

# EVALUATION OF DENTURE AESTHETIC FABRICATED WITH BPS TECHNIQUE - A RETROSPECTIVE PHOTOGRAPHIC STUDY

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## ABSTRACT:

The biofunctional prosthetic system (BPS) is designed in such a way that there is better comfort, function and aesthetic to the patient. The impression making and recording the maxillomandibular relation is a standardised in BPS method, this makes the dentist to understand the subject and makes things easier. There are 4 clinical procedures in BPS technique, which reduces the appointment time for the patient. With all the shortcomings of conventional complete denture and advantages of biofunctional prosthesis, we conducted a retrospective analysis of aesthetic outcome of complete denture constructed with biofunctional prosthetic system conducted in private university setup. A retrospective study was done in which 45 BPS dentures were placed from 1 June 2019 till 1 March 2020 were included. Data was reviewed from the patients records and analysed the data of 86,000 patients between June 2019 and March 2020 that were documented in a private institute. Data were analyzed with descriptive statistics. Chi Square test and Pearson's correlation was done for assessing the correlation between age and all the parameters checked, and between gender and all the parameters. Out of 45 patients, 44.4% BPS dentures were fabricated for the age group of 61-70 years. 51.1% of the patients were Males. Out of the total population for 55.6% of the population square shaped teeth were used and for 44.4% of the population tapered teeth were used. 53.3% of the population had premolar to premolar smile, while 31.1% of the population had molar to molar and 15.6% had canine to canine smile. In 82.2% of the teeth setting, the intercanine width matched the interalar width. 37.8% of the population had complete exposure of anterior teeth on smiling. According to our reviewers 62.2% of patients' smiles were attractive. From the present study, it can be concluded that the shape of the teeth showed a significant difference in perception among the individuals whereas the other parameters showed no difference.

**KEYWORDS:** BPS denture, Conventional denture, Intercanine width, Smile line.

## INTRODUCTION:

The biofunctional prosthetic system (BPS) is designed in such a way that there is better comfort, function and aesthetic to the patient (Sosnowiec *et al.*, 2016; Khazi *et al.*, 2019). However there is a shift in implant dentistry, few of the population are still partially or completely edentulous (Ariga *et al.*, 2018). There is a clear need for fabricating a good removable prosthesis, however the time and appointment for construction of a conventional complete denture is more (Terrell, 1958). Construction of a complete denture in some clinical situations is quite challenging, even though patients are treated with conventional complete denture, they are not satisfied with the final outcomes (MacEntee, 1999; Jyothi *et al.*, 2017). Patients treated

with complete denture may also face instability of the denture, discomfort during mastication and function, and sometimes difficulty speaking (Duraisamy *et al.*, 2019). These factors may lead to psychological effects within the patients (Tarbet, Boone and Schmidt, 1980; Bandodkar and Aras, 2007; Selvan and Ganapathy, 2016). In order to overcome the little pitfall in the conventional complete denture, BPS technique has evolved to overcome recent advances which has developed in the field of Prosthodontics by minimising the appointment time, and for better aesthetic outcome.

The construction of a biofunctional prosthetic system varies from conventional complete denture. This is based on bifunctional movements of the oral cavity in which the denture adapts well towards the tissue and provides better function, form and aesthetics (Sosnowiec *et al.*, 2016; Khazi *et al.*, 2019). Each step in BPS may vary depending on the special materials used to fabricate during this technique (Ganapathy *et al.*, 2016). The protocol or the guidelines to follow in making of the BPS denture is quite easier and simple to understand (Sosnowiec *et al.*, 2016). Learning the system accurately makes it superior to conventional denture. (Subasree, Murthykumar and Dhanraj, 2016). The use and the armamentarium is a unique feature in BPS. The materials involved are impression materials, articulator, facebow, special denture teeth and the denture base materials, technique using injection moulding method (Noh, 2015).

The impression making and recording the maxillomandibular relation is a standardised in BPS method, this makes the dentist to understand the subject and makes things easier. There are 4 clinical procedures in BPS technique, which reduces the appointment time for the patient (Khan and Aga Khan University Hospital, 2019). The maxillomandibular relation is done with the use of intramural tracers and the teeth setting is purely based on the anatomical landmarks of the patient ('4 The Use of Anatomical Landmarks', 2012; Khan and Aga Khan University Hospital, 2019). The priority is given to the patient's own functional movement by this system which makes it superior (Jain, Ranganathan and Ganapathy, 2017). The specially made Ivoclar teeth set provides excellent aesthetics and phonetics when they are set according to the anatomical landmarks (Roraff, 1977).

With all the shortcomings of conventional complete denture and advantages of biofunctional prosthesis, we conducted a retrospective analysis of aesthetic outcome of complete denture constructed with biofunctional prosthetic system conducted in private university setup.

#### **MATERIALS AND METHODS:**

A retrospective study was done in a private institution. Ethical clearance number was SDC/SIHEC/2020/DIASDATA/0619-0320. The clinical portion of this retrospective study was conducted over a 9 month period i.e from 1 June 2019 to 1 March 2020 and included patients for whom BPS denture were fabricated. A total of 45 BPS dentures were fabricated and esthetic evaluation was done for the same.

Inclusion Criteria : Patients for whom BPS denture was fabricated, age within 25 to 50 years, both male and female

Exclusion Criteria: Conventional denture patients, patients having fixed prosthesis.

The data of 86,000 patients documented between June 2019 and March 2020 were reviewed and analysed. The data was collected and photographic analysis was done for all the cases in the above mentioned time period by 2 reviewers. Outcome variables assessed were correlation between intercanine width and interalar width, smile line, exposure of teeth, shape of teeth used. Statistical analysis was done using SPSS Statistics Software for windows, version 20.0. Descriptive statistics was done. Chi Square test and Pearson's correlation was done for assessing the correlation between age and all the parameters checked, and between gender and all the parameters.

## RESULTS AND DISCUSSION:

Out of 45 patients, 44.4% BPS dentures were fabricated for the age group of 61-70 years. 51.1% of the patients were Males. Out of the total population for 55.6% of the population square shaped teeth were used and for 44.4% of the population tapered teeth were used. 53.3% of the population had premolar to premolar smile, while 31.1% of the population had molar to molar and 15.6% had canine to canine smile. In 82.2% of the teeth setting, the intercanine width matched the interalar width. 37.8% of the population had complete exposure of anterior teeth on smiling. According to our reviewers 62.2% of patients' smiles were attractive.

Association between gender and all other factors other than shape of the teeth was not significant (Table 1, Figure 1). There was no statistically significant association seen between age and all the outcome variables (Table 2).

Denture outcome can be evaluated by three determinants i.e comfort, esthetics and function (Lucena *et al.*, 2011; Ajay *et al.*, 2017). Edentulous patients have low self esteem, this can be improved by making esthetically pleasing dentures which will be close to the original esthetic smile according to patients age (Waliszewski, 2005; Basha, Ganapathy and Venugopalan, 2018). Smile line is defined as an imaginary line along the incisal edges of the maxillary anterior teeth which should mimic the curvature of the superior border of the lower lip while smiling (Vijayalakshmi and Ganapathy, 2016). According to the smile line exposure of the tooth also changes. Exposure of teeth in dentures can be guided by length of the lip as well. Depending on exposure the tooth smile line also changes. In our study, 37.8% had full exposure of teeth followed by 33.3% having two third exposure of teeth and only 28.9% of the population for whom denture was fabricated had less than half exposure to teeth. Patients who had less exposure mostly had long lip length.

Selection of the upper anterior teeth depends on various factors and can be done by various ways. There are many methods like correlation of upper anterior teeth with intercanthal distance, interalar distance, zygomatic distance, etc (Ganapathy, Kannan and Venugopalan, 2017; Nallaswamy, 2017). In our study correlation of upper anterior teeth was done with the interalar distance. There was no significant correlation found. But when this similar study was done in dentulous patient, there was statistically significant correlation between intercanine distance and interalar distance (Deogade *et al.*, 2015; Ashok and Suvitha, 2016). Esthetic outcome is important for completely edentulous patients and it mainly depends on the selection and arrangement of upper anterior teeth (Ashok *et al.*, 2014). Upper anterior teeth should have proper shape, anatomic forms, shade, arrangement: according to the level of exposure, curvature of smile line given, arrangement according to arch shape, etc (Venugopalan *et al.*, 2014).

Anterior teeth should be arranged to follow the positive smile line, the shape of the teeth can be decided according to the face form and the arch form of the patient (Kannan and Venugopalan, 2018). In our study the prevalence of use of square teeth was more followed by tapered. Shape of the teeth can affect the overall appearance of the patient. In our study there was a correlation between gender and shape of the teeth used. If square teeth is used in some patients it might look much bulkier and not appealing, making the patient look older. If tapered teeth are used it may give the appearance of longer teeth. Selection of teeth is important for getting good esthetic results.

Limitation of our study is that it is done in an institutional setting, hence there are limited samples. As it is an institutional study there can be operator bias, protocol bias seen. The clinical scenarios around the denture fabricated in our study were not the same as there were different operators and different clinical conditions.

## CONCLUSION:

The overall aesthetic outcome of complete denture constructed with a biofunctional prosthetic system conducted in private university setup was upto the mark.

#### **AUTHOR CONTRIBUTION:**

First author (Minal Tulsani) performed the analysis and interpretation and wrote the manuscript. Second author (Subhashree R) contributed to conception, data design, analysis, interpretation and critically revised the manuscript. Both authors have discussed results and revised the manuscript.

#### **CONFLICT OF INTEREST:**

The authors declare no conflict of interest, financial or otherwise.

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**LEGENDS:**

**TABLES:**

|  | Gender | Chi-square value | p value |
|--|--------|------------------|---------|
|  |        |                  |         |

|                         |                         | Male  | Female |       |        |
|-------------------------|-------------------------|-------|--------|-------|--------|
| Shape of teeth          | Square                  | 73.9% | 36.4%  | 6.421 | 0.011* |
|                         | Round                   | 0.0%  | 0.0%   |       |        |
|                         | Taper                   | 26.1% | 63.6%  |       |        |
| Smileline               | Premolar to Premolar    | 56.5% | 50.0%  | 0.287 | 0.866  |
|                         | Molar to Molar          | 30.4% | 31.8%  |       |        |
|                         | Canine to Canine        | 13.0% | 18.2%  |       |        |
| Inter canine Width      | Yes                     | 91.3% | 72.7%  | 2.655 | 0.103  |
|                         | No                      | 8.7%  | 27.3%  |       |        |
| Exposure of teeth       | Half teeth exposed      | 30.4% | 27.3%  | 3.194 | 0.203  |
|                         | Two Third teeth exposed | 43.5% | 22.7%  |       |        |
|                         | Full teeth exposed      | 26.1% | 50.0%  |       |        |
| Attractiveness of smile | Yes                     | 69.6% | 54.5%  | 1.079 | 0.299  |
|                         | No                      | 30.4% | 45.5%  |       |        |

\*The Chi-square statistics is significant at the 0.05 level.

Table 1: Table showing association between all the outcome variables and gender.

|  | Age | Chi- | P |
|--|-----|------|---|
|--|-----|------|---|

|                            |                         | 18-25 | 26-35 | 36-45 | 46-55 | Above 55 | square value | value |
|----------------------------|-------------------------|-------|-------|-------|-------|----------|--------------|-------|
| Shape of teeth             | Square                  | 28.6% | 80.0% | 55.0% | 50.0% | 0.0%     | 4.587        | 0.205 |
|                            | Round                   | 0.0%  | 0.0%  | 0.0%  | 0.0%  | 0.0%     |              |       |
|                            | Tapper                  | 71.4% | 20.0% | 45.0% | 50.0% | 0.0%     |              |       |
| Smileline                  | Premolar to Premolar    | 42.9% | 60.0% | 45.0% | 75.0% | 0.0%     | 5.068        | 0.535 |
|                            | Molar to Molar          | 28.6% | 20.0% | 45.0% | 12.5% | 0.0%     |              |       |
|                            | Canine to Canine        | 28.6% | 20.0% | 10.0% | 12.5% | 0.0%     |              |       |
| Inter canine Width         | Matching                | 71.4% | 70.0% | 90.0% | 87.5% | 0.0%     | 2.560        | 0.465 |
|                            | Not Matching            | 28.6% | 30.0% | 10.0% | 12.5% | 0.0%     |              |       |
| Exposure of Anterior teeth | Half teeth exposed      | 14.3% | 40.0% | 25.0% | 37.5% | 0.0%     | 5.611        | 0.468 |
|                            | Two Third teeth exposed | 14.3% | 30.0% | 45.0% | 25.0% | 0.0%     |              |       |
|                            | Full teeth exposed      | 71.4% | 30.0% | 30.0% | 37.5% | 0.0%     |              |       |
| Attractiveness of Smile    | Yes                     | 57.1% | 60.0% | 70.0% | 50.0% | 0.0%     | 1.121        | 0.772 |
|                            | No                      | 42.9% | 40.0% | 30.0% | 50.0% | 0.0%     |              |       |

Table 2: Table showing association between all outcome variables and age.

**FIGURES:**

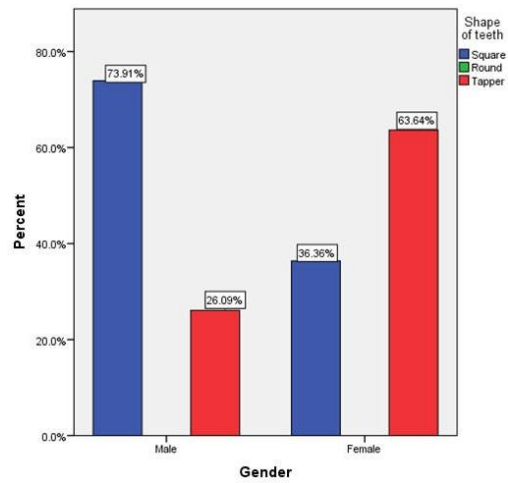


Figure 1: Bar graph showing association between gender and shape of teeth used for BPS denture. X-axis represents gender and Y-axis represents percentage distribution of shape of teeth used for BPS denture teeth. Blue colour represents square shaped teeth and red colour represents tapered teeth. Chi-square test was done and association was found to be significant. Pearson's Chi-square value: 6.421, p value: 0.011 (<0.05) hence statistically significant, proving that square shaped teeth were commonly used for males and tapered teeth were commonly used for females.