

Patient satisfaction levels for complete dentures (F/F) delivered by undergraduate dental students

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Abstract

One important aspect of acceptance of full denture treatment is that of patient's perceived outcome. A teaching environment is the best place for future clinicians to understand this aspect of treatment. The aim of this study was to assess the satisfaction levels of patients who received complete dentures delivered by undergraduate dental students at the University of Otago. Participants' attitude toward dentures was measured via a 16-item questionnaire based on Patient's Denture Assessment (PDA) questionnaire. It comprises of items that assessed factors related to dentures and was quantified on a four-point scale. A total of 60 edentulous patients wearing maxillary and mandibular dentures were recruited then contacted using a list of patients whose treatment were carried out and completed in the undergraduate clinic from 2010-2018 and were sent an explanatory letter, an informed consent form, and a self-administered questionnaire in a return envelope to the University of Otago Faculty of Dentistry. Bivariate analysis was then carried out on the responses. 55% of the invited participants responded to the survey. The mean extent of PDA impacts was 0.15 (range 0.0-0.71). There were no significant differences in the experience of the prevalence and extent of PDA impacts by gender and age. 81.8% reported their denture to be very important to them and 91% found it "very easy" or "easy" to eat and swallow. 88% enjoyed their meals "well" or "very well". Bivariate analysis showed those aged 70 years old or younger were less likely to report issues with the denture, while there was no statically significant difference between genders. Overall, the participants expressed satisfaction with the treatment received at the faculty over the sub-groups of function, speech/aesthetics, upper denture, lower denture, and considered the denture to be of high importance.

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Introduction

Historically New Zealand has one of the highest prevalence of edentulism in the world (Thomson, 2012). While there has been a considerable decline in the rate of edentulism, there are still approximately 22% of 65-74-year-old New Zealanders edentulous (Thomson, 2012). This is concerning as edentulism is associated with malnutrition, poorer systemic health,

negative social interactions and overall poorer quality of life (Slade and Spencer, 1994; Thomson, 2012).

Measurement of the Oral Health Related Quality of Life (OHRQoL) is a useful tool in evaluating the impact of oral rehabilitation (Strassburger *et al.*, 2004). It encompasses a range of factors including and not limited to function, pain, comfort, psychological, social factors and overall wellbeing in relation to oral health (Strassburger *et al.*, 2004).

Numerous studies have indicated that conventional denture treatment improves OHRQoL (Eric *et al.*, 2017; Martins *et al.*, 2021). For instance, one study found that edentulous patients who requested conventional dentures had significant improvements in their quality of life after treatment (Eregie *et al.*, 2021). Similarly, Shrestha *et al.* found that treatment with new complete dentures amongst edentulous patients resulted in significant improvement in OHRQoL with regards five of the seven subscales measured (Shrestha *et al.*, 2020). These included functional limitation, psychological discomfort, psychological disability, physical disability and handicap. Also, research indicates that despite the success of implant overdentures, conventional dentures are still required as part of dental treatment due to relatively good satisfaction rates and financial limitation, with edentulism being usually related to low SES. (Meijer *et al.*, 2003).

Clinical studies have also showcased that denture treatment is an effective method in improving nutrient intake amongst edentulous patients. Given the loss of masticatory function, malnutrition associated with tooth loss cannot be fully repaired (Rahn *et al.*, 2009), however the impact of tooth loss is generally reduced. De Marchi *et al.* (2008) indicated that edentulous individuals without dentures were more likely to be malnourished, while those with complete dentures had adequate nutritional status. Another study by Han and Kim (2016) found that edentulous patients without dentures had 1.89 times the risk of being undernourished in comparison to edentulous patients with conventional dentures.

However, patient dissatisfaction with dentures can prevent these aforementioned benefits from reaching their full potential. Patient satisfaction can be challenging to achieve, as various factors need to be considered. These include aesthetics, comfort, fit, ease of mastication and speech (Berg, 1984; Rahn *et al.*, 2009; Sharka *et al.*, 2019). Patient specific factors such as personality, self-perception, socioeconomic factor expectations, attitude, denture

wearing experience, ridge form and anatomy also needs to be accounted for adding to the complexity of measuring treatment satisfaction based on these factors (Čelebić, *et al.*, 2003).

While a teaching institution is where future clinicians are educated about factors affecting patient's satisfaction with removable prostheses, there are limited number of studies examining satisfaction of treatment for patient being treated in those institution. Thus, the primary aim of this project was to investigate the level of satisfaction with complete dentures delivered by dental students at the University of Otago's Faculty of Dentistry, between 2010 and 2018, and how it compares to other reported results in other teaching institutes.

Materials and Methods

Participants

A convenience sample of 60 edentulous patients wearing maxillary and mandibular dentures were recruited from the undergraduate students' electronic completed list from 2010-2018 and asked to participate in the survey (37 males, 23 females), with age ranging from 56 to 82 year old. The complete dentures were fabricated by undergraduate dental students at the University of Otago, under supervision by the faculty staff. Participants with an implant, root over-dentures and those only requiring denture relines were excluded from the study. Selected participants could read and respond in English. Initially, participants were contacted via their home phone or cell phone. They were briefly informed about the purpose and nature of the study. All patients who agreed to take part and met the inclusion criteria were sent an explanatory letter, an informed consent form, and a self-administered questionnaire in a return envelope to the University of Otago Faculty of Dentistry. All participants gave their informed consent verbally and in written form before commencement of the study. This study was approved by the University of Otago Human Ethics Committee approval number D19/166. Research consultation

with Māori and approval gained from Ngāi Tahu Research Consultation Committee. Participants' confidentiality and anonymity were ensured throughout the process.

Survey

The questionnaire for the self-assessment of dentures was developed through a validated PDA Patient's Denture Assessment (PDA) questionnaire consisting of question items that assessed factors related to dentures. Participants' attitude towards dentures was rated through a questionnaire and assessed via a four-point Likert scale, where each question item was measured by words characterising the best situation. The questionnaire was comprised of five factors, which were categorised into 'function', 'lower denture', 'upper denture', 'aesthetic and speech' and 'importance'. Table 1 represents the 16 question items derived from the PDA, which were translated from Japanese to English in the study by Komagamine and colleagues (Komagamine *et al.*, 2014). All 60 participants were sent out surveys to their residential houses to complete the questionnaire, and to repost the completed questionnaire back to the faculty. IBM SPSS Version 26 (IBM, New York, USA) was used to carry out the statistical analysis.

Results

Responses were received from 33 of the 60 invited participants, giving a response rate of 55%, results are summarised in Table 1. Of the 33 who participated in the survey,

53.1% were male, with a mean age of 68.6 years (sd 11.6; range 40-86). The majority (69.7%) responded to all 15 PDA questions. One in four (24.2%) responded to 14 questions, while one responded to 11 and 12 questions, respectively. In the analyses for the overall prevalence and extent of PDA impacts, all 33 responses were included. For the bivariate analyses by the PDA subscales, only those who had provided responses to all items within each of the four PDA subscales were included.

Most participants (81.8%, n=17) reported their denture as being very important to them. Only one participant (3.0%) rated their denture as being unimportant. Table 2 showed the results of the bivariate analyses for the overall prevalence and extent of PDA impacts by gender and age. Overall, 60.6% of participants reported experiencing 1+ PDA impacts. The mean extent of PDA impacts was 0.15 (range 0.0-0.71). There were no significant differences in the experience of the prevalence and extent of PDA impacts by gender and age.

The results for the bivariate analyses for the prevalence of 1+ PDA subscales impacts by gender and age were shown in Table 3. A higher proportion of females reported having experienced impacts with their lower dentures than male, but this did not reach statistical significance. Those aged ≤ 70 years old were significantly less likely to report any aesthetic and speech impacts. No other statistical significance differences were noted by gender and age for the other three PDA subscales.

Table 1. Question items used in the questionnaire derived from the PDA (Patient’s Denture Assessment) and participants’ response quantified as a percentage.

Subscale	Questionnaire items	Percentage
Function	1. How much pain do you feel with your dentures?	No pain - 61% Occasional - 36% Pain - 3% Frequent Pain – 0% Constant Pain – 0%
	2. How easy is it for you to swallow food and water?	Very easy - 58% Easy - 33% Difficult - 6% Very Difficult - 3%
	3. How well do you enjoy your meals?	Very well - 58% Well - 30% Poorly - 9% Very Poorly - 3%
	4. How worn out does your jaw feel?	Very worn - 3% Worn - 6% Slightly Worn - 24% Not Worn - 61% No answer - 6%
Aesthetics and Speech	5. How worried are you about other people watching?	Very worried - 9% Worried - 6% Somewhat worried - 12% Not worried - 73%
	6. How easy is it for you to speak?	Very easy - 49% Easy - 39% Difficult - 12% Very difficult – 0%
	7. How worried are you about your mouth?	Very worried - 3% Worried - 0% Somewhat worried - 30% Not worried - 67%
	8. How often do your dentures click when chewing?	Always - 3% Frequently - 6% Occasionally - 39% No clicking - 43% No answer - 9%
Lower Denture	9. How often does food debris get stuck under your lower denture?	Constantly - 9% Frequently - 27% Occasionally - 45% Does not get stuck - 13% No answer - 6%

	10. How is your lower denture detained on the ridge	Very well - 30% Well - 39% Poorly - 19% Very poorly - 6% No answer - 6%
	11. How does your lower denture fit?	Very well - 34% Well - 39% Poorly - 15% Very poorly - 12%
	12. How uncomfortable is your lower denture?	Very uncomfortable - 6% Uncomfortable - 12% Comfortable - 46% Very comfortable - 30% No answer - 6%
Upper Denture	13. How often does food debris get stuck under your upper denture?	Constant - 3% Frequently - 9% Occasionally - 42% Does not get stuck - 43% No answer - 3%
	14. How does your upper denture fit?	Very well - 55% Well - 27% Poorly - 3% Very poorly - 15%
	15. How often does your upper denture fall down?	Constantly - 3% Frequently - 6% Occasionally - 24% Does not fall down - 67%
Importance	16. How important is your denture to you?	Unimportant - 3% Somewhat important - 9% Important - 6% Very important - 82%

Table 2. Prevalence and extent of PDA by gender and age.

	Prevalence of PDA impacts (%)		Extent of PDA (mean number of PDA impacts) (sd)
	No impacts	1+ impacts	
Sex^a			
Male	9 (52.9)	8 (47.1)	0.11 (0.2)
Female	4 (26.7)	11 (73.3)	0.17 (0.2)
Age			
≤ 70 years	6 (35.3)	11 (64.7)	0.12 (0.1)
> 70 years	7 (43.8)	9 (56.3)	0.19 (0.2)
Total	13 (39.4)	20 (60.6)	0.15 (0.2)

^a missing data for one participant

Table 3. Prevalence of 1+ PDA subscale impacts.

	Functional ^a (%)		Aesthetic and speech ^a (%)		Lower denture ^a (%)		Upper denture ^a (%)	
	No impacts	1+ impacts	No impacts	1+ impacts	No impacts	1+ impacts	No impacts	1+ impacts
Sex								
Male	13 (76.5)	4 (23.5)	14 (87.5)	2 (12.5)	9 (64.3)	5 (35.7)	12 (80.0)	3 (20.0)
Female	12 (92.3)	1 (7.7)	12 (85.7)	2 (14.3)	4 (28.6)	10 (71.4)	11 (73.3)	4 (26.7)
Age								
≤ 70 years	12 (80.0)	3 (20.0)	16 (100.0)	0 (0) ^b	6 (40.0)	9 (60.0)	13 (81.3)	3 (18.8)
> 70 years	13 (81.3)	3 (18.8)	10 (71.4)	4 (28.6)	7 (53.9)	6 (46.2)	10 (71.4)	4 (28.6)
Total	25 (80.7)	6 (19.4)	26 (86.7)	4 (13.3)	13 (46.4)	15 (53.6)	23 (76.7)	7 (23.3)

^a Number of responses for each PDA subscale differ as only those who responded to all items within each of the subscales were included.

^b $p < 0.05$, Chi-square test

When asked about the function of their dentures, 97% of participants responded with 'no pain' or 'occasional pain' on wearing dentures (Figure 1). Almost all of the participants (91%) found it 'very easy' or 'easy' to swallow food and water. There were similar results for participants enjoying their meals, where 88% could enjoy their meals 'well' or 'very well'. Eighty-five percent of the participants felt like their jaw were 'not worn' or only 'slightly worn' when using their dentures.

Regarding aesthetics, the majority of the respondents (73%) were 'not worried' about other people watching while using their dentures (Figure 2). Regarding speech, 88% of respondents found it 'very easy' or 'easy' to speak when wearing their dentures. Eighty-two percent of patients experienced 'no clicking' or 'occasional clicking' when chewing. It was noticeable that 97% of respondents were either 'not worried' or 'somewhat worried' about their mouth in general.

Fifty-eight percent of respondents experienced 'no food trap' or 'occasional food trap' under their lower denture. It was noticeable that 6% of participants did not answer this section as they commented that they took their dentures out when eating (Figure 3). Approximately one-third (69%) of the respondents felt their lower denture fitted 'very well' or 'well'. Seventy-six percent of patients found their lower denture 'very comfortable' or 'comfortable', and again, 6% did not answer this section, commenting that they could not use the lower denture at all.

Regarding the upper denture, 85% experienced 'no food trap' or 'occasional' food trap under their denture (Figure 4). The fit of the upper denture was 'very good' or 'good' in 82% of the respondents. Ninety-one percent of the respondents 'never' experienced their upper denture falling out or only 'occasionally'. It was noteworthy that, regardless of function, speech, and aesthetics, 97% of respondents felt their denture was important to them

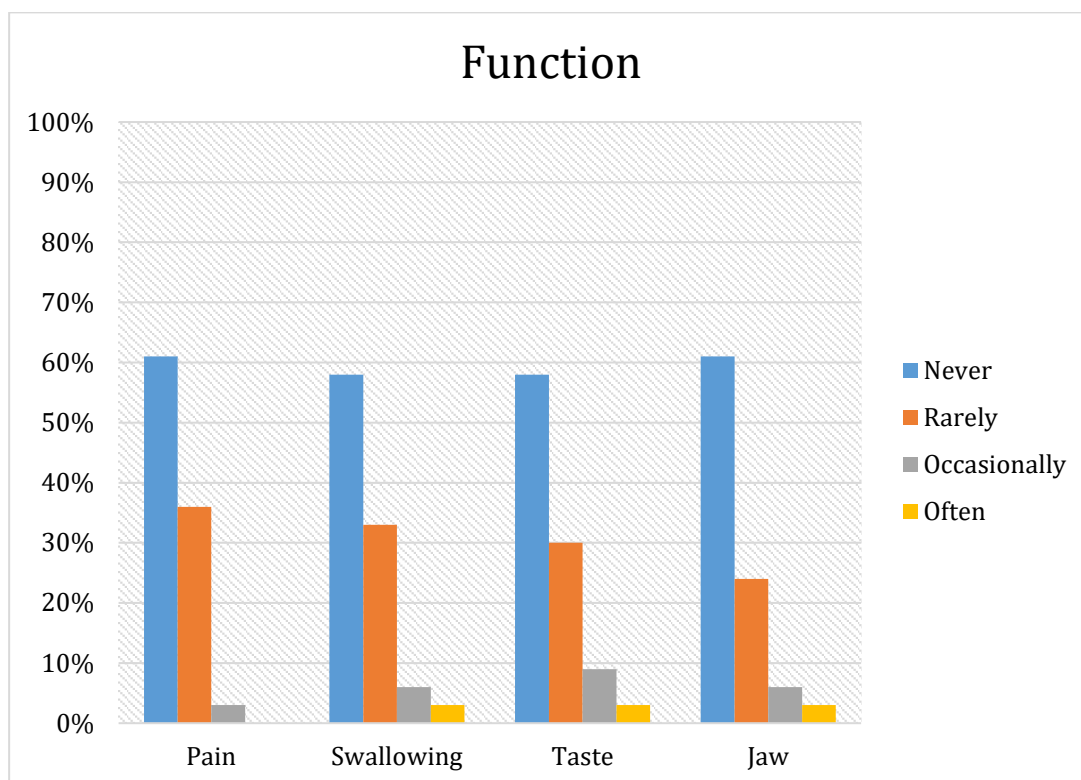


Figure 1. Response of participants regarding subgroup 'Function' quantified as a percentage by a four-point scale.

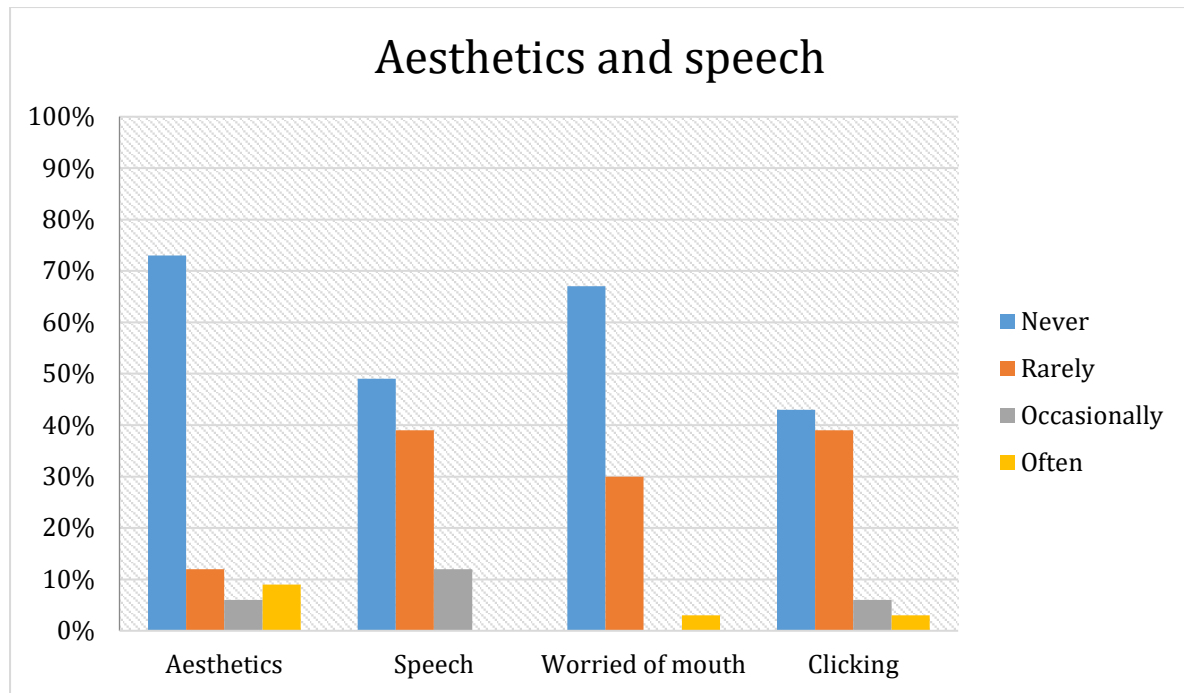


Figure 2. Response of participants regarding subgroup 'Aesthetics and Speech' quantified as a percentage by a four-point scale.

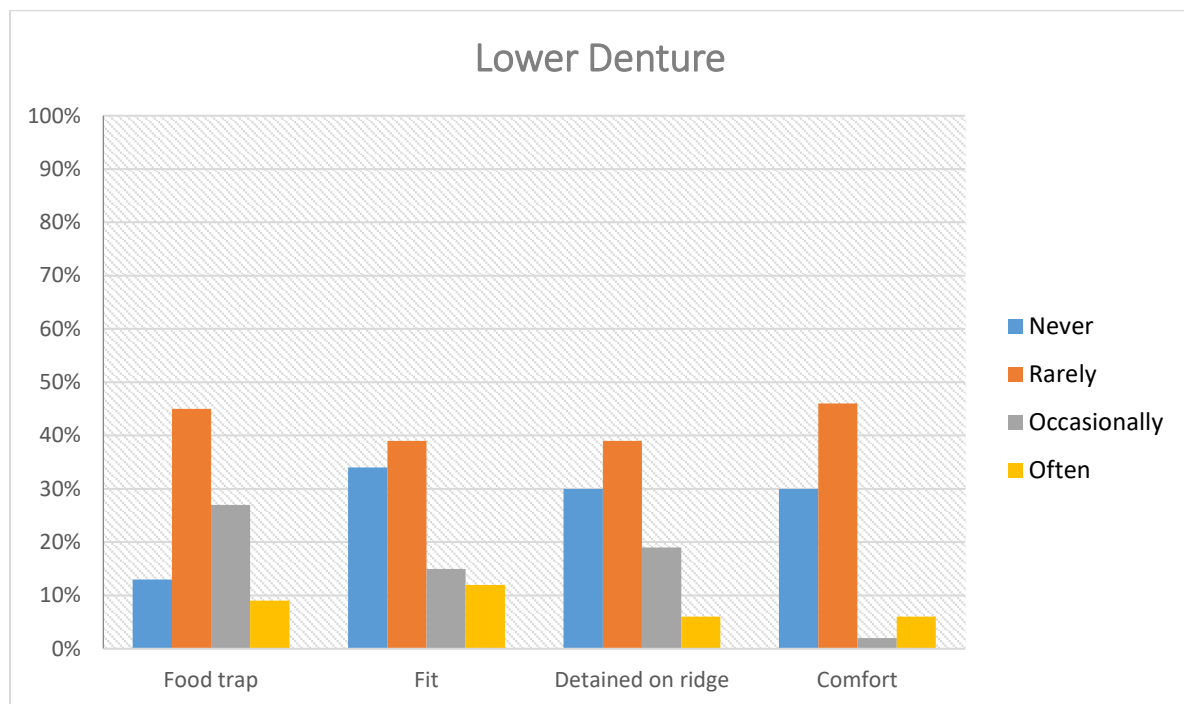


Figure 3. Response of participants regarding subgroup 'Lower Denture' quantified as a percentage by a four-point scale.

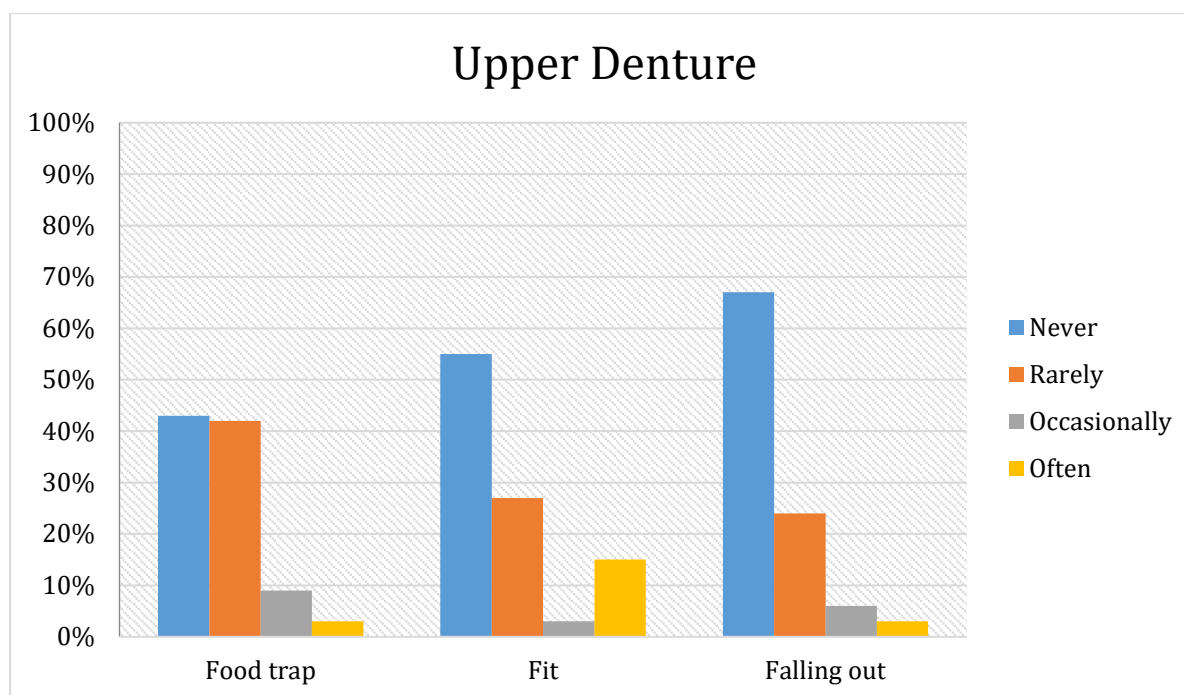


Figure 4. Response of participants regarding subgroup 'Upper Denture' quantified as a percentage by a four-point scale.

Discussion

Using PDA scale, our study has found that the sample of patients who responded have high satisfaction levels with dentures fabricated at the University of Otago's faculty of dentistry.

Patient satisfaction is essential with regards to any dental treatment but more difficult to achieve with dentures. Complete dentures are essentially an inferior replacement of dentition and can in turn negatively impact ones' nutrition, health, self-esteem and thus overall quality of life. Patient self-assessment is an inexpensive and economical method in measuring the success of the denture. In the literature, there have being several methods being employed to assess patient satisfaction with dentures including use of visual and OHIP scales, making it difficult to carryout direct comparisons between studies (Assunção *et al.*, 2010). In the present study, the questionnaire was derived from a validated Patient Denture Assessment (PDA) questionnaire created by Komagamine and colleagues (Komagamine *et al.*, 2014). The

questionnaire was categorised into 'function', 'lower denture', 'upper denture', 'aesthetic and speech' and 'importance' to measure the level of satisfaction with complete dentures (F/F) delivered by dental students at the University of Otago's Faculty of Dentistry between 2006 and 2018. Patient satisfaction is generally not based on one sole factor but on many, and consequently, a multidimensional patient self-assessment questionnaire was chosen that can capture both positive and negative denture-related effects.

Reliability and Validity of the Patient's Denture Assessment (PDA) has been evaluated by various studies (Komagamine *et al.*, 2014, Rezeki *et al.*, 2017). Internal consistency and test-retest reliability were utilised to demonstrate the reliability of the PDA questionnaire (Komagamine *et al.*, 2014). Internal consistency for the questionnaire items and the five categories was measured using Cronbach's alpha, which showed that the Cronbach's summary score was 0.78, demonstrating that the result of the reliability test of the PDA was satisfactory (Komagamine *et al.*, 2014). Furthermore, the PDA established good

validity by evaluating discriminant validity (Komagamine *et al.*, 2014). Studies concluded that the reliability of the PDA questionnaire was satisfactory, as determined by the assessment of its internal consistency and test-retest reliability. It also showed good validity, as demonstrated by the results of the factor analysis and convergent validity (Komagamine *et al.*, 2014).

Removable prostheses are not only dependent on the technical quality of the dentures, and defining the criteria of successful results in complete denture patients can be difficult. Psychological and emotional factors may be of great importance in maladaptive patients, irrespective of them seeking technical advice. For example, research indicates that there may be a relationship between neuroticism and the patient's capability to adequately wear their dentures (Critchlow and Ellis, 2010). Thus they are likely to benefit from counselling to reduce the risk of dissatisfaction with their dentures (Critchlow and Ellis, 2010).

Research has indicated there is an association between no or poorly designed dentures and a poorer diet in various populations with different diets (Nowjack-Raymer and Sheiham, 2003; Salazar *et al.*, 2021). Poorer nutrition is detrimental to health. It can increase the risk of metabolic syndrome and health problems associated with it (Truswell and Mann, 2007). For example, high saturated fat intake and low vegetable intake increases cholesterol levels, which in turn can lead to increased risk of cardiovascular disease (Truswell and Mann, 2007). Thus patient satisfaction with dentures, especially with regards to masticatory abilities is vital and should always be taken into account.

In this study, the most of the responses in regard to function were positive. Sixty-one percent of participants reported that their complete denture (F/F) caused no pain. Fifty-eight percent of participants responded that their complete dentures made swallowing of food and water very easy and they were able to enjoy their meals.

Sixty-one percent also responded that they did not perceive their dentures as worn. The majority of the remaining participants selected the next best category for each question, indicating good satisfaction levels in association with function. Participants with full dentures were 62% more likely to have chewing difficulties compared to participants with natural teeth or fixed prosthesis (Choi *et al.*, 2014). This, in turn, influences their diet and therefore nutrient intake. Research indicates that complete denture wearers have a lower fibre intake, higher fat intake (particularly saturated fatty acids) and overall 200 kcal higher energy intake compared to the recommendations of physiological needs (Pancheva *et al.*, 2018). Furthermore, findings by Bradbury *et al.* (2008) indicated that denture wearers consume fewer fruits and vegetables than dentate individuals, as a result of the chewing difficulties associated with dentures. Hence, even with dentures that appear satisfactory, follow up of patient's nutritional intake and general health should always be at the forefront of a clinician's mind during the maintenance and monitoring phase of treatment, noting any sudden weight loss or changes in the patient's general health post denture insertion.

The quality of complete dentures is closely related to denture usage, and the quality of complete dentures is the product of underlying latent variables, including anatomical factors, anatomical forms, the accuracy of the reproduction of retruded jaw relationships *etc.* (Fenlon *et al.*, 2007). Other important factors which can affect patient satisfaction include, previous denture wearing experience, attitudes and expectations, patient demographics, residual ridge form and anatomy, patient-dentist relationship, the quality of construction and time since delivery (Critchlow and Ellis, 2010). To help such patients, the dentist must be able to listen to their concerns and communicate with them efficiently.

The clinical quality of complete dentures does not always equate to patient satisfaction. While studies examining the association between these two variables

have produced inconsistent results, many of the findings tend to suggest that there is no significant association between the two. One study found that the clinical quality of complete dentures was not significantly associated with patient satisfaction two years after delivery (Fenlon and Sherriff, 2014). Two other studies have also found no significant link between denture quality and patient satisfaction of complete dentures (Berg *et al.*, 1984; Diehl *et al.*, 1996). This imposes the fact that the success of a denture should be evaluated by measuring patient satisfaction, along with clinical examination.

Dentures delivered by University Hospital of Dentistry, Tokyo Medical and Dental University students also produced positive and similar results (Komagamine *et al.*, 2014). Patient Denture Assessment (PDA) was also utilised in that study, however, results were measured via the 100 mm Visual Analogue Scale (VAS). The mean VAS values for pain, ease of swallowing boluses and water, meal enjoyment and jaw wear levels were comparable to the best two categories of the PDA questionnaire (Komagamine *et al.*, 2014). Similarly, favourable results were obtained with regards to questions examining mastication by complete dentures designed by students attending the Dental Faculty of Marmara University in Turkey (Turker *et al.*, 2009; Komagamine *et al.*, 2014). Questionnaire answers were quantified via a 7-point scale. With regards to chewing capacity, level of comfort during eating and attitude toward eating, these findings were comparable to the second-best category of the PDA questionnaire (Turker *et al.*, 2009).

In regards to aesthetics and speech, the most of the participants were satisfied. 73% were not concerned about people watching, and 88% found it either very easy or easy to speak with the dentures. Although 43% reported no clicking when chewing, 39% did report occasional clicking. Positive values were also obtained University Hospital of Dentistry, Tokyo Medical and Dental University students and Dental Faculty of Marmara University (Turker *et al.*, 2009; Komagamine *et al.*, 2014). Both results were

comparable to the second-best category of the PDA questionnaire.

Questions tailored to mandibular and maxillary dentures produced slightly less favourable results in this study. Forty-five percent and 42% of participants stated that debris gets stuck under their lower and upper dentures respectively. Furthermore, 27% stated that debris gets stuck under their lower denture frequently. Overall, participants were more satisfied with maxillary dentures compared to mandibular dentures. A higher percentage of respondents experienced 'no food trap' of 'occasional food trap' with upper dentures (85%) in comparison to lower dentures (58%). Similarly, the upper dentures had a better fit (82%) than lower dentures (69%). In addition, 6% of participants did not share their experience on food trap under their lower denture, nor the comfort of the lower denture.

Similar unfavourable findings were obtained by The University Hospital of Dentistry with regards to debris and mandibular dentures (Turker *et al.*, 2009). Like this study, the score was more favourable for maxillary dentures (Turker *et al.*, 2009). With regards to the fitting of the denture, positive outcomes were obtained (Turker *et al.*, 2009). In contrast, VAS scores obtained by The University Hospital of Dentistry were less favourable for mandibular dentures but adequate for maxillary (Komagamine *et al.*, 2014).

These findings are expected due to the differences in the underlying anatomical structures. The presence of the palate generally provides adequate support for the maxillary denture, while the posterior palatal seal enables retention (Rahn *et al.*, 2009). However, in the mandible the tongue is present and therefore there is complete reliance on musculature and ridge anatomy (Rahn *et al.*, 2009). Furthermore, post extraction resorption of the mandibular ridge is four times the rate of the maxilla (Rahn *et al.*, 2009). Therefore, it is more challenging to design an adequate mandibular denture compared to a maxillary denture. This in turn makes achieving

patient satisfaction a more difficult task. According to Čelebić *et al.* (2003), patients with the best mandibular ridge form were least satisfied with their mandibular denture. In contrast, patients rated to have the best maxillary ridge form were most satisfied with their maxillary denture (Čelebić *et al.*, 2003). Another study indicated that there was a significant relationship between lower ridge resilience and patient satisfaction (Magnusson, 1988). Research has also found that the anatomy of the lower ridge is a key variable in determining the success of the denture (Critchlow and Ellis, 2010). One factor strongly agreed upon by both the University of Otago's Faculty of Dentistry and The University Hospital of Dentistry patients was that their dentures were very important to them.

Due to a limited number of studies measuring patient satisfaction levels for complete dentures delivered by general dental practitioners, we were not able to directly compare our findings with private practices. However, findings of a review examining seven studies stated that regardless of the adequacy of designed dentures, a percentage of patients remained unsatisfied with the delivered prosthesis (Critchlow and Ellis, 2010). These dentures were all delivered by qualified dental practitioners and the percentage of residual dissatisfaction ranged from 7.2% to 21 % (Critchlow and Ellis, 2010). As different methods, sample sizes, and means of measuring patient satisfaction were used, we cannot make direct comparisons to our findings. However, it is important to note that, in this study, a small percentage of patients were also not satisfied with the delivered complete dentures. This raises the question whether patient satisfaction was attributed to the quality of the fabricated dentures or due to patient-specific factors. The success of complete denture treatment does not depend on the assessment by the dentist, but on patient self-assessment results.

Another common theme amongst our study with previously conducted research was the importance of aesthetics to patients.

Fourteen percent of participants reported to be worried about aesthetics often or occasionally, which was greater than the other variables examined under this category. Other studies have reported the importance of aesthetics in achieving patient satisfaction. A study indicated that the patient's perception of the aesthetics of their maxillary denture had an impact on their satisfaction levels (Carlsson *et al.*, 1967). Literature has also found that rehabilitation with new dentures improved patient satisfaction which in turn was likely to be associated with better aesthetics and comfort (Allen and Mc Millan, 2003 De Lucena *et al.*, 2011; ELsyad *et al.*, 2019).

Our research also highlights the importance of an additional psychological factor-interpersonal relationship between the dentist and the patient. A large number of participants praised the staff and students in charged with their denture making process. They commented on how helpful, kind and patient they were. As most of our participants were satisfied with their dentures, it is possible that their positive relationship with the students contributed to the overall satisfaction levels. This could be attributed to longer appointment times at the Dental School opposed to private practice, allowing for a better relationship to establish. Several studies have found that high-domineering dentists had more unsatisfied patients than undomineering dentists (Waas, 1990).

Regardless, our findings indicate that patients were generally satisfied with the complete removable dentures delivered by University of Otago's Faculty of Dentistry students. The results are similar to dentures delivered by dental students from Dental Faculty of Marmara University and University Hospital of Dentistry, Tokyo Medical and Dental University (Turker *et al.*, 2009; Komagamine *et al.*, 2014). Hence it is possible to conclude that dentures fabricated by University of Otago dental students are generally adequate and compare well with other teaching institutions. Currently, a large percentage of dentures in the private sector are being designed by clinical dental technicians.

Therefore, it would be interesting to conduct a similar study with larger sample size, examining patient satisfaction of dentures delivered by clinical dental technician students.

Given the persistence of edentulism in the population, the results of this study are of importance. University of Otago's Faculty of Dentistry is the sole dental institution in New Zealand. Therefore, it gives us some indication of the clinical skills expected from future dental professionals, with regards to denture fabrication. Although the clinical skills and therefore presumably patient satisfaction is likely to improve throughout practice, the results are overall positive. With limitations discussed, the results indicate that complete dentures fabricated by undergraduate students at the University of Otago's Faculty of Dentistry have a high satisfaction rates. Using the PDA questionnaire in assessing patient satisfaction with complete dentures helped obtain a detailed understanding of the patients' perceptions in using their dentures, as the questionnaire demonstrated good validity and reliability (Rezeki *et al.*, 2017; Komagamine *et al.*, 2017).

There are some limitations to the current study including the relatively low sample size and response rate of 60% may have given rise to non-response bias as the non-response could be unequal among the participants regarding satisfaction from their dentures, and may also undermine the ability to generalise the results to a larger population. Another is the lack of clinical examination as there are several other factors effect satisfaction, particularly success of lower denture, such as fit and occlusal relationship a clinical examination may shed further light on the findings (Fenlon and Martyn, 2008). Self reported satisfaction has been reported to underestimate the functional performance as rated by dental clinician, particularly for older adults, who make up the bulk of the participants in this study (De Lucena *et al.*, 2011; Reis *et al.*, 2022).

Conclusion

This study aimed to examine the patient satisfaction levels of complete dentures fabricated by University of Otago's undergraduate students using a validated PDA survey. Results indicated that patients were largely satisfied with the dentures delivered. These findings suggest that the prosthodontics aspect of the BDS course has been taught effectively. In the future, a study with larger sample size and inclusion of Clinical Dental Technician students would make the findings more applicable to the New Zealand population.

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