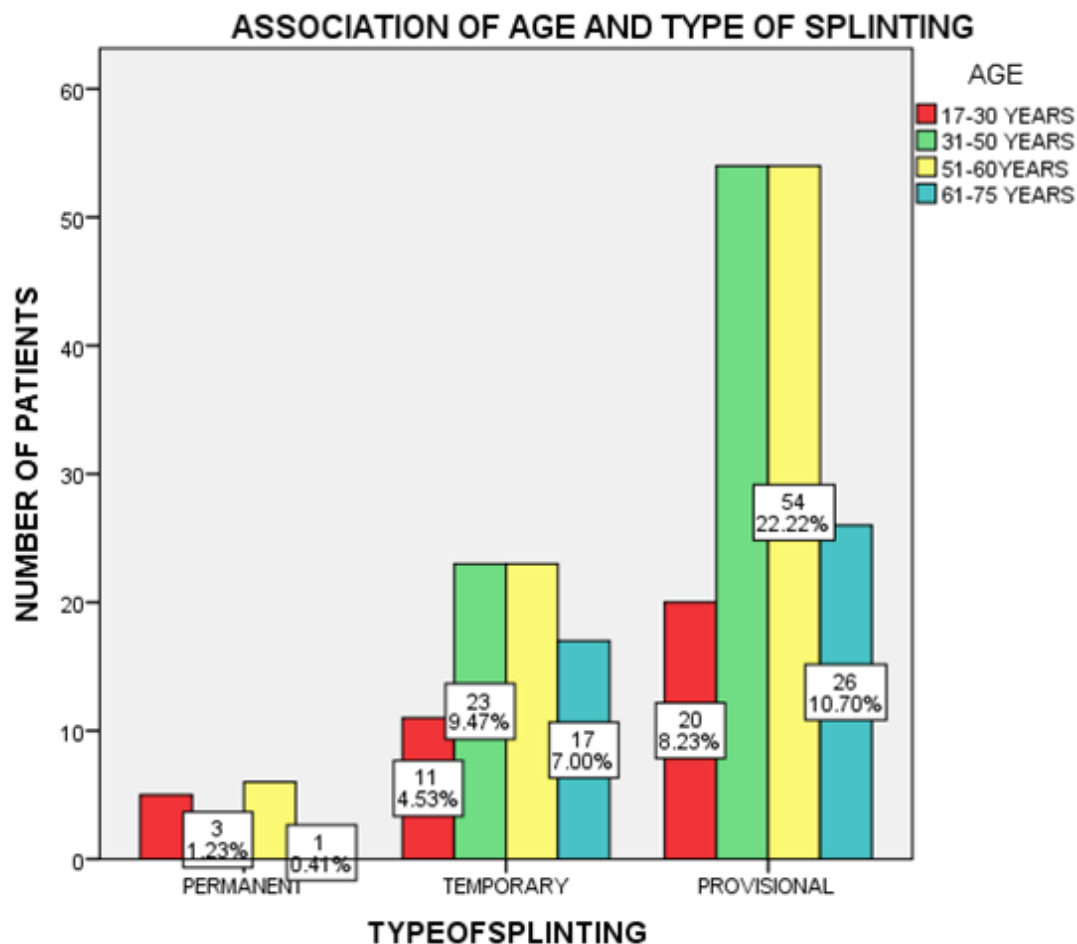


FIGURE 7: This figure shows the association between age and type of splinting, where the red colour denotes the age group of 17-30 years, green denotes the age group of 31-50 years, yellow denotes the age group of 51-60 years followed by blue which denotes the age group of 61-75 years. In the age group of 17-30, the most common type of splinting done was provisional(8.23%) followed by temporary(4.53%). In the age group of 31-50 years, the most common type of splinting done was found to be provisional (22.22%) followed by temporary (9.47%). In the age group of 51-60 years, the most common type of splinting done was found to be provisional (22.22%) followed by temporary (9.47%). In the age group of 61-75 years, most common type of splinting done was found to be provisional (8.23%) followed by temporary (4.53%). P value >0.05 shows no statistically significant association between type of splinting and age. (Chi-square value= 7.443 , p=0.282)

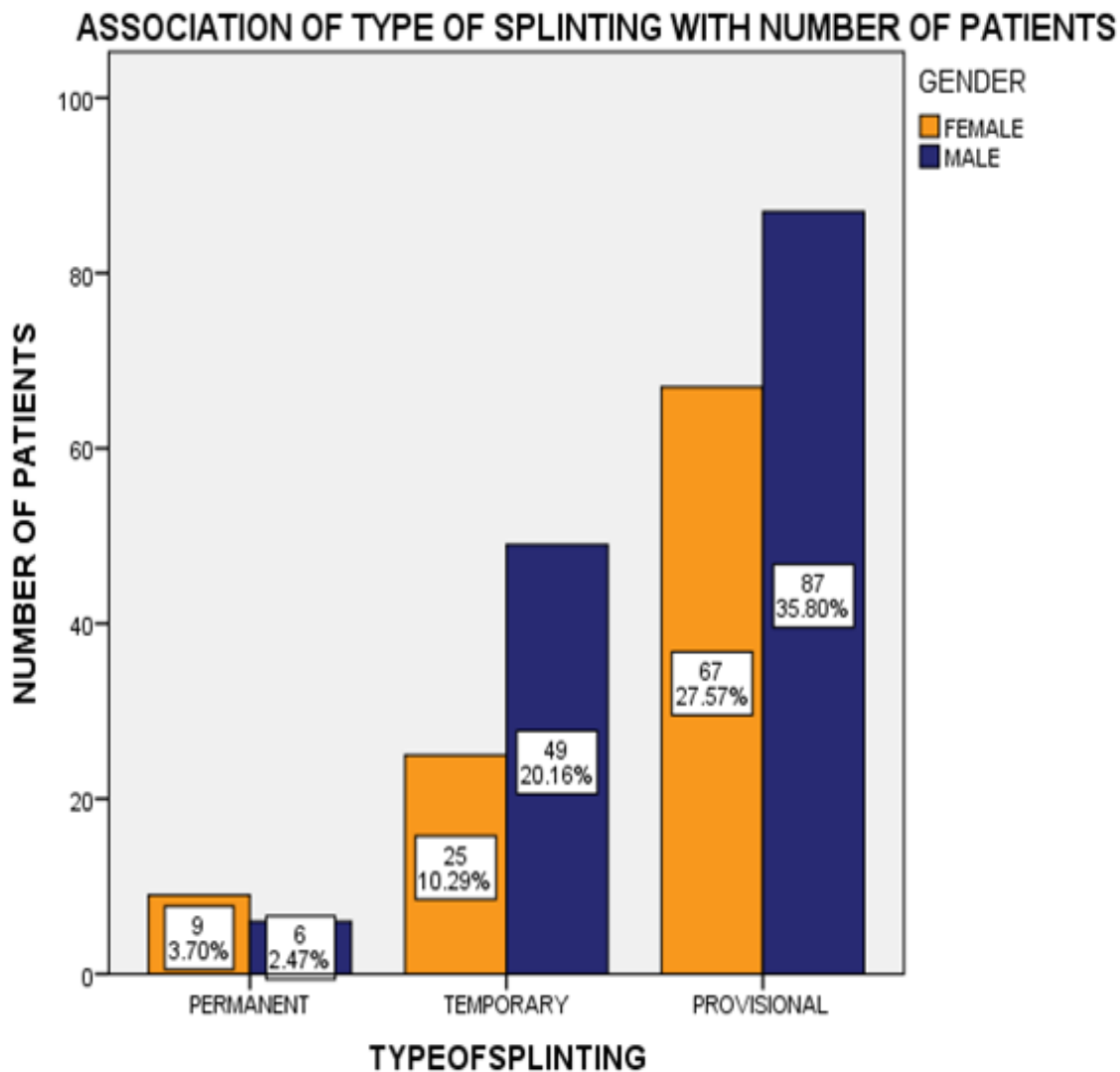


FIGURE 8: This figure shows the association between gender and type of splinting, where the orange colour denotes females and dark blue colour denotes males. In females, the most common type of splinting done was found to be provisional (25.57%) followed by temporary (10.29%) and permanent (3.70%). In males, the most common type splinting done was found to be provisional (35.8%) followed by temporary (20.16%) and permanent (2.47%). P value >0.05 shows no statistically significant association between type of splinting and gender. (Chi-square value= 4.183 , p=0.124).

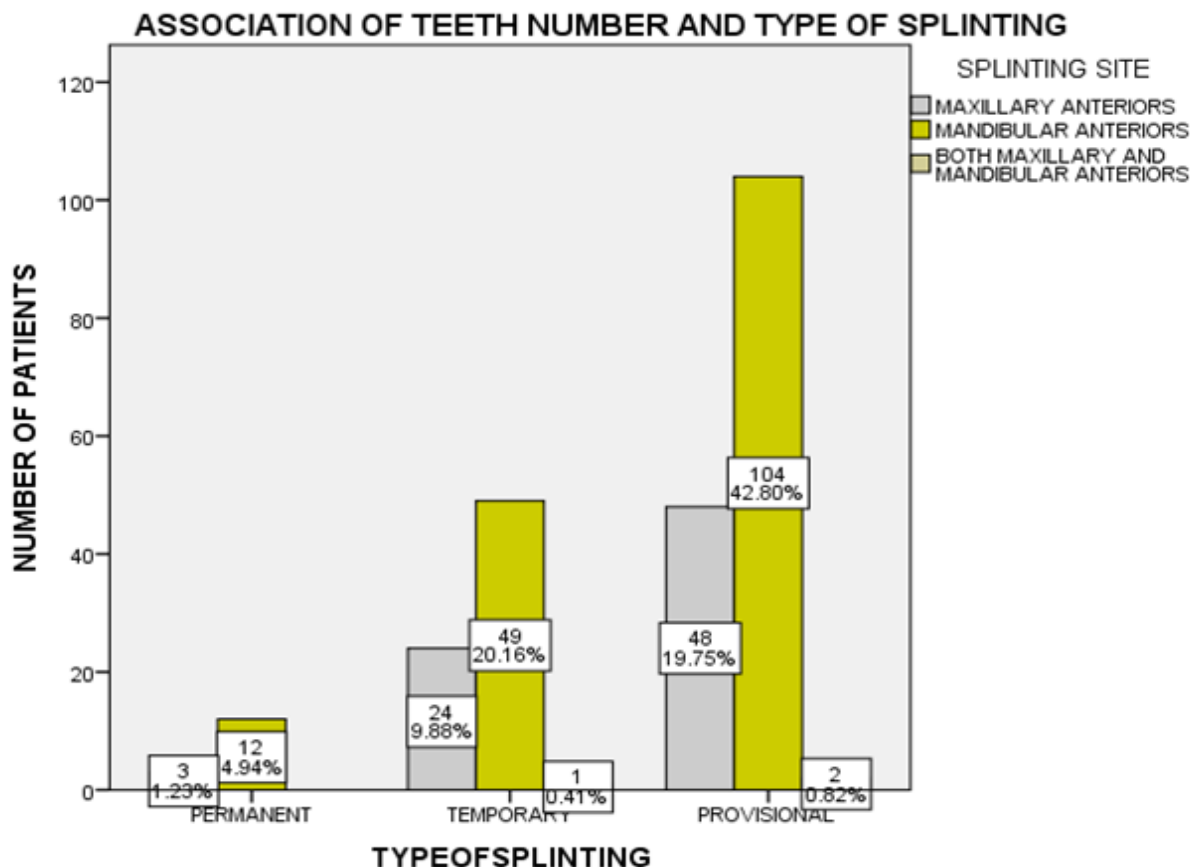


FIGURE 9: This figure shows the association between the type of splinting done and splinting site, where the yellow colour denotes the mandibular anteriors and grey colour denotes maxillary anteriors and ivory denotes both the maxillary and mandibular anteriors. Splinting was most commonly done for the mandibular anteriors. The provisional type of splinting was commonly done in the mandibular (42.8%) and the maxillary anteriors(19.75%). In both the arches, the most common type of splinting was found to be permanent (1.23%) followed by permanent (1.23%) and temporary(0.41%). P value >0.05 shows no statistically significant association between type of splinting and the teeth number. (Chi-square value= 1.193, p=0.879).

CONCLUSION:

Within the limits of our study, we conclude that periodontal splints could overcome impaired chewing comfort due to the tooth mobility as a result of severe periodontal disease. The most common type of splinting was found to be provisional splinting followed by temporary and permanent. In generalised chronic periodontitis patients, the most common type of splinting was provisional. In patients with diabetes, the most common type of splinting done was temporary. In patients with hypertension, the most common type of splinting done was provisional. Splinting was most commonly done for the lower anteriors.

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CONFLICTS OF INTEREST:

The authors declare no conflicts of interest.

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