Original Article
บทวิทยาการ

Comparison of chewing ability of mandibular implant-retained overdenture patients using the subjective and the objective assessments

Neerush Kunon D.D.S., M.S.[1]
Orapin Kaewplung D.D.S., Ph.D.[2]

[1]Dentist, Dental Department, Paktongchai Hospital, Nakornrachasrima
[2]Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Abstract

Objective To compare the chewing ability of mandibular implant-retained overdenture in Thai elderly patients using the subjective and objective assessments.

Materials and methods Thirty-three participants were recruited. Their chewing ability were evaluated twice: 1 month after implant placement and 3 months after the insertion of a mandibular implant-retained overdenture. The subjective chewing ability was evaluated using a developed questionnaire consisting of 14 common food types. For the objective chewing ability, it was assessed by a wax cube analysis method. The relationship between the changes of chewing ability assessed by the subjective and the objective method was analyzed using Pearson's correlation statistic analysis.

Results The chewing ability change evaluated by the subjective method significantly related to those changes evaluated by the objective method. (r = 0.35, $p < 0.05$)

Conclusion There was a statistically significant relationship between the chewing ability change evaluated by the subjective and the objective methods.

(CU Dent J. 2014;37:171-82)

Key words: *chewing ability; implant-retained overdenture; objective assessment; subjective assessment; Thai elderly*

Correspondence to Orapin Kaewplung, orapin.dent@gmail.com

Introduction

When teeth are lost, chewing ability is decreased.[1] The masticatory performance of a patient wearing a complete denture is less than one-sixth that of a dentate subject.[2] Totally edentulous patients are typically treated with conventional complete dentures. However, more than 50% of those receiving a mandibular conventional complete denture have problems with denture stability and retention.[3] This results in a range of problems including difficulty in eating; then, malnutrition.[4] According to the McGill Consensus Statement on Overdentures, it was suggested that a 2-implant retained mandibular overdenture should be the treatment of choice for an edentulous mandible.[5] This treatment option offers better stability and retention of the mandibular denture, better chewing function[6], and improved quality of life of the patients.[7]

Assessment of chewing ability can be classified into two broad categories. The first one is the objective method, various chewing tests have been developed in this regard.[8–9] In 2003, the paraffin wax cube was developed as a test food to evaluate masticatory performance on the basis of the degree of color mixing and the shape of the chewed wax.[10,11] In 2010, a wax cube analysis method was developed by Prapatrungsri *et al* for Thai people.[12] This system can be another method for the assessment of chewing ability of complete denture wearer.[13] The second category is the subjective method. This evaluation uses either a questionnaire or interviewing patients.[14–15]

Although the objective tests can offer quantitative data, they fail to consider the psychosocial aspect of patients' oral function. Giddon and Hittelman[16] stated that the psychological assessment of a patient was essential because treatment success depended on the patients' expectations and opinions. In addition, Miura *et al*[17] found a close relationship between the subjective chewing ability and the perceived quality of life. This study suggested that the assessment of treatment success should also be based on the patients' own rating of treatment outcome.

The purpose of this study was to compare the chewing ability of mandibular implant-retained overdenture in Thai elderly patients using the subjective and the objective assessments. The null hypothesis wasthat there is no difference between the changes of the subjective and the objective evaluations.

Materials and methods

Patient population

The Ethics Committee of the Prasat Neurological Institute, Bangkok, Thailand approved the protocol of this study (Ethic number 54038). Written informed consent was obtained from each patient after a full explanation of the clinical trial. In this study, the subjects were selected purposively. Thirty-three totally edentulous patients (11 males and 22 females) were selected. The mean age was 69.4 ± 8.2 years. They had worn their dentures for 1–48 months prior to participating in this project. These individuals had participated in the "Royal Dental Implant Project" at Prasat Neurological Institute, Bangkok, Thailand from May 2011 to September 2011. All subjects were recruited into this project using the following inclusion criteria:

General inclusion criteria

- Ability to understand written and spoken Thai language and respond to the point range used in the questionnaire.

- No smoking or smoking ofless than one pack of cigarettes per day.

- No physical conditions or contraindications for implant surgery and no treatment with any of the bisphosphonate drugs.

- No problems of neuromuscular control that affected masticatory function.

- No psychological or psychiatric conditions that could influence treatment or the study.

Dental Inclusion criteria

- Individuals with appropriate occlusion and peripheral border of their conventional upper and lower complete dentures, but experiencing functional problems with their lower complete dentures.

- Sufficient bone to install implants in the appropriate areas of the mandible and there are at least 6 mm of keratinized mucosa in the implant placement area.

The subjects who did not completely fulfill the above criteria were not recruited into the study.

Surgical and prosthetic procedures

Prior to surgery, all subjects had the minimum vertical mandibular height at the implant placement sites evaluated using panoramic view radiography.[18] All surgical procedures were performed by one dentist from the Dental Department of the Prasat Neurological Institute. The surgeries were done according to a standardized two-stage implant placement protocol as previously described.[19] In the first stage, a dental implant fixture designed and produced in Thailand ("Fun-Yim", Advanced Dental Technology Center, Thailand; diameter 3.7 mm; length 10 or 13 mm) (Fig. 1)

was placed in each of the lower canine regions of each patient. The appropriate diameter and length of implant fixture were determined from the panoramic radiograph. Four months later, at the second stage, healing abutments (diameter 5 mm; length 3 or 5 mm) were placed. Three weeks after the second stage surgery, the healing abutments were replaced with ball attachments, which were tightened with a torque wrench to 20 N/cm. Using an intra-oral technique, the patient's preexisting lower complete denture was modified to contain O-ring attachments, which fit with the ball attachments. The occlusion of the prosthesis was thoroughly verified in both centric and eccentric position. The treatment was completed as a mandibular implant-retained overdenture. The prostheses were evaluated after 1 day, 1 week, 1 month, and 3 months. All abutment placement surgery and prosthodontic procedures were performed according to the manufacturer's instructions by one experienced prosthodontist. A schematic methodology of our study can be seen in Fig. 2.

Chewing function evaluation

Each subject's chewing function both subjectively and objectively were performed twice : 1 month after implant placement while wearing his/her conventional

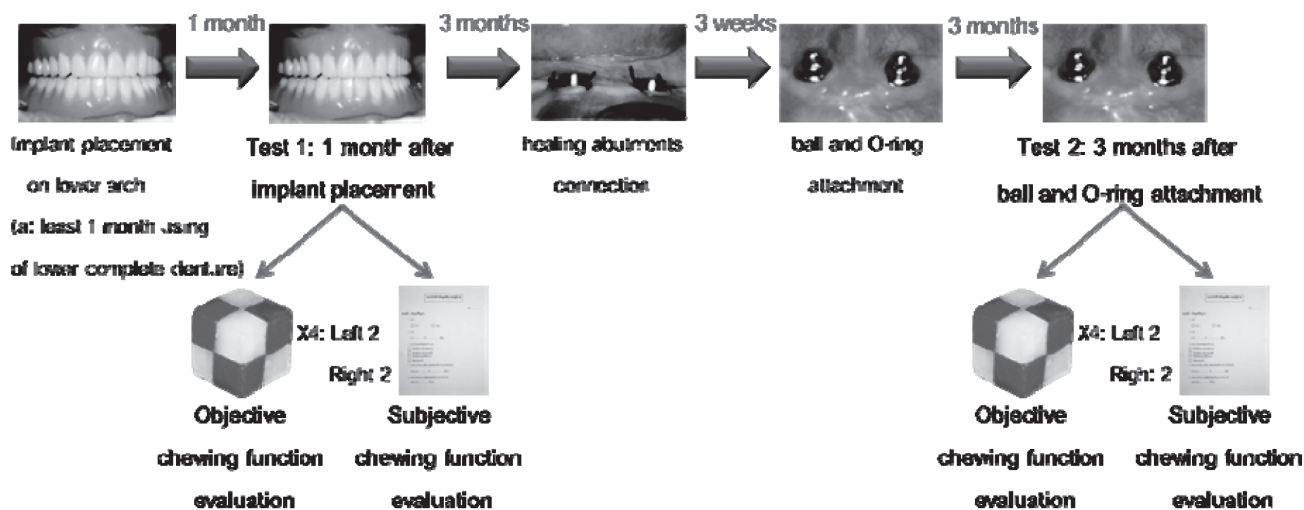**Fig.** 1 Dental implant fixture designed and produced in Thailand.

Fig. 2 Schematic of the methodology.

lower complete denture (Test 1) and 3 months after the insertion of the ball and O-ring attached overdentures (Test 2).

Objective assessment using a two-colored (red and white) wax cube

The wax cube analysis method was chosen for the objective assessment.[12] The wax cubes were kept in an incubator (Contherm160M, Contherm Scientific Ltd., New Zealand) at 37°C for 24 hours and soaked in a water bath (Isotemp202, Fisher Scientific Co., Ltd, Japan) at 37°C for a further 10 minutes prior to the test. Prior to testing, denture-bearing area of each participant was thoroughly verified by the dentist to ensure that the soft tissue was free from inflammation and sore spot which can affected masticatory function. At each test, the subject sat in an upright position on the dental chair and was instructed to chew a wax cube using 10 habitual strokes on one side; then, removed and repeated the process again with another wax cube on the same side. After finished two cycles of chewing on one side, the subject was asked to repeat all the above chewing process on the contralateral side. Therefore, each subject had four pieces of the chewed wax per test. The chewed wax was removed from the oral cavity of the subject, run under tap water for 20 seconds, and soaked in a 70 percent concentration of

ethyl-alcohol for 5 minutes. At the end of the second test, eight pieces of chewed wax per subject were obtained for the masticatory performance analysis.

Images of the chewed wax were performed on both sides using a digital camera (Canon EOS 500D, Canon Inc., Tokyo, Japan) with a macro lens (Canon macro 100 mm) under standardized distances and light conditions (a photo stand kit; Copy stand CS920 and Copy light CL-150 with 2 light bulbs; Phillips® Cool Daylight 125 Watts, Color temperature 6,500 K and a lux meter; DigiconLX-70, Protonics Inter-trade Co, Ltd., Thailand). Thus, 16 digital images per subject were obtained from two tests. All images were transferred and analyzed using the Image J program (Version 1.42Q, NIH, MD, USA). The average value of the degree of mixing of the white and red wax was calculated after each test to determine the average "percentage of chewing ability (PCA)" of each subject as previously described.[12] The whole procedure of the wax cube analysis method was shown in Fig. 3.

Subjective assessment using the self-reported questionnaire

At the same time, right after the objective chewing test, the patients were interviewed to evaluate their subjective chewing ability using a self-reported questionnaire. For questionnaire development, the food

Table 1 Descriptive characteristics of the participants. (N=33)

Characteristics	N (%)
Age (years)	
< 65	11 (33.3)
65–70	12 (27.3)
> 70	15 (39.4)
Sex	
Male	11 (33.3)
Female	22 (66.7)
Resident area	
Bangkok	26 (78.8)
Nonthaburi	3 (9.1)
Samutprakarn	1 (3.0)
Pathumthani	2 (6.1)
Ratchaburi	1 (3.0)
Period of complete denture wearing (month)	
< 12	15 (45.5)
12–24	10 (30.3)
> 24	8 (24.2)
Minimum vertical mandibular bone height (mm)	
≥ 21	5 (15.2)
16–20	13 (39.4)
11–15	12 (36.4)
10	3 (9.0)

The minimum vertical mandibular bone height was measured from the panoramic radiograph.

lists had been created from interviewing 25 elderly Thais (12 males and 13 females, mean age 72.4 ± 7.9 years) who received dental care at the Postgraduate Prosthodontic clinic, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand about their daily food intake for breakfast, lunch, and dinner both in and out of the home for 7 days. All of them lived in Bangkok, Thailand. Based on the obtained data, we selected the 14 most frequently consumed food items for use in the questionnaire. Next, the forty-seven lower edentulous subjects who attended the follow up visit at 1 month after implant placement at the Dental Department of
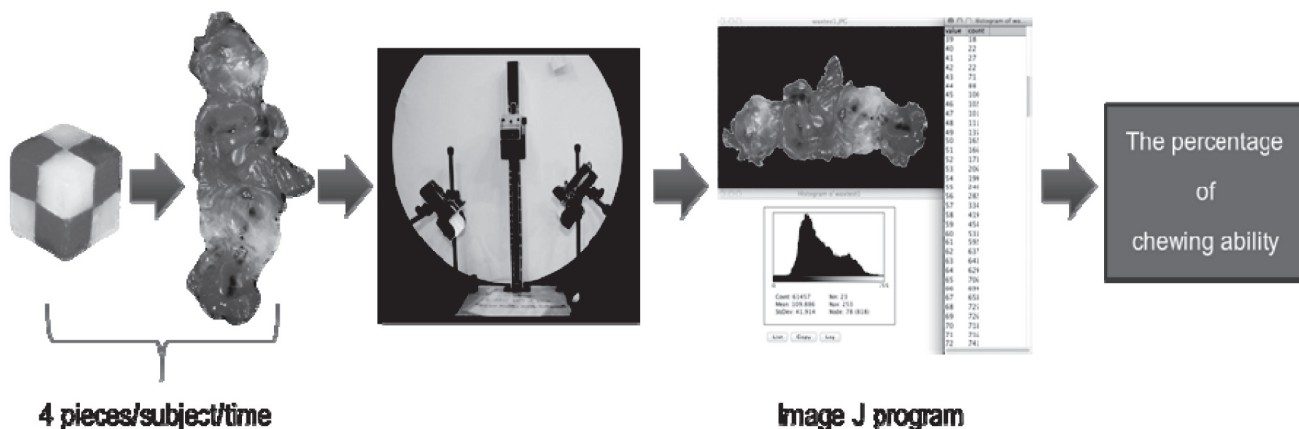
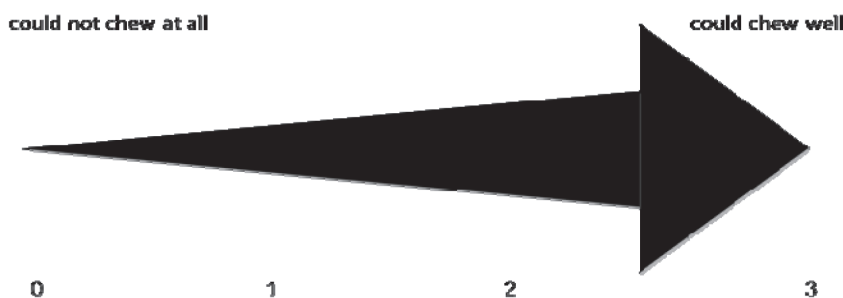**Fig**. 3 Chewed wax cube analysis method.

Food item

Fig. 4 The four-point rating scale for each food choice.

the Prasat Neurological Institute, Bangkok, Thailand (16 males and 31 females, mean age 68.4 ± 8.4 years) were asked to rate the hardness of these 14 foods using a 100 mm visual analogue scale. Seventy-six percent of these 47 subjects resided in Bangkok, Thailand. The results indicated that there were various textures and hardness of the food list. From this information we developed a food intake questionnaire comprising the 14 most frequently consumed food items with their various textures and hardness's: porridge, chinese vegetable stew, chinese cabbage soup, steamed rice, noodle soup, omelet, steamed fish, sour curry, banana, fried fish, orange, fresh guava, fried pork and stir-fried vegetables. The subjects were asked to rate their chewing ability for each food type. Each food was rated using a four-point rating scale ranging from

"could not chew at all" (0 points) to "could chew well" (3 points). The four-point rating scale of each food item was on a separate page to prevent subjects from comparing the scores among food items as shown in Fig. 4.

The total score of these 14 foods, ranging from 0-42, was calculated as the "perceived chewing ability score (PCAS)" of each subject. Higher scores indicated better chewing ability. We assessed the test-retest reliability of this questionnaire by having a subset of subjects answer the questionnaire a second time, 1 week after the initial evaluation at 1 month following implant placement. A Kappa value of 0.733 indicated that the responses between these two time points were in substantial agreement.[20] Therefore, we used these

14 common foods in the developed questionnaire for the subjects to evaluate their chewing ability.

Data modification

Due to the differences in the measurement scales between the outcomes of the PCA and the PCAS, these two values were converted into the same measurement type as the "percentage change of the PCA" and the "percentage change of the PCAS" prior to analyzing the relationship between the outcomes of the subjective and the objective assessments of chewing ability. They were calculated using the following formula.

Percentage change of the PCA =

$$\frac{\text{Test 2 score} - \text{Test 1 score}}{100} \times 100$$

Percentage change of the PCAS =

$$\frac{\text{Test 2 score} - \text{Test 1 score}}{42} \times 100$$

Statistical analysis

The normality of the data distribution was tested using aone–sample Kolmogorov–Smirnov test. Pearson's correlation analysis was carried out to evaluate the relationship between the changes of the subjective and the objective chewing ability. All statistical analyses were carried out using the statistics package for the social sciences (SPSS) version 17.0 (SPSS [Thailand] Co., Ltd. Bangkok, Thailand). In all statistical analyses,

a p-value less than 0.05 was considered significant.

Results

Thirty-three subjects (11 males and 22 females, mean age = 69.4 ± 8.2 years) enrolled in this study. These patients were the early elderly, predominantly women, and had worn their complete dentures for 1–48 months prior to participating in this project. The distribution of the participant's demographic, clinical characteristicsand their minimum vertical mandibular height can be seen in Table 1.

The means and standard deviations of the percentage of chewing ability (PCA) and the perceived chewing ability scores (PCAS) determined at one month post implant placement and 3 months after overdenture delivery are presented in Table 2. The mean and 95% confidence interval of the percentage change of PCA and the percentage change of the PCAS were calcu-lated and revealed in Table 2.

Pearson's correlation coefficient between the percentage change of the PCA and the percentage change of the PCAS indicated that these two assessments were significantly related toeach other. (r = 0.35, $p < 0.05$) The scatter plot of the correlation between the per-centage change of PCA and the percentage change of PCAS is shown in Fig. 5.

Table 2 The percentage of chewing ability and the perceived chewing ability scores obtained from the two tests and the percentage change (n=33).

	Test 1	Test 2	Percentage change Mean [(95% CI)]
Percentage of chewing ability (mean ± S.D.)	24.26 ± 8.06	34.35 ± 4.54	10.09 (7.32, 12.86)
Perceived chewing ability scores (mean ± S.D.)	29.85 ± 6.14	39.24 ± 4.72	22.37 (15.75, 28.98)

r = 0.35, p < 0.05
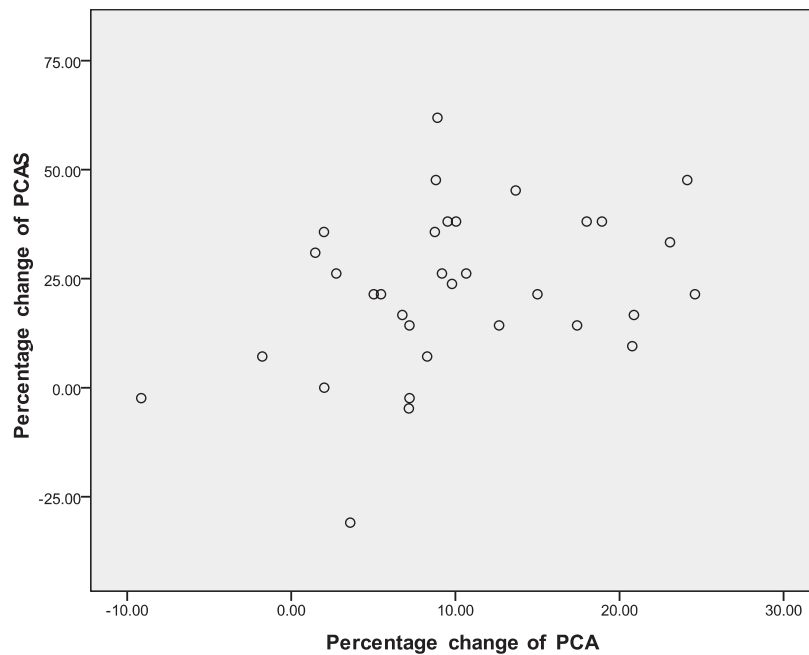
Fig. 5 Scatter plot of the correlation between the percentage change of PCA and the percentage change of PCAS.

Discussion

As shown in the descriptive data, the subjects in the present study belong to the early elderly group, with a mean age of 69.4 ± 8.2 years. The systemic diseases reported by some participants included hypertension and diabetes mellitus. All implant fixtures successfully integrated with the alveolar bone. This result suggests that the subjects show favorable outcome of implant treatment in the limited study periods. Nevertheless, this result should be confirmed in a longer term.

Receiving a mandibular implant-retained overdenture has been shown to benefit patients in several ways, including improved chewing function[6] and quality of life.[7] However, financial issues are a barrier to many edentulous patients in accessing this treatment.[21] Therefore, it is important that this kind of treatment should be included in all oral health insurance programs and the academic should help in enhance dentists' skill to the treatment modality.

Many studies have demonstrated that patients treated with mandibular implant-retained overdentures experienced improvement in chewing function compared to conventional mandibular complete dentures.[22-23] The present study aimed to develop a food intake questionnaire for Thai elderly and to compare and find the relationship between the chewing ability evaluated by the subjective assessment using a developed questionnaire and the objective assessment using a wax cube analysis method in the mandibular implant-retained overdenture patients. The first measurement of the subjective and the objective method was performed at one month post implant placement because the participants would have proprioception from the implant fixtures that had been placed in the edentulous ridge. Then, at that time, the subjects could rate their subjective chewing ability precisely.

To achieve proper function, patients require time to adjust themselves with the new prostheses in their mouth. A previous study demonstrated an improvement in chewing function after 3 months of use of implant-retained prostheses.[22] By that time, the subjects appeared to be more motivated and also more capable

of judging their chewing ability.[24] Furthermore, ball attachment mandibular prostheses exhibited no alteration of retention force and relatively few functional problems after 3 months of loading.[25] Therefore, we decided to examine the relationship between the subjective and the objective methods 3 months after the insertion of the mandibular implant–retained overdentures.

For questionnaire development, the subjects of pilot investigations and the main study were mostly resided in Bangkok, Thailand. Therefore, it might be claimed that most of these subjects consumed foods in the same manner. From the test-retest reliability assessment, a Kappa value of 0.733 indicated that the responses between the two time points were in substantial agreement.[20] This can be assumed that all of the subjects in this study were able to understand the content and scale used in the questionnaire and their responses are reliable.

In the patients' subjective analysis of their chewing ability in our study, they described a marked increase in chewing ability at the second test, averaging nearly a full score. The increased scores suggest that the patient's demands and expectations were either very modest or easily met.[26]

In the present study, the correlation between the subjective and the objective chewing ability analysis method was weak, which is in agreement with the findings of most studies.[27,28] This weak correlation might be influenced from uncontrolled factors such as age, sex and different period of denture wearing of the participants. Furthermore, the subjects' responses might be affected by the food preference more than by the physical limitation. Moreover, it might be encountered from the content validity of the questionnaire, which measures the chewing ability subjectively in a restricted range of score. Nevertheless, it is recommended to evaluate this relationship over a longer time.

Since it is the clinically long–term study within the limitation of the time, therefore there are only 33 patients that passed all the inclusion criteria and willing to join this project. For more information, we need to observe and collect data from these selected subjects in the long term in many aspects. In addition, the developed questionnaire of this study was created based on elderly Thais residing in the central region. To appropriately apply this questionnaire in other areas, the food items may need to be modified accordingly

Although there was only a weak correlation between the subjective and the objective assessments of chewing ability, it is reasonable to assess masticatory function using a questionnaire because the outcome of the objective measurements do not always reflect the patients' performance in their daily living. Despite the subjective chewing ability score is individual subjec-tively different, it accurately reflects patients' actual function. Thus, it seems logical that patient–based ratings of performance be considered as valid outcome measures.[29]

Conclusion

There is a statistically significant relationship between the chewing ability changes evaluated by the subjective and the objective assessment.

Acknowledgement

References

1. Locker D. Changes in chewing ability with ageing: a 7-year study of older adults. J Oral Rehabil. 2002;29:1021-9.

2. Kapur K, Soman S. Masticatory performance and efficiency in denture wearers. J Prosthet Dent. 2006;95:407-11.

3. Redford M, Drury T, Kingman A. A denture use and the technical quality of dental prostheses among persons 18-74 years of age: United States 1988-1991. J Dent Res. 1996;75:714-25.

4. Sheiham A, Steele JG, Marcenes W, Lowe C, Finch S, Bates CJ, et al. The relationship among dental status, nutrient intake, and nutritional status in older people. J Dent Res. 2001;80:408-13.

5. Feine JS, Carlsson GE, Awad MA, Chehade A, Duncan WJ, Gizani S, et al. TheMcGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. Gerodontology. 2002;19:3-4.

6. van der Bilt A, Burgers M, Kampen FMC, Cune MS. Mandibular implant-supported overdentures and oral function. Clin Oral Impl Res. 2010;21:1209-13.

7. Harris D, Höfer S, O'Boyle CA, Sheridan S, Marley J, Benington IC, et al. A comparison of implant-retained mandibular overdentures and conventional dentures on quality of life in edentulous patients: a randomized, prospective, within-subject controlled clinical trial. Clin Oral Impl Res. 2013;24:96-103.

8. Kapur K, Soman S, Yurkstas A. Test foods for measuring masticatory performance of denture wearers. J Prosthet Dent. 1964;14:483-91.

9. Matsui Y, Ohno K, Michi K, Hata H, Yamagata K, Ohtsuka S. The evaluation of masticatory function with low adhesive colour-developing chewing gum. J Oral Rehabil. 1996;23:251-6.

10. Sato H, Fueki K, Sueda S, Sato S, Shiozaki T, Kato M, et al. A new and simple method for evaluating masticatory function using newly developed artificial test food. J Oral Rehabil. 2003;30:68-73.

11. Sato S, Fueki K, Sato H, Sueda S, Shiozaki T, Kato M, et al. Validity and reliability of a newly developed method for evaluating masticatory function using discriminant analysis. J Oral Rehabil. 2003;30:146-51.

12. Prapatrungsri K, Petsom A, Kaewplung O. The evaluation of chewing ability by locally developed wax cubes. J Dent Assoc Thai. 2010;60:66-73.

13. Liangbunyaphan S, Petsom A, Kaewplung O. The development of wax cube hardness for chewing ability evaluation. J Dent Assoc Thai. 2012;62:85-92.

14. Locker D. Patient-based assessment of the outcomes of implant therapy: a review of the literature. Int Dent J. 1998;11:453-61.

15. Sato Y, Akagawa Y, Nagasawa T. An evaluation of chewing function of complete denture wearers. J Prosthet Dent. 1989;62:50-3.

16. Giddon DB, Hittelman E. Psychologic aspects of prosthodontic treatment for geriatric patients. J Prosthet Dent. 1980;43:374-9.

17. Miura H, Miura K, Mizugai H, Arai Y, Umenai T, Isogai E. Chewing ability and quality of life among the elderly residing in a rural community in Japan. J Oral Rehabil. 2000;27:731-4.

18. McGarry TJ, Nimmo A, Skiba JF, Ahlstrom RH, Smith CR, Koumjian JH. Classification system for complete edentulism. J Prosthod. 1999;8:27-39.

19. Lapsukkitkul J, Sessirisombat S. A comparative study of Fun-Yim implant between single and two-stage implant placement for implant-retained mandibular overdenture. J Dent Assoc Thai. 2012;62:41-51.

20. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. Fam Med. 2005;37:360-3.

21. Müller F, Salem K, Barbezat C, Herrmann FR,

Schimmel M. Knowledge and attitude of elderly persons towards dental implants. Gerodontology. 2012;29:e914-23.

22. Stellingsma K, Slagter AP, Stegenga B, Raghoebar M. Mastocatory function in patients with an extremely resorbed mandible restored with mandibular implant-retained overdentures: comparison of three types of treatment protocols. J Oral Rehabil. 2005;32:403-10.

23. vanKampen FMC, van der Bilt A, Cune MS, Fontjin-Tekamp FA, Bosman F. Masticatory function with implant-supported overdentures. J Dent Res. 2004;83:708-11.

24. Gunne HJ, Wall A. The effect of new complete dentures on mastication and dietary intake. Acta Odontol Scand. 1985;43:257-68.

25. van Kampen F, Cune M, van der Bilt A, Bosman F. Retention and postinsertion maintanance of bar-clip,ball and magnet attachments in mandibular implant overdenture treatment: an in vivo comparison after 3 months of function. Clin Oral Impl Res. 2003;14:720-6.

26. Geertman ME, Slagter AP, van T Hof MA, van Waas MAJ, Kalk W. Masticatory performance and chewing experience with implant-retained mandibular overdentures. J Oral Rehabil. 1999; 26:7-13.

27. Slagter AP, Olthoff LW, Bosman F, Steen WH. Masticatory ability, denture quality, and oral conditions in edentulous subjects. J Prosthet Dent. 1992;68:299-307.

28. Boretti G, Bickel M, Geering AH. A review of masticatory ability and efficiency. J Prosthet Dent. 1995;74:400-3.

29. Feine JS, Lund JP. Measuring chewing ability in randomized controlled trials with edentulous populations wearing implant prostheses. J Oral Rehabil. 2006;33:301-8.

การเปรียบเทียบความสามารถในการบดเคี้ยวของผู้ป่วยใส่ฟันเทียมทั้งปากล่างคร่อมรากฟันเทียม ประเมินด้วยวิธีตรวจพินิจแบบจิตวิสัยและวิธีตรวจพินิจแบบวัตถุวิสัย

นีรัช กุลอ่อน ท.บ., วท.ม.[1]
อรพินท์ แก้วปลั่ง ท.บ., **Ph.D.**[2]

[1] แผนกทันตกรรม โรงพยาบาลปักธงชัย จังหวัดนครราชสีมา
[2] ภาควิชาทันตกรรมประดิษฐ์ คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

บทคัดย่อ

วัตถุประสงค์ เพื่อเปรียบเทียบความสามารถในการบดเคี้ยวในผู้ป่วยสูงอายุไทยที่ใส่ฟันเทียมทั้งปากล่างคร่อมรากฟันเทียมระหว่างการใช้วิธีการตรวจพินิจแบบจิตวิสัยกับวิธีการตรวจพินิจแบบวัตถุวิสัย

วัสดุและวิธีการ ผู้เข้าร่วมวิจัยจำนวน 33 รายถูกคัดเลือกเพื่อเข้าร่วมการศึกษา ความสามารถในการบดเคี้ยวของผู้เข้าร่วมวิจัยเหล่านั้นถูกประเมิน 2 ครั้ง คือ ภายหลังการฝังรากฟันเทียม 1 เดือน และภายหลังใส่ฟันเทียมทั้งปากล่างคร่อมรากฟันเทียม 3 เดือน โดยการประเมินความสามารถในการบดเคี้ยวด้วยวิธีการตรวจพินิจแบบจิตวิสัยใช้แบบสอบถามที่พัฒนาขึ้น ซึ่งประกอบด้วยรายการอาหารทั่วไปจำนวน 14 ชนิด สำหรับการประเมินความสามารถในการบดเคี้ยวด้วยวิธีการตรวจพินิจแบบวัตถุวิสัยถูกประเมินด้วยวิธีการวิเคราะห์ชิ้นขี้ผึ้งจากนั้นวิเคราะห์ความสัมพันธ์ระหว่างการเปลี่ยนแปลงความสามารถในการบดเคี้ยวที่ประเมินด้วยวิธีการตรวจพินิจแบบจิตวิสัยกับวิธีการตรวจพินิจแบบวัตถุวิสัยด้วยสถิติ Pearson's correlation

ผลการศึกษา ผลการศึกษาแสดงให้เห็นว่าการเปลี่ยนแปลงความสามารถในการบดเคี้ยวที่ประเมินด้วยวิธีการตรวจพินิจแบบจิตวิสัยมีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับแบบวัตถุวิสัย (r = 0.35, $p < 0.05$)

สรุป มีความสัมพันธ์กันอย่างมีนัยสำคัญทางสถิติระหว่างการเปลี่ยนแปลงความสามารถในการบดเคี้ยวที่ประเมินด้วยวิธีการตรวจพินิจแบบจิตวิสัยกับวิธีการตรวจพินิจแบบวัตถุวิสัย

(ว ทันต จุฬาฯ 2557;37:171–182)

คำสำคัญ: *การตรวจพินิจแบบจิตวิสัย; การตรวจพินิจแบบวัตถุวิสัย; ความสามารถในการบดเคี้ยว; ฟันเทียมทั้งปากล่างคร่อมรากฟันเทียม; ผู้สูงอายุไทย*

ผู้รับผิดชอบบทความ อรพินท์ แก้วปลั่ง orapin.dent@gmail.com