DURATION AND LENGTH OF ADAPTATION TO NEW COMPLETE DENTURES: A SURVEY BASED ON PATIENTS' SELF-REPORTED OUTCOMES

Renata Poljak-Guberina[1a*] , Tina Poklepović-Peričić[1b] , Marko Guberina[2c] , Asja Čelebić[3d*]

[1]Department of Dental Prosthodontics, School of Medicine, University of Split, Split, Croatia
[2]Department of Oral Surgery, Dental Polyclinic Zagreb, Zagreb, Croatia
[3]Department of Removable Prosthodontics, School of Dental Medicine, University of Zagreb, Zagreb, Croatia

[a]DMD, PhD, Assistant Professor; e-mail: rpoljak@mefst.hr; ORCIDiD: https://orcid.org/0000-0002-6081-8424
[b]DMD, PhD, Assistant Professor; e-mail: tinapoklepovic@gmail.com; ORCIDiD: https://orcid.org/0000-0002-9686-5062
[c]DMD; email: markoguberina@yahoo.com; ORCIDiD: https://orcid.org/0000-0003-3717-1324
[d]DMD, PhD, Professor (tenured); email: celebic@sfzg.hr; ORCIDiD: https://orcid.org/0000-0001-5985-8966

ABSTRACT

Introduction We studied the duration of adaptation to new complete dentures (CD) and changes for 5 years based on patients' self-reported outcomes.

Methodology Sixty fully edentulous patients who received new CDs and wore them for 5 years were included. A questionnaire (answers 0-10 VAS) related to self-perceived speech, chewing function, comfort of denture wearing, denture retention, and orofacial esthetics was completed on the 1st, 3rd, 8th, 15th, and 30th day after new CD delivery, and after 1, 3, and 5 years of denture wearing.

Results Self-perceived speech reached the highest scores on the 30th day; females and previous removable denture (RD) wearers adapted faster during the first days. Chewing reached the highest scores on the 30th day, remained unchanged over the 1st year, and decreased significantly afterwards; females gave higher scores during the first 15 days and previous RD wearers from the 3rd till the 30th day. A comfort of denture wearing first slightly decreased, but soon increased, reaching the highest values the 30th day, remained unchanged after one year, then decreased gradually, with no significant difference between gender and previous RD experience. Retention scores decreased after 3 and 5 years, without difference between gender and previous RD experience. Orofacial esthetics scores decreased substantially after 3 years with no effect of gender and previous experience (p>0.05).

Conclusion The highest scores were obtained for orofacial esthetics and speech, the lowest for chewing function. Participants needed 30 days to adapt to new CDs. The adaptation lasted one year and decreased significantly the 3rd and the 5th year.

KEYWORDS

Complete Denture; Adaptation; Chewing; Speech; Comfort Esthetics.

1. INTRODUCTION

Edentulism represents a certain level of physical impairment, which is regarded as a chronic disability, causing many edentulous individuals to face obstacles in their everyday activities, such as eating or speaking [1]. Furthermore, it may significantly impact an individual's psychological and social functioning and the overall quality of life [2,3,4]. Global trends have shown significant differences in the rates of edentulism worldwide [1,2,3,5]. Recent data from developed countries demonstrated a slight but encouraging decline in complete edentulism [6]. However, although edentulism is becoming less frequent in developed, industrialized countries, it remains prevalent in many parts of the world, and a complete denture is still one of the most frequent treatment options in cases of edentulism, especially considering older patients [1,6-9]. Prosthodontic treatment using a complete denture (CD) aims to achieve oral rehabilitation and reestablishment of the lost function, namely speech, occlusion, aesthetics, and masticatory function. It is considered one of the main challenges of prosthodontic treatment [9-15]. It is important to obtain satisfactory retention and stability of CDs, crucial factors for successful adaptation to them [15,16]. The masticatory function, antagonistic contacts, and preservation of masticatory muscle reflexes in CD patients were negatively correlated with the development of dementia in old patients [14,17]. The success of treatment with CDs is further influenced by many other factors that are also important to secure optimal retention and

stabilization of a denture, such as characteristics of the saliva, status of the alveolar bone, condition of the mucosa and its resilience, relations between maxillary and mandibular residual alveolar ridges and neuromuscular factors [7-11,16,18]. Besides, a new denture may cause difficulties during speaking, and time is needed for patients to reach a satisfactory level of speech [16,18]. Although the quality of a new denture depends mainly on technological, biological, and physiological factors, it also depends on the interaction between the patient and the therapist [7]. However, long time CD wearing elicits some inherent problems, such as continuous residual ridge resorption, injuries of underlying mucosa, mucosal inflammation, flabby ridge development, and even loss of a complete alveolar ridge bone with consequent loss of denture retention and stability, loss of vertical dimension of the lower third of a face, and contra-clockwise rotation of the mandible [19-24]. As the mandible is more prone to residual alveolar ridge loss, recent recommendations of a panel of experts led to McGill consensus proposing that the minimum treatment needed for completely edentulous subjects is a manufacture of maxillary complete denture and a mandibular two-implant overdenture [25, 26, 27]. In subjects with narrow alveolar ridges, rehabilitation with four mini implant retained mandibular overdenture is also an option. Unfortunately, rehabilitation of the implant retained overdenture is usually not available to many patients due to economic, social, or general health issues [7-15,27,28]. Consequently, the manufacture of conventional CDs is the only treatment option for them. A certain amount of time is needed for a patient to accept a new prosthodontic device, especially a removable denture [8-15]. This study aimed to assess how long patients need to adapt to their new conventional CDs and how long their satisfaction lasts. An additional aim was to evaluate the association between gender, previous removable denture experience, and age with adaptation to CDs and self-perceived satisfaction.

2. METHODOLOGY

2.1. Sample
The subjects recruited in this study comprised 82 fully edentulous individuals needing new CDs, unwilling to undertake implant-supported mandibular overdenture treatment for different reasons, primarily due to a fear of a surgical procedure, general health, or economic reasons. A total of 40 participants received new CDs at the Department of Prosthodontics, Dental Polyclinic, Split, Croatia, from September 2015 to June 2016. The Ethics Committee of the School of Dental Medicine in Split approved the study. Another 42 participants received new CDs at the Department of Removable Prosthodontics, School of Dental Medicine, Zagreb, Croatia, in the same period, with the approval of the Ethics Committee of

the respective dental school (No. 05-PA-26-6/2015). After 30 days, one patient was not available for the recall examination, after 12 months an additional 9 patients dropped out, after 3 years 5 more patients dropped out, and another seven patients were not available after 5 years. Finally, 60 patients completed the prospective clinical study and were included in the final analysis. The flowchart of the study protocol and drop-outs is presented in Figure 1.
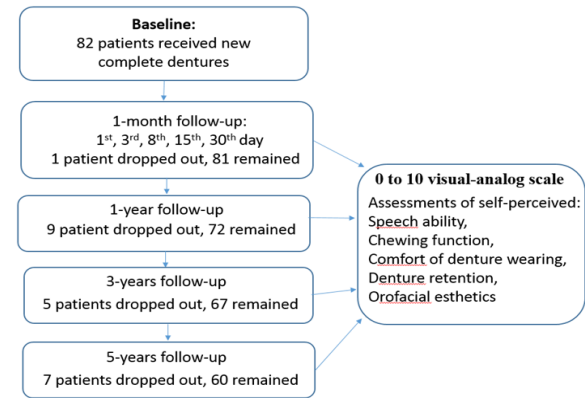

Figure 1. Flowchart of the study protocol and the participants' availability at follow-up examinations.

2.2. Complete denture manufacture
All dentures were made following the same criteria. After alginate preliminary impressions, custom trays were made, and custom (individual) impressions were obtained for everyone. After registration of the vertical jaw relation in a centric position, the occlusal rims were transferred into a semi-adjustable articulator. The semi-anatomical artificial teeth and a lingualized occlusion scheme, with no attempt of occlusal balance were applied. New CDs were processed after the artificial teeth set-up in a trial denture and verification of satisfactory esthetics and antagonistic contacts in a centric relation in the mouth. After the new dentures delivery, during adaptation, the occlusion was checked and adjusted if necessary, oral mucosa was inspected for soreness, and the denture was trimmed-off when necessary.

Two experienced specialists in Prosthodontics, who were not involved in the CD manufacture assessed the quality of new complete dentures in retention (quality of fit), flange extension, stability, esthetics, and occlusion, as described in previous studies [8,9] . The observers listed the dentures into low, average or high quality dentures. The weighted kappa statistics was calculated based on the number of matching categories between the two observes and showed satisfactory agreement (κ= 0.808). Only patients with high-quality new dentures were recruited in the study.

2.3. Study protocol
After the new CDs delivery, the patients had to fill in a small questionnaire consisting of two parts. The first part comprised data about gender, age, and previous dental status in their mouth [fixed partial denture or natural teeth (FPD); removable partial denture (RPD)].

The second part comprised five questions with the answers on the 0 to 10 visual-analog scale (VAS) for assessment of self-perceived speech ability, chewing function, comfort of denture wearing, denture retention, and orofacial esthetics. Assessments were repeated on the 3rd day after CDs delivery, 8th day, 15th day, and 30th day. Same assessments were again repeated after 9-12 months of denture wearing and in a period after 3 and after 5 years of denture wearing. The checks were made in a dental office for the 1st, 3rd, 8th, and 15th day. If the patients needed any denture adjustments, they also came to a dental office, and if not, they were assessed by telephone. The one-year, 3-year and 5-year examination was performed in a dental office. The flowchart is presented in Figure 1.

2.4. Statistical analysis
We used the IBM SPSS Statistics for Windows (Version 20.0.; IBM Corp, Armonk, NY, USA) to evaluate the descriptive statistics (medians, modal values, quartiles, means and standard deviations for the patients' self-perceived assessments of their speech, chewing ability, denture retention, the comfort of denture wearing, and their orofacial esthetics). Changes over time were estimated by the Friedman non-parametric test for related samples. Comparisons between gender and comparison between patients who previously wore removable denture and the first time removable denture wearers were performed by non-parametric Mann-Whitney test.

3. RESULTS

The patients' age was between 66 and 81 years. There were 44 females (77.3%) and 16 males (26.7%). Seven patients (3 females, 4 males) (11.66%) had natural teeth or a fixed partial denture before treatment with new complete dentures (were the first time

removable denture wearers), while 53 patients (41 females, 12 males) (88.33%) already had experience with removable partial dentures.

The patients' self-perceived speech ability on the 1st, 3rd, 8th, 15th, and 30th day after complete denture delivery, and after 12 months, 3 years and 5 years of denture wearing is presented in Table. 1. The scores gradually increased till the 30th day after CD delivery, then remained almost unchanged at the 12 months and 3-year recall examinations and only slightly decreased after 5 years of denture wearing. Statistically significant difference existed between the observed periods (Friedman test; $X^2=116.04$, df=7, ($p=<0.001$), mostly due to lower grades till the 30th day. However, participants without previous removable denture experience gave lower scores during the first 15 days, but after 30 days and further on no significant difference was observed between previous CD and the first time CD wearers (Table 2, Mann-Whitney test). Females gave better scores for speech than males during the first 15 days of denture wearing (Tab. 2).

The patients' self-perceived chewing ability on the 1st, 3rd, 8th, 15th, and 30th day after complete denture delivery, and after 12 months, 3 years and 5 years of denture wearing is presented in Table 1. The scores were the lowest from the 1st to the 8th day, afterwards increased, reached the highest values on the 30th day, remained almost unchanged during the first year and afterwards decreased (the 3rd year) and reached the lowest values in the 5th year of follow-up examination (Friedman test; $X^2=223.45$, df=7, $p=<0.001$). During the first 3 days after new CDs' delivery no significant difference existed between the previous and the first time denture wearers, but after the 3rd day previous CD wearers gave significantly better scores than the first time denture wearers; that remained unchanged till the 3rd year.

Table 1. Medians, mods, means, and percentiles of self-assessed speech, chewing, the comfort of denture wearing, denture retention, and esthetics.

Speech		1st day	3rd day	8th day	15th day	30th day	1 year	3 years	5 years
Median		**8.50**	**9.00**	**9.00**	**9.00**	**10.00**	**10.00**	**10.00**	**10.00**
Mode		10	10	10	10	10	10	10	10
Mean		8.27	8.43	8.83	9.08	9.43	9.58	9.50	9.28
SD (mean)		1.89	1.84	1.28	1.09	0.81	0.67	0.70	0.96
Percentile	25	7.00	8.00	8.00	8.00	9.00	9.00	9.00	9.00
	50	8.50	9.00	9.00	9.00	10.00	10.00	10.00	10.00
	75	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Chewing		1st day	3rd day	8th day	15th day	30th day	1 year	3 years	5 years
Median		**7.00**	**7.00**	**7.00**	**8.00**	**9.00**	**9.00**	**7.00**	**6.50**
Mode		7	7	7	8	9	9	7	6
Mean		6.87	6.73	7.45	8.02	8.87	8.95	7.48	6.57
SD (mean)		1.70	2.00	1.73	1.51	0.87	0.81	1.07	1.73
Percentile	25	6.00	5.25	7.00	7.00	8.00	9.00	7.00	6.00
	50	7.00	7.00	7.00	8.00	9.00	9.00	7.00	6.50
	75	8.00	8.00	8.00	9.00	10.00	9.00	8.00	8.00

Original Articles

Comfort of denture wearing	1st day	3rd day	8th day	15th day	30th day	1 year	3 years	5 years
Median	9.00	8.00	8.00	8.50	9.00	9.00	8.00	6.50
Mode	10	10	10	10	10	9	9	9
Mean	8.03	7.60	8.27	8.43	9.03	8.77	7.53	6.40
SD (mean)	2.25	2.28	1.65	1.44	1.12	0.96	1.32	2.20
Percentile 25	7.00	6.00	7.00	7.00	8.00	8.00	6.00	5.00
50	9.00	8.00	8.00	8.50	9.00	9.00	8.00	6.50
75	10.00	10.00	10.00	10.00	10.00	9.00	9.00	8.00

Retention of complete dentures	1st day	3rd day	8th day	15th day	30th day	1 year	3 years	5 years
Median	9.00	8.00	9.00	9.00	9.00	9.00	7.00	5.50
Mode	10	8	8	9	10	9	7	5
Mean	8.63	8.13	8.50	8.63	9.17	8.70	6.97	5.50
SD (mean)	1.83	2.05	1.56	1.39	0.98	0.94	1.66	2.13
Percentile 25	8.00	8.00	8.00	8.00	9.00	8.00	6.00	4.00
50	9.00	8.00	9.00	9.00	9.00	9.00	7.00	5.50
75	10.00	10.00	10.00	10.00	10.00	9.00	8.00	7.00

Esthetics	1st day	3rd day	8th day	15th day	30th day	1 year	3 years	5 years
Median	10.00	10.00	10.00	10.00	10.00	10.00	9.00	8.00
Mode	10	10	10	10	10	10	9	9
Mean	9.40	9.63	9.70	9.73	9.80	9.72	8.60	7.58
SD (mean)	1.09	0.66	0.65	0.58	0.48	0.58	1.12	2.05
Percentile 25	9.00	9.00	10.00	10.00	10.00	10.00	8.00	7.00
50	10.00	10.00	10.00	10.00	10.00	10.00	9.00	8.00
75	10.00	10.00	10.00	10.00	10.00	10.00	9.00	9.00

Table 2. Significance of the differences for the self-perceived speech ability between gender, and between participants with previous removable denture experience and the first time complete denture wearers over the observed period.

SPEECH	PREVIOUS RPD EXPERIENCE	N	MEAN RANK	P			GENDER	N	MEAN RANK	P
1ST DAY	no	7	7.36	<0.001 **		1ST DAY	female	44	34.91	0.001 **
	yes	53	33.56				male	16	18.38	
3RD DAY	no	7	8.93	<0.001 **		3RD DAY	female	44	34.86	0.001 **
	yes	53	33.35				male	16	18.5	
8TH DAY	no	7	10.64	0.001 **		8TH DAY	female	44	34.55	0.002**
	yes	53	33.12				male	16	19.38	
15TH DAY	no	7	12.36	0.001 **		15TH DAY	female	44	32.98	0.051 NS*
	yes	53	32.90				male	16	23.69	
30TH DAY	no	7	19.64	0.08 NS		30TH DAY	female	44	32.98	0.25 NS
	yes	53	31.93				male	16	26.75	
1 YEAR	no	7	18.86	0.061 NS		1 YEAR	female	44	32.39	0.09 NS
	yes	53	32.04				male	16	25.31	
3 YEARS	no	7	20.86	0.25 NS		3 YEARS	female	44	31.66	0.33 NS
	yes	53	31.77				male	16	27.31	
5 YEARS	no	7	24.29	0.33 NS		5 YEARS	female	44	31.05	0.66 NS
	yes	53	31.32				male	16	29.00	

**=$p<0.01$; *=$p<0.05$; NS=not significant. **=$p<0.01$; *=$p<0.05$; NS=not significant.

Afterwards no significant difference existed (Table 3). Females gave better scores to chewing than males for the first 15 days and at the one-year observation (Table 3).

Table 3. Significance of the differences for the self-perceived chewing ability between gender, and between participants with previous removable denture experience and the first time complete denture wearers over the observed period.

CHEWING	PREVIOUS RPD EXPERIENCE	N	MEAN RANK	P
1ST DAY	no	7	20.71	0.119 NS
	yes	53	31.79	
3RD DAY	no	7	21.07	0.113 NS
	yes	53	31.75	
8TH DAY	no	7	17.14	0.030 *
	yes	53	32.26	
15TH DAY	no	7	18.21	0.046 *
	yes	53	32.12	
30TH DAY	no	7	16.86	0.026 *
	yes	53	32.30	
1 YEAR	no	7	14.79	0.009 **
	yes	53	32.58	
3 YEARS	no	7	21.50	0.150 NS
	yes	53	31.69	
5 YEARS	no	7	22.29	0.194 NS
	yes	53	31.58	

**= $p<0.01$; *= $p<0.05$; NS=not significant.

	GENDER	N	MEAN RANK	P
1ST DAY	female	44	34.55	0.003 **
	male	16	19.38	
3RD DAY	female	44	35.58	<0.001 **
	male	16	16.53	
8TH DAY	female	44	34.31	0.004 **
	male	16	20.03	
15TH DAY	female	44	33.43	0.027 *
	male	16	22.44	
30TH DAY	female	44	32.43	0.134 NS
	male	16	25.19	
1 YEAR	female	44	33.65	0.011 *
	male	16	21.84	
3 YEARS	female	44	31.88	0.286 NS
	male	16	26.72	
5 YEARS	female	44	32.39	0.156 NS
	male	16	25.31	

**= $p<0.01$; *= $p<0.05$; NS=not significant.

The patients' self-perceived comfort of denture wearing is presented in Table 1. It decreased after the 1st day till the 8th day, then increased till the 30th day remained unchanged at the 1-year follow-up and again decreased after 3 and 5 years (Friedman test;

$X^2=223.45$, df=7, $p=<0.001$). There was no significant differences between males and females, and between those without or with previous removable denture experience (Table 4).

Table 4. Significance of the differences for the self-perceived comfort of denture wearing between gender, and between participants with previous removable denture experience and the first time complete denture wearers over the observed period.

COMFORT	PREVIOUS RPD EXPERIENCE	N	MEAN RANK	P
1ST DAY	no	7	29.07	0.822 NS
	yes	53	30.69	
3RD DAY	no	7	32.79	0.718 NS
	yes	53	30.20	
8TH DAY	no	7	27.64	0.652 NS
	yes	53	30.88	
15TH DAY	no	7	21.93	0.171 NS
	yes	53	31.63	
30TH DAY	no	7	23.93	0.296 NS
	yes	53	31.37	
1 YEAR	no	7	22.50	0.202 NS
	yes	53	31.56	
3 YEARS	no	7	27.57	0.652 NS
	yes	53	30.89	
5 YEARS	no	7	29.93	0.928 NS
	yes	53	30.58	

**= $p<0.01$; *= $p<0.05$; NS=not significant.

	GENDER	N	MEAN RANK	P
1ST DAY	female	44	32.23	0.188 NS
	male	16	25.75	
3RD DAY	female	44	30.45	0.973 NS
	male	16	30.63	
8TH DAY	female	44	30.77	0.836 NS
	male	16	29.75	
15TH DAY	female	44	31.14	0.629 NS
	male	16	28.75	
30TH DAY	female	44	31.59	0.392 NS
	male	16	27.50	
1 YEAR	female	44	33.02	0.067 NS
	male	16	24.75	
3 YEARS	female	44	31.09	0.196 NS
	male	16	28.88	
5 YEARS	female	44	28.86	0.499 NS
	male	16	35.00	

**= $p<0.01$; *= $p<0.05$; NS=not significant.

The results were similar with the self-perceived assessment of denture retention, with a more emphasized decrease after one year (Friedman test; $X^2=218.65$, df=7, $p=<0.001$) (Table 1) Also, no significant differences were found between gender and previous or the first time denture wearers (Table 5).

Table 5. Significance of the differences for the self-perceived complete dentures' retention between gender, and between participants with previous removable denture experience and the first time complete denture wearers over the observed period.

RETENTION	PREVIOUS RPD EXPERIENCE	N	MEAN RANK	P
1ST DAY	no	7	32.64	0.735 NS
	yes	53	30.22	
3RD DAY	no	7	30.79	0.964 NS
	yes	53	30.46	
8TH DAY	no	7	29.93	0.928 NS
	yes	53	30.58	
15TH DAY	no	7	23.93	0.296 NS
	yes	53	31.37	
30TH DAY	no	7	23.64	0.276 NS
	yes	53	31.41	
1 YEAR	no	7	21.21	0.152 NS
	yes	53	31.86	
3 YEARS	no	7	29.71	0.152 NS
	yes	53	30.60	
5 YEARS	no	7	21.50	0.150 NS
	yes	53	31.82	

$**=p<0.01; *=p<0.05$; NS=not significant.

	GENDER	N	MEAN RANK	P
1ST DAY	female	44	28.59	0.095 NS
	male	16	36.50	
3RD DAY	female	44	29.23	0.095 NS
	male	16	34.00	
8TH DAY	female	44	28.86	0.211 NS
	male	16	35.00	
15TH DAY	female	44	29.18	0.313 NS
	male	16	34.13	
30TH DAY	female	44	28.41	0.098 NS
	male	16	36.25	
1 YEAR	female	44	28.68	0.157 NS
	male	16	35.50	
3 YEARS	female	44	28.77	0.196 NS
	male	16	35.25	
5 YEARS	female	44	29.59	0.499 NS
	male	16	33.00	

$**=p<0.01; *=p<0.05$; NS=not significant.

Table 6. Significance of the differences for the self-perceived esthetics between gender, and between participants with previous removable denture experience and the first time complete denture wearers over the observed period.

ESTHETICS	PREVIOUS RPD EXPERIENCE	N	MEAN RANK	P
1ST DAY	no	7	25.93	0.469 NS
	yes	53	31.10	
3RD DAY	no	7	33.50	0.636 NS
	yes	53	30.10	
8TH DAY	no	7	31.79	0.839 NS
	yes	53	30.33	
15TH DAY	no	7	31.64	0.857 NS
	yes	53	30.35	
30TH DAY	no	7	30.64	0.982 NS
	yes	53	30.48	
1 YEAR	no	7	37.00	0.307 NS
	yes	53	29.64	
3 YEARS	no	7	32.57	0.752 NS
	yes	53	30.23	
5 YEARS	no	7	34.00	0.588 NS
	yes	53	30.04	

$**=p<0.01; *=p<0.05$; NS=not significant.

	GENDER	N	MEAN RANK	P
1ST DAY	female	44	29.55	0.400 NS
	male	16	33.13	
3RD DAY	female	44	28.82	0.110 NS
	male	16	35.13	
8TH DAY	female	44	29.55	0.314 NS
	male	16	33.13	
15TH DAY	female	44	29.59	0.337 NS
	male	16	33.00	
30TH DAY	female	44	30.00	0.570 NS
	male	16	31.88	
1 YEAR	female	44	29.41	0.264 NS
	male	16	33.50	
3 YEARS	female	44	29.81	0.570 NS
	male	16	32.41	
5 YEARS	female	44	29.30	0.366 NS
	male	16	33.81	

$**=p<0.01; *=p<0.05$; NS=not significant.

Self-perceived orofacial esthetics did not change from the 1st day till the 3-year examination, when it decreased and continued to decrease till the 5-year follow-up (Friedman test; $X^2=234.05$, df=7, $p=<0.001$) (Table 1). Although females gave slightly lower scores, no significant differences were found for any of the observation stages (Table 6).
The same results were seen with previous and the first time removable denture wearers (Table 6).

3. DISCUSSION

The treatment of complete or partial edentulousness has always been a major challenge. Although dental implants enable better and longer-lasting adaptation to removable dentures, they are still unavailable to most of the population due to health issues and economic reasons. Therefore, we aimed to study how long it is necessary to adapt to new CDs considering

self-perceived speech function, chewing ability, the comfort of CD wearing, denture retention, and orofacial esthetics. We also aimed to monitor the duration of the peak of patients' satisfaction and the influence of gender, and previous dental status. The study was designed as a longitudinal clinical prospective study in a cohort of edentulous patients receiving new CDs. Most patients gradually adjusted to complete dentures over 30 days. Self-perceived chewing ability, speech and comfort of denture wearing reached the highest scores only after 30 days. However, self-perceived chewing function, and the comfort of denture wearing, first decreased from the 1st to the 8th day and then increased until the 30th day, then remained unchanged through the first year, and decreased after 3 years. Orofacial esthetics and denture retention did not change significantly from the first day to the first year but the scores decreased significantly after 3 years, and even more after 5 years of CD wearing. Speech significantly and gradually increased over 30 days. It seems that the period of 30 days can be considered sufficient for CD adaptation due to speech, chewing and comfort of denture wearing. However, this applies for patients who received high-quality new CDs, as insufficient denture quality has been one of the risk factors for non-adaptation to removable dentures [8,9,29].

It is not surprising that previous RPD wearing influenced a self-perceived speech function, as patients with previous RPD experience adapted faster [8,9,29]. They had already adapted to speaking with a palatal coverage. With first time CD wearers, adjustment to new complete dentures took the longest. When analyzing speech, it is important to have in mind that older patients are more likely to suffer from xerostomia and have difficulty speaking clearly due to insufficient saliva flow, therefore they need to adapt longer [29]. Decrease of a self-perceived speech ability after 5 years of CD wearing can be attributed to the loss of maxillary and mandibular denture retention, mainly due to alveolar bone atrophy over time [19-22], which is significantly higher in CD wearers than in mandibular complete implant-supported overdenture patients [20,31].

During the first days of wearing new CDs, dentures may cause pain and discomfort. That was probably the reason why participants' scores for chewing ability, the comfort of denture wearing, and denture retention first decreased after the 1st day and increased only after the 8th day. The scores peaked on the 30th day, when all occlusal and denture adjustments were finished and patients learned how to speak more clearly. These results remained throughout the 1st year of denture wearing. The results coincide with the results of other studies [11,12,32,33]. No influence of gender and previous denture status was observed on a self-perceived comfort of denture wearing and denture retention. This is in line with the results of some previous research [33-36]. However, gender and previous removable denture experience significantly

influenced chewing function, as females and previous RPD wearers gave better scores. The results were the same for the self-perceived speech ability. Better sores obtained from female patients can be probably explained by their happiness about esthetic outcome. Although males were also almost equally satisfied with esthetics, the accepted cultural and personality standards probably played a role in the fact that females scored some other domains better than men [6,37,38].

The already experienced denture wearers adapted faster, which is in line with other studies [8,9,28,29,39], although it has also been reported that greater overall improvements after complete denture therapy were observed in participants without than in those with previous denture experience [10,40]. First time CD wearers were probably uncomfortable with palatal coverage, which could be a reason for their lower scores immediately after delivery. Previous CD wearers had already adapted to palatal coverage. It has been reported that previous denture wearers also adapted faster as their discrimination of tactile ability significantly increased faster over the first 30 days than in the first time denture wearers [39].

Orofacial esthetics scored highly as in other studies [8,9,38], but the score started to decrease significantly after three years of denture wearing. There could be many reasons. The vertical dimension of the lower third of the face decreases gradually over time due to alveolar ridge atrophy and artificial teeth wear [19-22, 30,31], accompanied by a counterclockwise rotation of the mandible and the appearance of emphasized wrinkles and a decreased lip volume. The CD patients probably noticed that problem. Moreover, artificial teeth and denture materials also absorb colors from drinks and food and stain over time.

All new complete dentures delivered in this study were made without balanced occlusion, as it has been proved that no occlusal scheme is superior regarding chewing ability [11,41,42].

One article reported that 38.0% of patients showed non-adaptation to CDs. Non-adaptation was significantly associated with the absence of previous mandibular denture experience ($p = 0.042$), ulcerations after 15 days of rehabilitation ($p < 0.001$), and a reduced posterior mandibular ridge ($p = 0.035$). After 6 months, this incidence decreased to 14.1% [43]. Our study sample had in the most cases previous CD experience, only 7 of them were the first time CD wearers, which is also the limitation of the study. The strength of the study is the duration of observation up to 5 years.

Our longitudinal prospective clinical research confirmed that the process of adapting to new CDs is usually completed within a month. The patients' satisfaction remained unchanged during the first year and significantly decreases after 3 years of CD wearing in all domains: function, speech, comfort, retention, and esthetics, reaching the lowest scores after 5 years.

Original Articles

REFERENCES
1. Sheiham A, Steele JG, Marcenes W, et al. Prevalence of impacts of dental and oral disorders and their effects on eating among older people; a national survey in Great Britain. *Community Dent Oral Epidemiol.* 2001;29(3):195-203. doi: 10.1034/j.1600-0528.2001.290305.x. PMID:11409678.
Full text link PubMed GoogleScholar Scopus WoS

2. John MT, Feuerstahler L, Waller N, et al. Confirmatory factor analysis of the Oral Health Impact Profile. *J Oral Rehabil.* 2014;41(9):644-652. doi: 10.1111/joor.12191. PMID:24909797
Full text link PubMed GoogleScholar WoS

3. Ozdemir AK, Ozdemir HD, Polat NT, et al. Effect of personality type on denture satisfaction. *Int J Prosthodont.* 2006;19(4):364-370. PMID:16900819
PubMed GoogleScholar Scopus WoS

4. al Quran F, Clifford T, Cooper C, Lamey PJ. Influence of psychological factors on the acceptance of complete dentures. *Gerodontology* 2001l;18(1):35-40. doi: 10.1111/j.1741-2358.2001.00035.x
Full text link PubMed GoogleScholar Scopus

5. Poljak-Guberina R, Čelebić A, Catović A, Živković O. Epidemiological study on removable denture deliveries in different districts of Croatia, 1996-2001 and 2002. *Coll Antropol* 2005;29(1):127-132. PMID:1611731
PubMed GoogleScholar Scopus WoS

6. Partida MN. Geriatric prosthodontic care. *Dent Clin North Am.* 2014;58(1):103-112. doi: 10.1016/j.cden.2013.09.005.
Full text link PubMed GoogleScholar

7. Berg E. Acceptance of full dentures. *Int Dent J.* 1993;43 (3Suppl1)299–306. PMID 8406961
PubMed GoogleScholar

8. Čelebić A, Knezović-Zlatarić D, Papić M, et al. Factors related to patient satisfaction with complete denture therapy. *J Gerontol A Biol Sci Med Sci.* 2003;58(10):M948-M953. doi: 10.1093/gerona/58.10.m948.
Full text link PubMed GoogleScholar WoS

9. Celebić A, Knezović-Zlatarić D. A comparison of patient's satisfaction between complete and partial removable denture wearers. *J Dent.* 2003;31(7):445-451. doi: 10.1016/s0300-5712(03)00094-0.
Full text link PubMed GoogleScholar Scopus WoS

10. Peršić S, Čelebić A. Influence of different prosthodontic rehabilitation options on oral health-related quality of life, orofacial esthetics and chewing function based on patient-reported outcomes. *Qual Life Res.* 2015;24(4):919-926. doi: 10.1007/s11136-014-0817-2.
Full text link PubMed GoogleScholar Scopus

11. Kamalakidis SN, Anastassiadou V, Sofou A, Pissiotis AL. Comparative study of acceptance and adaptation to new complete dentures, using two construction protocols. *J Prosthodont.* 2016; 25(7):536-543. doi 10.1111/jopr.12466
Full text link PubMed GoogleScholar Scopus WoS

12. Tokmakçi M, Asyali M, Zortuk M, Kilinç HI. Effect of chewing on dental patients with total denture: an experimental study. *SpringerPlus* 2013; 40(2):1-8. PMID:23504412; PMCID:PMC3597334; doi: 10.1186/2193-1801-2-40
Full text link PubMed GoogleScholar Scopus WoS

13. Zlatarić DK, Celebić A. Treatment outcomes with removable partial dentures: a comparison between patient and prosthodontist assessments. *Int J Prosthodont.* 2001;14(5):423-426. PMID:12066636
PubMed GoogleScholar Scopus WoS

14. Celebic A, Valentic-Peruzovic M, Alajbeg IZ, et al. Jaw elevator silent periods in complete denture wearers and dentate individuals. *J Electromyogr Kinesiol.* 2008;18(6):947-954. doi: 10.1016/j.jelekin.2007.05.009.
Full text link PubMed GoogleScholar Scopus WoS

15. Alajbeg IZ, Valentic-Peruzovic M, Alajbeg I, et al. The influence of dental status on masticatory muscle activity in elderly patients. *Int J Prosthodont.* 2005;18(4):333-338. PMID:1605278916.
PubMed GoogleScholar Scopus WoS

16. Kim Y, Oh TJ, Misch CE, Wang HL. A systematic review and meta-analysis of removable and fixed implant-supported prostheses in edentulous jaws: post-loading implant loss. *Clin Oral Implants Res.* 2016;27(2):174-195. doi: 10.1111/clr.12531. PMID:25664612; PMCID:PMC5024059.
Full text link PubMed GoogleScholar Scopus WoS

17. Popovac A, Čelebić A, Peršić S, et al. Oral health status and nutritional habits as predictors for developing Alzheimer's disease. *Med Princ Pract.* 2021;30(5):448-454. doi: 10.1159/000518258. PMID:34348313; PMCID:PMC8562035.
Full text link PubMed GoogleScholar Scopus WoS

18. Adaki R, Meshram S, Adaki S. Acoustic analysis and speech intelligibility in patients wearing conventional dentures and rugae incorporated dentures. *J Indian Prosthodont Soc.* 2013;13(4):413-420. doi: 10.1007/s13191-013-0262-x. PMID:24431770; PMCID:PMC3792320.
Full text link PubMed GoogleScholar Scopus

19. Kranjčić J, Kostelić Stunić M, Čelebić A, et al. Denture relining as an indicator of residual ridge resorption. *Med Glas* (Zenica). 2013;10(1):126-132. PMID:23348174
Full text link PubMed GoogleScholar

20. Kovacic I, Knezovic Zlataric D, Celebic A. Residual ridge atrophy in complete denture wearers and relationship with densitometric values of a cervical spine: a hierarchical regression analysis. *Gerodontology.* 2012;29(2):e935-e947. doi: 10.1111/j.1741-2358.2011.00589.x
Full text link PubMed GoogleScholar Scopus WoS

21. Kovacić I, Celebić A, Zlataric DK, et al. Decreasing of residual alveolar ridge height in complete denture wearers. A five year follow up study. *Coll Antropol.* 2010;34(3):1051-1056. PMID:20977102.
PubMed GoogleScholar Scopus WoS

22. Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: a mixed-longitudinal study covering 25 years. *J Prosthet Dent.* 2003;89(5):427-435. doi: 10.1016/s0022-3913(03)00158-6.
Full text link PubMed GoogleScholar Scopus WoS

23. Zlatarić DK, Čelebić A. Clinical bone densitometric evaluation of the mandible in removable denture wearers dependent on the morphology of the mandibular cortex. *J Prosthet Dent.* 2003;90(1):86-91. doi: 10.1016/s0022-3913(03)00171-9.
Full text link PubMed GoogleScholar Scopus WoS

24. Knezović-Zlatarić D, Celebić A. Mandibular bone mineral density changes in complete and removable partial denture wearers: a 6-month follow-up study. *Int J Prosthodont.* 2003;16(6):661-5. PMID:14714848.
Full text link PubMed GoogleScholar Scopus WoS

25. Feine JS, Carlsson GE, Awad MA, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. *Gerodontology.* 2002;19(1):3-4. PMID:12164236.
Full text link PubMed GoogleScholar

26. Kovačić I, Peršić S, Kranjčić J, Čelebić A. A cohort study on short mini-implants for mandibular overdentures compared to those of standard length. *Clin Oral Implants Res.* 2020;31(2):121-132. doi: 10.1111/clr.13542. PMID:31541517
Full text link PubMed GoogleScholar Scopus WoS

27. Čelebić A, Peršić S, Kovačić I, et al. Comparison of three prosthodontic treatment modalities for patients with periodontally compromised anterior mandibular teeth: a 2-year follow-up study. *Acta Stomatol Croat.* 2019;53(1):4-16. doi: 10.15644/asc53/1/1.
Full text link PubMed GoogleScholar Scopus WoS

28. da Veiga Pessoa DM, Roncalli AG, de Lima KC. Economic and sociodemographic inequalities in complete denture need among older Brazilian adults: a cross-sectional population-based study. *BMC Oral Health.* 2016 Jul 4;17(1):5. doi: 10.1186/s12903-016-0233-9.
Full text link GoogleScholar Scopus WoS

29. Carr L, Lucas VS, Becher PJ. Disease, medication and post insertion visits in complete denture wearers. *J Prosthet Dent.* 1993;70(3):257-260. doi: 10.1016/0022-3913(93)90061-r; PMID:8410734.
Full text link PubMed GoogleScholar

30. Carlsson GE. Responses of jawbone to pressure. *Gerodontology.* 2004 Jun;21(2):65-70. doi: 10.1111/j.1741-2358.2004.00005.x.
Full text link PubMed GoogleScholar

31. Sennerby L, Carlsson GE, Bergman B, Warfvinge J. Mandibular bone resorption in patients treated with tissue-integrated prostheses and in complete-denture wearers. *Acta Odontol Scand.* 1988;46(3):135-140. doi: 10.3109/00016358809004759.
Full text link PubMed GoogleScholar Scopus WoS

32. Čelebić A, Stančić I, Kovačić I, et al. Psychometric characteristics of the Croatian and the Serbian versions of the oral health impact profile for edentulous subjects, with a pilot study on the dimensionality. *Zdr Varst.* 2020 31;60(1):55-64. doi: 10.2478/sjph-2021-0009. eCollection 2020 Dec. PMID:33488823; PMCID:PMC7780771.
Full text link PubMed GoogleScholar Scopus WoS
33. Gunne HS, Wall AK. The effect of new complete dentures on mastication and dietary intake. *Acta odontologica Scandinavica.* 1985; 43(5):257-268. PMID:3866477; doi:10.3109/00016358509046506.
Full text link PubMed GoogleScholar WoS
34. Poyiadjis YM, Likeman PR. Some clinical investigations of the masticatory performance of complete denture wearers. *J Dent.* 1984; 12(4):334-341. PMID:6596313; doi:10.1016/0300-5712(84)90093-9
Full text link PubMed GoogleScholar Scopus WoS
35. Alves C, Munhoz M, Nascimento G, et al. The Influence of age, gender, mandibular bone height, previous experience with prostheses, and fabrication methods on masticatory performance of complete denture wearers. *J Prosthodont.* 2019; 28(1): e34-e40. doi: 10.1111/jopr.12948
Full text link PubMed GoogleScholar Scopus WoS
36. Celebić A, Valentić-Peruzović M, Stipetić J, et al. The patient's and the therapist's evaluation of complete denture therapy. *Coll Antropol.* 2000;24 Suppl 1:71-7. PMID:10946468.
PubMed GoogleScholar Scopus WoS
37. Peršić S, Strujic S, Strajnić L, et al. Self-perceived esthetics, chewing function and oral health-related quality of life in patients treated with new removable dentures. *Stoma Edu J.* 2016;(3):92-97. doi: 10.25241/stomaeduj.2016.3(1-2).art.14.
Full text link GoogleScholar
38. Alhajj MN, Ariffin Z, Celebic A, et al. Perception of orofacial appearance among laypersons with diverse social and demographic status. *PLoS One.* 2020;17;15(9):e0239232. doi: 10.1371/journal.pone.0239232.
Full text link PubMed GoogleScholar Scopus WoS

Renata POLJAK-GUBERINA

DMD, PhD, Assistant Professor
Department of Dental Prosthodontics
School of Medicine
University of Split
Split, Croatia

CV

Dr. Poljak-Guberina received her PhD (1998) and specialization in Prosthodontics (2001) from the School of Dental Medicine, University in Zagreb, Croatia. Since 2017, she has been working as Assistant Professor at the Department of Prosthodontics at the Faculty of Dentistry in Split, Split University, Croatia. Her research areas of interest are clinical projects and dental materials.

Questions

1. How long does a patient need to adapt to new complete dentures?

❏ a. One day;
❏ b. Two weeks;
❏ c. Four weeks;
❏ d. Six month.

2. How long does the adaptation to new denture last (based on the data in this manuscript)?

❏ a. One week;
❏ b. One month;
❏ c. One year;
❏ d. 4-5 years.

3. Which two categories received the highest grades after one month of new complete denture wearing, based on patients' self-reported outcomes??

❏ a. Chewing and retention;
❏ b. Comfort of denture wearing and chewing;
❏ c. Retention and speech;
❏ d. Speech and esthetics.

4. Which category did not significantly change within one-month period of new denture wearing?

❏ a. Comfort of denture wearing;
❏ b. Esthetics;
❏ c. Speech;
❏ d. Chewing ability.

Original Articles