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Flexible denture base material: A viable alternative for conventional denture base material

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***Abstract*---**Aim: This study was conducted to evaluate the patient overall experience and problems encounter in use of conventional and FD base material. Materials and Method: The study comprises of randomly selected 54 partially edentulous patients (male or female) reported to the Department of Prosthodontic. The nature of the study was explained and informs consent was taken. The conventional denture is made of polymethyl-methacrylate, Valplast and Flexite were two nylon denture base materials utilized in complete 54 cases were given the imperative prostheses. Results: There were total no of 54 cases were taken. All off the cases were evaluated on basis of halitosis, mucosal irritation, ease of insertion and removal, functional comfort and fracture/crack frequency. As per the questioner, the result was compiled and data were analysed by, Wilcoxon signed ranks test to study the change in various indices of functional observations and to draw the conclusion. Out of 54 cases only 6 cases were reported with halitosis, 0 cases reported with the difficulty in removing and insertion of denture, 3 cases reported with mucosal irritation and 12 cases reported with Debonding of teeth after 8 to 9 months, respectively. Conclusion: On the measurements used in this

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investigation, FDs performed much better than regular conventional dentures. When asked about sort of denture base material they preferred, 100% of patients elected FDs over regular conventional dentures.

***Keywords*---**conventional denture, nylon denture base, replacement, debonding.

Introduction

Due to dental diseases like trauma, and pathology loss of tooth occur which may alter the psychological of patient but also disturb the esthetic, phonetic and occlusal function. So, replacement of those teeth is essential in order to improve appearance, discourse, social certainty and confidence, capacity to chew comfortably and to preserve rest of the natural tooth. As time passed and civilization advanced with development of biological, chemical and physical science, there is slow but steady increase in quality and quantity of material for dental prosthesis. These materials advanced according to compatibility, availability, inexpensive and easy to manipulate with controlled procedure to develop a prosthesis which is functionally effective and have pleasing appearance.[1-3] Since 1937 by introduction of acrylic resin the plastic industry has undergone lots of research and introduced a new material Nylon. The adaptable dental replacements were first present in mid-1950.[4-5] An assortment of variables engaged with manufacture of dental replacement and none of the component can be overlooked as it can prompt disappointment of dental replacement.[6-9] Most frequent complaints complain encountered by patient wearing denture made from acrylic resin denture are mucosal irritation, allergic reaction, insufficient retention and stability, food accumulation under denture, difficulties in speech, mastication, unattractive appearance, fracture and Debonding of teeth.[10-11] Numerous patients find acrylic and metal dental replacement awkward on the grounds that it applies tension on fundamental delicate tissue causing torment and distress. Other fined that metal clasping as an aesthetic concern. This problem can be solved by newer flexible material which are now available that possess natural aesthetics and are also long lasting. So, the creation of FDs such as Valplast has changed the lives of many patients. A common complain arises by conventional denture is that they levered out while they speak or eat. This problem arises because convention denture is rigid while chewing when force is applied on one side the other side get dislodged from the opposite side. The FD eliminates this issue because of its flexibility. This kind of incomplete dental replacement is amazingly steady and retentive, and the flexibility of the adaptable plastic catches keeps them that way endlessly. It has predominant feel, no metallic taste and is non-unfavourably susceptible. Free movement is allowed by the overall flexibility and can, therefore, be referred to as “a built in stress breaker”.[12-14] FD material are more expensive the traditional denture. As we grow the bone cause resorption which cause the denture to loosen over time to overcome this acrylic denture can be relined and FD can’t be. More hygiene method needed for cleansing of FD twice a day. Henceforth, this study was conducted to assess overall patient experience and various problems with the use of convention vs. FD base.

Materials and Methods

The cross sectional study was conducted at Rama dental college hospital and research centre, Kanpur in 2020. The study comprises of randomly selected 54 partially edentulous patients (male or female) reported to the Department of Prosthodontic. The nature of the study was explained and informed consent was taken. Patient was selected who were not happy with their existing conventional partially denture. The conventional denture was made of polymethyl-methacrylate. The patient reported commonly with the complain of difficulty in wearing and removing of denture, irritating to mucosa, foul smell, frequently fracture, aesthetically not good, etc with their recently conventional removable partial denture. Radiographic examination has been taken to revel the condition of the remaining natural teeth; whether the remaining natural tooth are in good condition and can be used After throughout diagnosis and investigation of patient like radiographic and clinical findings, treatment were planned to fabricated flexible partial denture. Valplast and Flexite were two nylon dental replacement base materials utilized in 54 cases. The following cases were observed for1year for their function and acceptance by the patient as compared to their old denture. A questionnaire was prepared, which was narrated to patients. Following processing techniques, special flasks were used for flasking, dewaxing, and injecting moulted Valplast or Flexite denture material were used as per directions of manufacturer. The laboratory manipulation of this thermoplastic material is done by injection moulding technique. Dewaxing of the flask was done by putting the flask in boiling water for 4 to 6 minutes till the wax is softened. Dentsply Silicone Spray was sprayed on a Valplast FRS cartridge (fig 1-5). By using heat resistant gloves, the FRS cartridge was inserted into the cartridge sleeve with nozzle of cartridge facing in inward direction. The denture was finally inserted and instruction was given to the patient to follow as they were following for the previous acrylic denture. Patient was recall after 1week to check the proper adaptability of denture. After 1 year patient were recalled for the questionnaire.

Figure 1. Manual Compression Unit with electric cartridge furnace

Figure 2. Injection molding flask

Figure 3. Holes showing diatorics

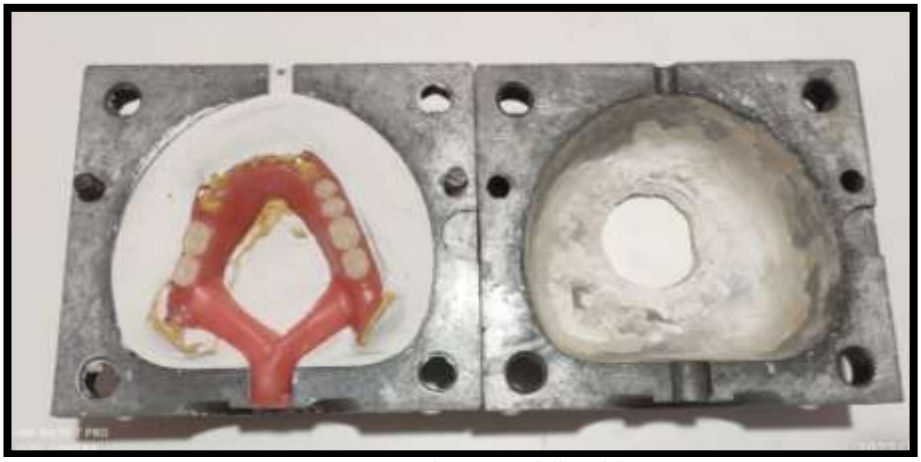
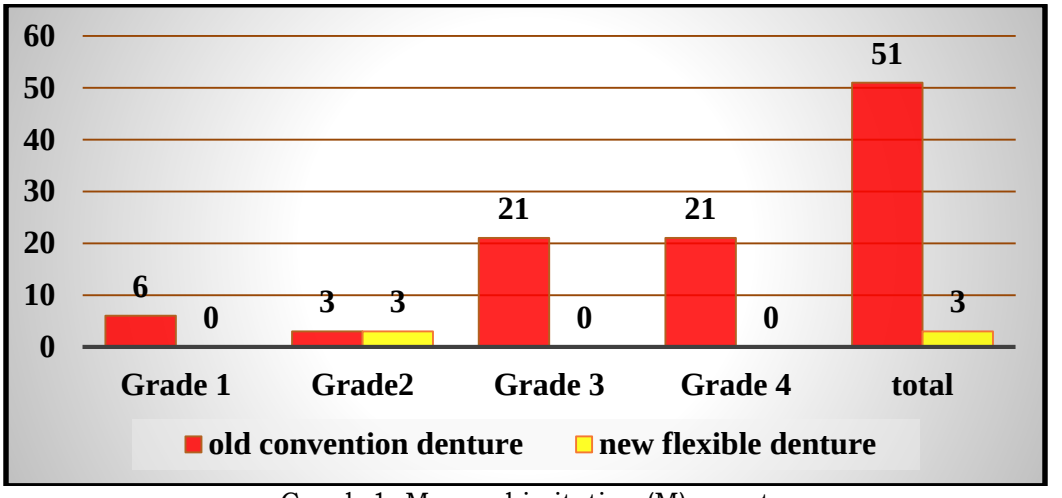


Figure 4. Sprue design of flexible RPD

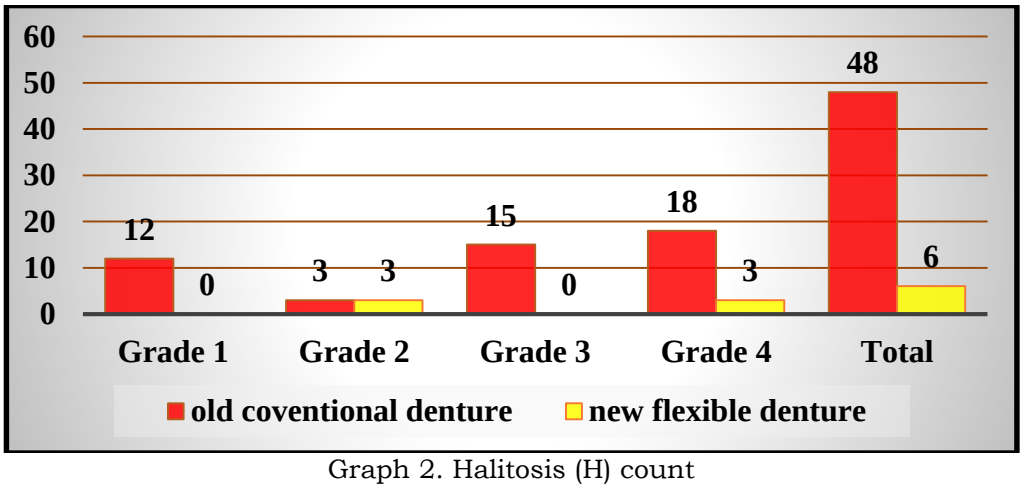
Figure 5. Flexible RPD

Results

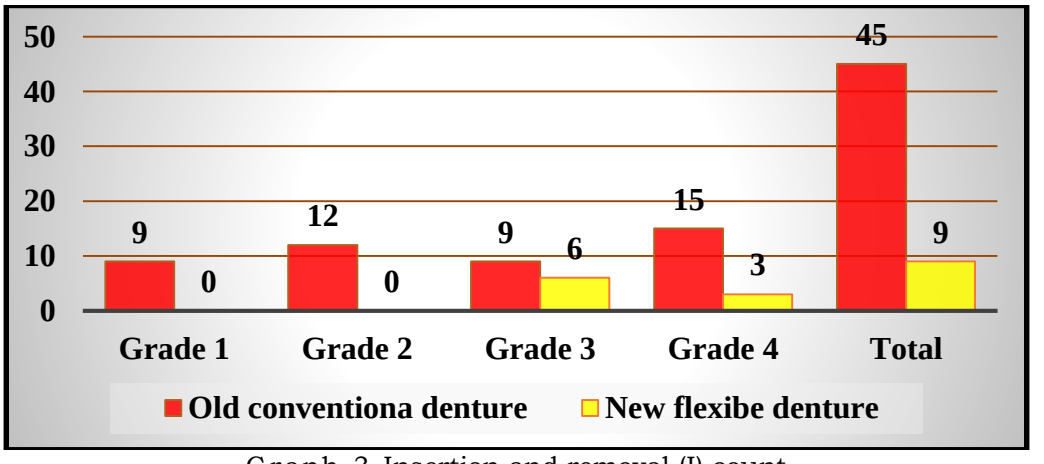
All the measured data and points were compiled and sent for statistical evaluation using statistical software Statistical Package for Social Sciences version 22 (IBM Inc., Armonk, New York, USA).The noteworthy data was subjected to appropriate statistical tests to obtain p values, mean, standard error. Total no of 54 cases were taken. All of the cases were evaluated on basis of halitosis, mucosal irritation, ease of insertion and removal, functional comfort and fracture/crack frequency. All the patients were followed up for check-ups at regular interval of 1 year. The questionnaire was narrated to the patient for the response. As per the questionnaire, the result was compiled and data was analysed by non-parametric test, Wilcoxon signed ranks test to study the change in various indices of functional observations and to draw the conclusion. Out of 54 cases, which range from 35 to 80 yrs, 30 were males and 24 were females in the study. Only 6 cases were reported with halitosis, 0 cases were reported with the difficulty in removing and insertion of denture, 3 cases reported with mucosal irritation and 12 cases reported with Debonding of teeth from the denture after 8 to 9 months, respectively (graph 1-4 and table 1).



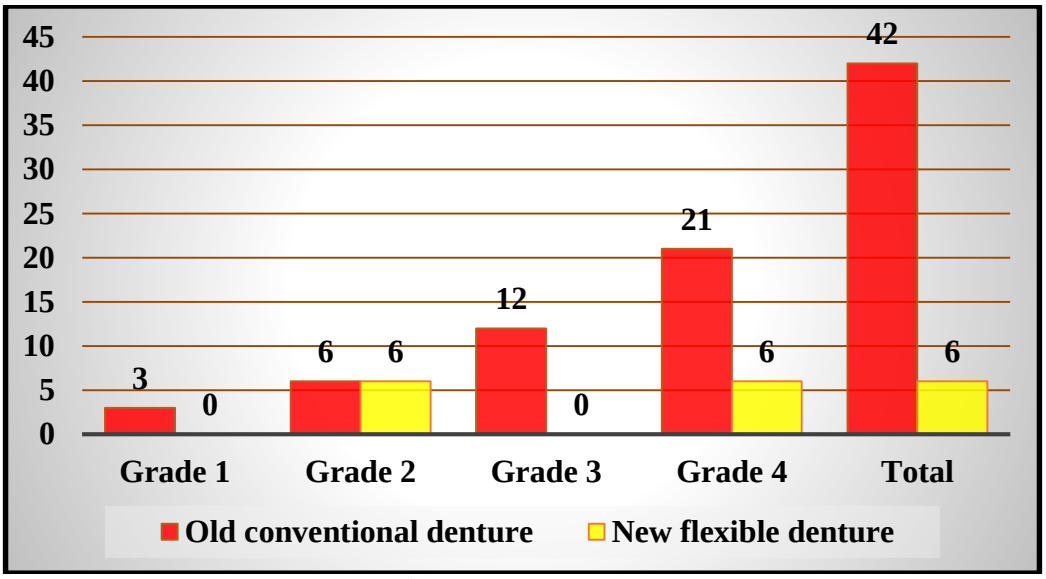
Graph 1. Mucosal irritation (M) count



Graph 2. Halitosis (H) count



Graph 3.Insertion and removal (I) count



Graph 4. Fracture (F) count

Table 1: Wilcoxon Signed Ranks Test (P value)

Index	P value
Mucosal irritation	<.001
Halitosis	<0.001
Insertion	<0.001
Fracture	<0.001
Comfort	<0.001

Discussion

Poly methyl methacrylate (PMMA) was introduced as a thermosetting, rigid,heat processed material in1936.It is an acrylic material widely used for denture applications owing to its useful attributes including simple processing, light weight, low cost, stability in oral environment. PMMA has many other advantages including biocompatibility, reliability, and absence of taste, odour, toxicity, insoluble in body fluid, relative ease of manipulation, good aesthetic appearance, etc. Moreover, PMMA based material are preferred in various aspect.[15-18] Nevertheless, PMMA denture resin demonstrates poor surface characteristics and week mechanical specifications comprising flexural strength, hardness, and fracture and impact strength. Polymethyl methacrylate denture base material was most commonly used for fabrication of complete/partial denture. It is a without metal removable partial denture constructed from ISO 1567 thermoplastic resins that could be either polycarbonates (polyesters) acrylic resins or polyamides (nylons) polyaryletherketones. It displays lower flexural modulus than the conventional type of base plate material dental replacement that makes it almost rugged. The flexibility of these materials permit consolidation of dental flanges in undercut area of buccal vestibule the flexibility of these materials permit joining of dental flanges in undercut area of buccal vestibule.[19-24] Like conventional PMMA denture, maintenance is by making peripheral seal around the whole

denture border around the entire denture border. It is additionally eluded as hypoallergenic denture particularly for the people who are unfavourably susceptible towards methyl methacrylate monomer and metal.[25-27] In 1953, Valplast introduced a flexible semi-translucent thermoplastic resin to create flexible tissue-born partial dentures.[28] Additionally, a New York-based organization gave one more variation of flexible material, Flexite thermoplastic which was a fluoropolymer (Teflon type plastic) in 1962. With a development in aesthetic requests during the 80s it was feasible to conceal the noticeable clasp by fusing resin into the partial denture or utilizing injection techniqueto make the entire denture including imperceptible clasp from Acetal resin dentures which give clasp from the comparable material In 1992, The Flexite Company made and ensured the essential pre-formedtooth hued clasps 'Clasp Eze', in both pink and clear tone. Presently, there are three sorts of thermoplastic pitches accessible which are Polyamide (PA-type) resins, Polycarbonate (PC-type) resins and Polyethylene terephthalate (PET-type) resins. Every one of them shows their own solidarity and limitations.[29] This new-age nylon-based thermoplastic material has unsurprising long haul execution. It is steady in nature and gives protection from polymer unzipping. It also has high creep resistance and fatigue endurance along with the excellent wear characteristics and solvent resistance. It has no porosity, no organic material development, and stains. It provides high dimensional stability .The material coordinates with the tissue and tooth tone to a sensibly well degree. It has the flexibility to separate forces on individual teeth and forestall move of forces to staying natural teeth and the contrary side of the curved. The material is light in weight, heat resistant, and bendable and is injected at a temperature of 274° to 300°C.[30-33] Every one of the patients in this review preferred FDs over the standard methyl methacrylate dentures since they had unpleasant involvement in their old dentures and this new material gave them expect better personal satisfaction Super polyamide dentures material was considered to be more flexible (low flexural modulus) than PMMA denture, and subsequently is by all accounts promising.

Conclusion

Within the limitation of study, the following conclusion can be drawn

1. FD cause least mucosal irritation as compare to conventional denture base material.
2. In conventional denture halitosis cases were report in large scale where as in FD base cases it is least.
3. Conventional denture shows difficulties in removing and inserting of denture where as in FD due to its flexibility it is easy to wearing and removing denture.
4. The tendency of debonding of tooth and fracture tendency is more in conventional denture than FD.

The FD was found to charge essentially better as contrast with customary methyl methacrylate denture on the boundaries taken on present study. When examined regarding the preference among the two kind of dental replacement base material 100% cases preferred FD over conventional methyl methacrylate denture.

However future long haul studies are recommended to survey the general convenience of the material.

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Statement of conflict of interest
In the opinion of the author, there was no conflict of interests.

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