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Standardized multi-institutional data analysis of fixed and removable prosthesis: estimation of life expectancy with regards to variable risk factors

Hae-In Jeon[1†], Joon-Ho Yoon[2†], Jeong Hoon Kim[1], Dong-Wook Kim[4,5], Namsik Oh[3], Young-Bum Park[1]*

[1]Department of Prosthodontics, College of Dentistry, Yonsei University, Seoul, Republic of Korea
[2]Department of Prosthodontics, NHIS Ilsan Hospital, Goyang, Republic of Korea
[3]Department of Dentistry, School of Medicine, Inha University, Incheon, Republic of Korea
[4]Department of Information and Statistics, Research Institute of Natural Science, Gyeongsang National University, Jinju, Republic of Korea
[5]Department of Bio & Medical Bigdata (BK21 Plus), Gyeongsang National University, Jinju, Republic of Korea

ORCID
Hae-In Jeon
https://orcid.org/0009-0007-9137-0953
Joon-Ho Yoon
https://orcid.org/0000-0002-4571-7342
Jeong Hoon Kim
https://orcid.org/0000-0003-3993-7418
Dong-Wook Kim
https://orcid.org/0000-0002-4478-3794
Namsik Oh
https://orcid.org/0000-0002-0155-7746
Young-Bum Park
https://orcid.org/0000-0003-4177-1947

Corresponding author
Young-Bum Park
Department of Prosthodontics, College of Dentistry, Yonsei University, 50-1, Yonsei-ro, Seodaemun-gu, Seoul, 03722, Republic of Korea
Tel +82 2 2228 3164
E-mail drybpark@yuhs.ac

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[†]These authors contributed equally to this work.

PURPOSE. This study aims to assess and predict lifespan of dental prostheses using newly developed Korean Association of Prosthodontics (KAP) criteria through a large-scale, multi-institutional survey. **MATERIALS AND METHODS.** Survey was conducted including 16 institutions. Cox proportional hazards model and principal component analysis (PCA) were used to find out relevant factors and predict life expectancy. **RESULTS.** 1,703 fixed and 815 removable prostheses data were collected and evaluated. Statistically significant factors in fixed prosthesis failure were plaque index and material type, with a median survival of 10 to 18 years and 14 to 20 years each. In removable prosthesis, factors were national health insurance coverage, antagonist type, and prosthesis type (complete or partial denture), with median survival of 10 to 13 years, 11 to 14 years, and 10 to 15 years each. For still-usable prostheses, PCA analysis predicted an additional 3 years in fixed and 4.8 years in removable prosthesis. **CONCLUSION.** Life expectancy of a prosthesis differed significantly by factors mostly controllable either by dentist or a patient. Overall life expectancy was shown to be longer than previous research. [J Adv Prosthodont 2024;16:67-76]

KEYWORDS
Life expectancy; Multi-institutional data analysis; Fixed prosthesis; Removable prosthesis; Principal component analysis

INTRODUCTION

Estimation of average longevity of prosthesis has been a subject of interest for both dentists and patients. With the desire to deliver more stable and reliable information to patients, studies of this subject have been reported

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throughout decades. In 1970s, Schwartz[1] examined 1320 units of prosthesis in 406 patients and reported that the average longevity is 10.3 years. In 1990s, Foster[2] and Valderhaug[3] also conducted a research trying to overcome the shortcomings of past studies and reported average longevity as 6.2 years and 10.5 years. Recently, Pjetursson[4] conducted a meta-analysis and reported 5 year survival of 94.4% for fixed partial dentures and 94.7% for single fixed prosthesis. Even still, establishment of solid, standardized evaluation criteria and reflection of varying conditions of individuals considering each risk factor's degree of influence seemed to be necessary since most of the studies had its limitations due to small sample size and being single institution survey. Most of studies with relatively large sample size were meta-analysis studies, and those with prospective or retrospective analysis rarely exceeded sample size of 500 patients. Therefore, categorizing the factors influencing the lifespan of prostheses was limited, and statistical methods mainly focused on calculating mean values for lifespan or observing somewhat fragmented aspects, such as 5-year and 10-year survival rates. Research on the lifespan of dental prostheses is continuously being published, proving that this topic remains of ongoing interest to both patients and dentists. However, most of the studies showed limited variety of restoration materials, restricted number of units, or a small sample size.

In 2014, Korean Assosiation of Prosthodontics (KAP) recognized the necessity of nationwide survey and evaluation of longevity and success rate of prosthesis and developed criteria[5] (KAP criteria) referencing California Dental Association (CDA) guideline and United States Public Health Service (USPHS) criteria, making it possible to present a standardized questionnaire more objective and straightforward for evaluators to use. By using this criteria, KAP aimed to conduct a large-scale sample analysis to reaffirm the lifespan of dental prostheses, using it as an indicator for future policy directions, including national health insurance.

The purpose of this study is to evaluate longevity of fixed and removable prosthesis and its influencing factors according to newly developed KAP criteria by conducting a multi-institution, large sample survey. Independent variables were selected based on previous research published about lifespan of prostheses, including factors clinicians encounter most commonly and frequently.[1-5] Contributing factors will be analyzed by Cox proportional hazards model and Kaplan-Meier analysis. Then, life expectancy will be estimated on high reliablity using PCA analysis based on large sample survey.

MATERIALS AND METHODS

This study's protocol was approved by the Inha University Hospital Institutional Review Board (IRB approval #INHAUH 2017-01-012-001). Survey form was established according to KAP criteria.[5] General review was graded from A to D. Prosthesis that had no defect was graded A. Prosthesis with minor defect, able to be used without any treatment or after simple repair, was graded B. Prosthesis with major defect, unable to be used in long term but could be used temporarily, was graded C. Prosthesis, harmful to adjacent hard or soft tissue thus requiring immediate removal, was graded D. Removal of prosthesis for any reason including esthetics was also graded as D. A, B were considered as success and C, D were considered as failure.

Survey form was distributed to 16 institutions (Chonnam National University Dental Hospital, Chosun University Dental Hospital, Ewha Woman University Medical Center, Gachon University Gil Medical Center, Gangneung-Wonju National University Dental Hospital, Inha University Dental Hospital, Jeonbuk National University Dental Hospital, Kyungpook National University Dental Hospital, Kyung Hee University Dental Hospital, National Health Insurance Service Ilsan Dental Hospital, Dankook University Dental Hospital, Pusan National University Dental Hospital, Seoul National University Dental Hospital, Veterans Hospital Seoul, Wonkwang University Dental Hospital, and Yonsei University Dental Hospital) with support of Korean Dental Association and Korean Ministry of Health and Welfare. Dentists participating in this study were educated by online and offline workshop. Survey forms and evaluation sheets were distributed in advance. Data collection was done by online platform established by Daumsoft corporation, a specialized company in big data collection and analysis. The survey was performed on patients who visited dental hospital from May 1, 2017 to April 30, 2018. Date of prosthesis placement was recorded based on past dental records. In case of absence of past dental records, date was recorded based on patient's statement and patients who did not recur exact year and month of tretment were excluded. To reduce selection bias, prosthesis corresponding to patient's chief complaint was excluded. R version 3.4 (The R Foundation for Statistical Computing, Vienna, Austria) was used for statistical analysis, and P values < .05 were considered statistically significant.

Cox proportional hazards model was used to find out relevance of factors to longevity of prosthesis. Cox regression analysis is a method used to assess which variables affect the lifespan of a prosthesis and estimate the effects of variables on the lifespan. Evaluation of the hazard ratio (HR) and statistical significance of each variable assesses their impact on the lifespan. Variables showing statistical significance in univariate analysis were selected preferentially with consideration of clinical and sociological correction factors that were expected to have an effect on dependent variables or regarded critical in previous studies such as age, sex, and national health insurance. A final model was established by running a multivariate analysis. Kaplan-Meier analysis was plotted to interpret the survival probability for each statistically significant factor. By plotting survival probability curves and comparing them among different groups, survival assosiated with various variables can be visually assessed. Median survival is generally used instead of average in medical lifespan research and was also used in this study because lifespan data can often have skewed distriution due to few individuals with extremely long survival time, having a significant influence on the average. By using median survival, impact of outliers can be reduced and generalizability will be increased, providing more realistic representation of a patient's survival and facilitating more stable interpretation of research results. Finally, principal component analysis (PCA) was applied for the calculation of life expectancy of prostheses more precisely. PCA is a commonly used analytical method for predicting life expectancy and healthy life expectancy. The research that utilizes PCA to predict lifespan was initially proposed by Nakamura,[6] and it has been applied to forecast trends in aging. It is a method for dimensionality reduction that explains variations by reducing the dimensions using principal component scores, depicting the relationships between dependent and independent variables in a multidimensional space. In this study, a prediction model was developed by defining factors that influence the lifespan of prostheses as biomarkers when the eigenvalues, representing the sum of the variances of all parameters, exceed 1.0. Based on this, longevity parameter scores (X_n) are generated which are used in "Biological Age Score (BAS)" to calculate life expectancy of prosthesis.[7,8]

RESULTS

Survey data of 1703 fixed dental prostheses and 815 removable dental prostheses were collected and evaluated. The median survival of fixed and removable dental prosthesis was 17 and 12 years each with a 95% confidence interval.

Total of 1703 surveys were collected and evaluated. Factors affecting the failure of fixed dental prosthesis were analyzed using generalized estimation equations method shown in Table 1 followed by Cox proportional hazards model in Table 2. Factors showing statistical significance in multivariate analysis were plaque index and type of material as seen in Table 2. Hazard ratio (HR) was higher in patients with higher plaque index and was statistically significant especially in patients with plaque index 2 (HR = 1.44 (1.058-1.958), P = .020) and 3 (HR = 1.70 (1.165-2.472), P = .006). Hazard ratio was higher in prosthesis made of nonprecious metal (HR = 1.35 (1.055-1.732), P = .017) and PFM (HR = 1.38 (1.142-1.661), P = .001) compared to precious metal. All-ceramic also showed higher failure rate than precious metal but was not statistically significant (HR = 1.53 (0.0919-2.534), P = .102)

Survival rate and the number of surviving prostheses of these factors were analysed using Kaplan-Meier analysis as seen in Figures 1 and 2. In plaque index, survival line was drawn lower as plaque index increased, showing lower survival rate in patients with higher plaque index. Risk rate of plque index 2 and 3 converged after 15 years. Median survival was estimated 18 years in plaque index 0 and 1, 14 years

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Table 1. Relevance of factors to failure risk on fixed prosthesis

		Success (n = 1020)	Failure (n = 683)	*P*-value
Age		60.02 ± 15.00	64.56 ± 14.02	< .001
Sex	Male	464 (62.61%)	277 (37.38%)	.049
	Female	566 (58.23%)	406 (41.77%)	
Plaque Index	0	241 (80.33%)	59 (19.67%)	< .001
	1	591 (62.74%)	351 (37.26%)	
	2	158 (42.59%)	213 (57.41%)	
	3	30 (33.33%)	60 (66.67%)	
Unit Number		2.05 ± 1.49	3.14 ± 2.25	< .001
Abutment Number		1.67 ± 0.94	2.32 ± 1.37	< .001
Material	P	430 (70.03%)	184 (29.97%)	< .001
	NP	66 (38.37%)	106 (61.63%)	
	PFM	437 (53.95%)	373 (46.05%)	
	AC	87 (81.31%)	20 (18.69%)	
Type of clinic	Hsp	156 (84.32%)	29 (15.68%)	< .001
	LC	754 (56.78%)	574 (43.22%)	
	NL	18 (24.32%)	56 (75.68%)	
	Uncertain	92 (79.31%)	24 (20.69%)	
Antagonist	Fixed	855 (60.85%)	550 (39.15%)	< .001
	Removable	114 (50.22%)	113 (49.78%)	
	Implant	53 (72.60%)	20 (27.40%)	

P: Precious metal, NP: Non-precious metal, PFM: Porcelain fused to metal, AC: All-ceramic, Hsp: Dental hospital, LC: Local dental clinic, NL: Non-licensed, Fixed: Fixed dental prosthesis, Removable: Removable dental prosthesis.

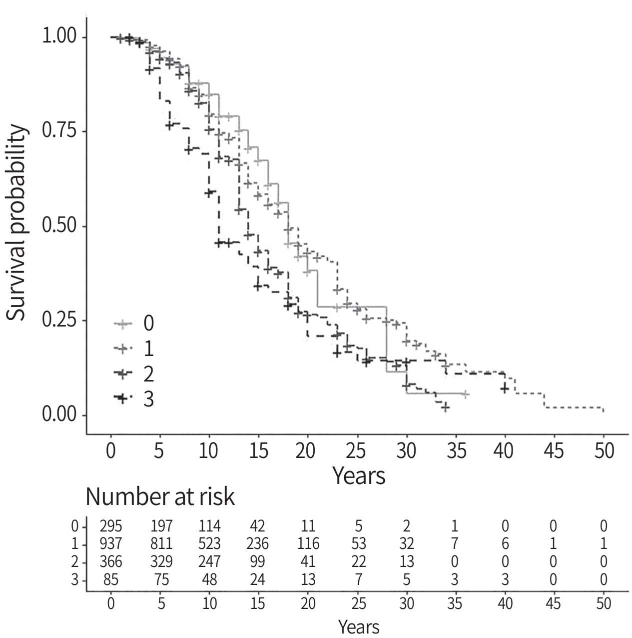

Fig. 1. Kaplan-Meier plot for plaque index.
Survival line was drawn lower as plaque index increased, showing lower survival rate in patients with higher plaque index. Risk rate of plaque index 2 and 3 converged after 15 years. Median survival was estimated 10 to 17 years.

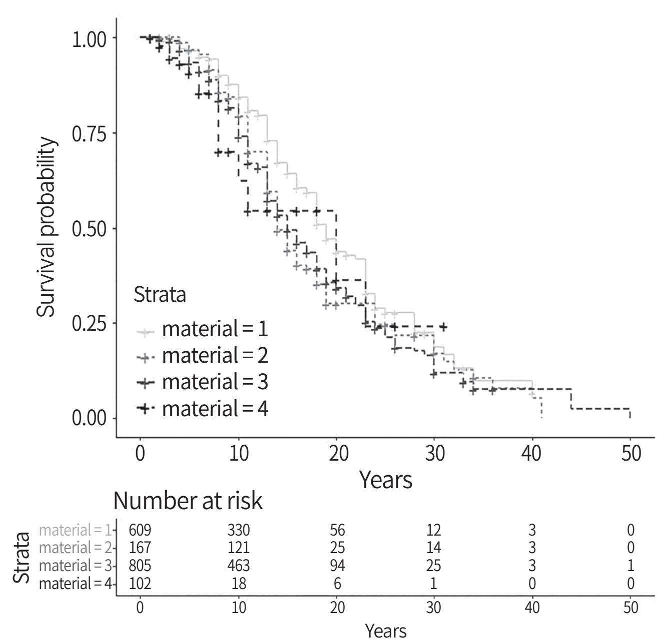

Fig. 2. Kaplan-Meier plot for material.
Median survival was estimated 14 to 20 years depending on type of material.

Table 2. Cox proportional hazards model of relevance of factors to failure risk on fixed prosthesis

		Uni-variate		Multi-variate	
		HR (95% CI)	*P*-value	HR (95% CI)	*P*-value
Age		0.98 (0.979-0.987)	< .001	0.99 (0.991-1.003)	.431
Sex	Male	1		1	
	Female	0.84 (0.742-0.951)	.006	1.02 (0.868-1.186)	.856
Plaque index	0	1		1	
	1	0.51 (0.436-0.587)	< .001	1.03 (0.775-1.368)	.842
	2	0.31 (0.256-0.383)	< .001	1.44 (1.058-1.958)	.020
	3	0.23 (0.152-0.343)	< .001	1.70 (1.165-2.472)	.006
Unit Number		0.77 (0.739-0.809)	< .001	1.01 (0.945-1.083)	.740
Abutment Number		0.66 (0.611-0.708)	< .001	1.01 (0.902-1.135)	.841
Material	P	1		1	
	NP	1.40 (1.098-1.776)	.007	1.35 (1.055-1.732)	.017
	PFM	1.44 (1.208-1.721)	< .001	1.38 (1.142-1.661)	.001
	AC	1.65 (1.042-2.626)	.033	1.53 (0.919-2.534)	.102
Type of clinic	Hsp	1		1	
	LC	0.25 (0.210-0.296)	< .001	0.93 (0.617-1.388)	.707
	NL	0.07 (0.038-0.119)	< .001	0.89 (0.541-1.465)	.647
	Uncertain	0.50 (0.385-0.648)	< .001	0.80 (0.451-1.404)	.431
Antagonist	Fixed	1		1	
	Removable	0.77 (0.633-0.943)	.011	1.10 (0.890-1.367)	.371
	Implant	1.31 (0.970-1.767)	.078	0.95 (0.605-1.497)	.831

Hazard ratio was higher in patients with higher plaque index especially in patients with plaque index 2 and 3. Hazard ratio was higher in prosthesis made of nonprecious metal and PFM compared to precious metal.
HR: Hazard ratio, CI: Confidence interval, P: Precious metal, NP: Non-precious metal, PFM: Porcelain fused to metal, AC: All-ceramic, Hsp: Dental hospital, LC: Local dental clinic, NL: Non-licensed, Fixed: Fixed dental prosthesis, Removable: Removable dental prosthesis.

in plaque index 2, and 11 years in plaque index 3. Estimation of survival line became meaningless after 30 years, since the number of surviving prosthesis was too small. In type of restorative material, median survival was estimated 18 years in precious metal, 14 years in nonprecious metal, 15 years in PFM, and 20 years in all-ceramic.

Estimation of life expectancy of prosthesis using principal component analysis (PCA) was done. Estimation was regarded as correct in average by 95% prediction limits, and additional 3 years were expected for prosthesis still usable at the time of examination as shown on Table 3.

Total of 815 surveys were collected and evaluated. Factors affecting the failure of removable dental prosthesis were analyzed using generalized estima-

Table 3. Estimated life expectancy of fixed prosthesis using principal component analysis (PCA)

	Number	Average	Standard deviation	Minimum	Maximum
Total	1703	-1.98	6.28	-12.83	34.01
Success	1020	-3.20	5.30	-12.69	15.08
Failure	683	-0.16	7.13	-12.83	34.01

Estimation was regarded as correct in average by 95% prediction limit. Additional 3 years were expected for prosthesis still usable at the time of examination.

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tion equations method shown in Table 4 followed by Cox proportional hazards model in Table 5. Factors showing statistical significance in multi-variate analysis were national health insurance coverage, type of antagonist, and type of removable dental prosthesis as seen in Table 5. Hazard ratio was lower in patients without insurance coverage (HR = 0.52 (0.325-0.842), *P* = .008). Hazard ratio was lower in prosthesis with RDP antagonist (HR = 0.80 (0.652-0.973), *P* = .026) compared to natural teeth antagonist with statistical significance, and higher with implant antagonist without statistical significance (HR = 2.56 (0.812-8.075), *P* = .109). Hazard ratio was lower in RDP (HR = 0.62 (0.509-0.763), *P* < .001) compared to CD.

Survival rate and the number of surviving prosthesis of these factors were analyzed using Kaplan-Meier analysis as seen in Figures 3 to 5. In insurance coverage, survival line for insurance covered prosthesis was drawn lower than non-covered prosthesis, showing lower survival rate in patients treated with insurance. Median survival was estimated 2 years in insurance covered treatment and 17 years in non-covered treatment. Estimation of survival line became meaningless after 25 years, since number of surviving prosthesis became too small.

In type of antagonist, removable prosthesis having fixed dental prosthesis (FDP) as an antagonist showed shorter life expectancy than those having removable dental prosthesis (RDP) as an antagonist. Median survival was estimated 11 years in FDP antagonist, and 14 years in RDP antagonist. Prosthesis with implant antagonists in this study were used too shortly, and was unable to draw statistically meaningful conclusion. Estimation of survival line became meaningless after 25 years.

In type of removable prosthesis, CD showed shorter life expectancy than RDP. Median survival was estimated 10 years in CD, and 15 years in RDP. Estimation of survival line became meaningless after 20 years since number of surviving CD became too small. Estimation of life expectancy of prosthesis using PCA was done. Estimation was regarded as correct in average by 95% prediction limits, and additional 4.8 years were expected for prosthesis still usable at the time of examination as shown on Table 6.

Table 4. Relevance of factors to failure risk on removable prosthesis

		Success (n = 378)	Failure (n = 437)	*P*-value
Age		73.21 ± 10.43	75.68 ± 9.70	< .001
Sex	Male	179 (46.37%)	207 (53.63%)	.997
	Female	199 (46.39%)	230 (53.61%)	
Site	Mx	212 (47.53%)	234 (52.47%)	.468
	Mn	166 (44.99%)	203 (55.01%)	
Treated at	Hsp	122 (86.52%)	19 (13.48%)	< .001
	LC	167 (34.29%)	320 (65.71%)	
	NL	5 (9.43%)	48 (90.57%)	
	Uncertain	884 (62.69%)	50 (37.31%)	
Insurance	Yes	76 (79.17%)	20 (20.83%)	< .001
	No	302 (42.00%)	417 (58.00%)	
Antagonist	Fixed	136 (36.86%)	233 (63.14%)	.001
	Removable	238 (54.21%)	201 (45.79%)	
	Implant	4 (57.14%)	3 (42.86%)	
Treatment experience		0.85 ± 1.02	0.43 ± 0.85	< .001
Type	CD	144 (39.34%)	222 (60.66%)	< .001
	RPD	234 (52.12%)	215 (47.88%)	

Hsp: Dental hospital, LC: Local dental clinic, NL: Non-licensed, Mx: Maxilla, Mn: Mandible, Fixed: Fixed dental prosthesis, Removable: Removable dental prosthesis, CD: Complete denture, RPD: Removable partial denture.

Table 5. Cox proportional hazards model of relevance of factors to failure risk on removable prosthesis

		Univariate		Multiple	
		HR (95%CI)	*P*-value	HR (95%CI)	*P*-value
Age		0.99 (0.987-1.007)	.553	0.99 (0.989-1.009)	.824
Sex	Male	1		1	
	Female	1.06 (0.878-1.281)	.541	1.01 (0.835-1.222)	.920
Site	Mx	1			
	Mn	1.07 (0.886-1.291)	.49		
Treated at	Hsp	1			
	LC	1.05 (0.659-1.675)	.836		
	NL	1.20 (0.701-2.054)	.507		
	Uncertain	0.88 (0.517-1.492)	.631		
Insurance	Yes	1		1	
	No	0.70 (0.444-1.106)	.126	0.52 (0.325-0.842)	.008
Antagonist	Fixed	1		1	
	Removable	0.75 (0.618-0.906)	.003	0.80 (0.652-0.973)	.026
	Implant	2.34 (0.743-7.354)	.147	2.56 (0.812-8.075)	.109
Treatment experience		0.99 (0.878-1.121)	.902		
Type	CD	1		1	
	RPD	0.62 (0.509-0.747)	< .001	0.62 (0.509-0.763)	< .001

Hazard ratio was lower in patients without insurance coverage. Hazard ratio was lower in prosthesis with RDP antagonist compared to natural teeth antagonist. Hazard ratio was lower in RDP compared to CD.
Hsp: Dental hospital, LC: Local dental clinic, NL: Non-licensed, Mx: Maxilla, Mn: Mandible, Fixed: Fixed dental prosthesis, Removable: Removable dental prosthesis, CD: Complete denture, RPD: Removable partial denture.

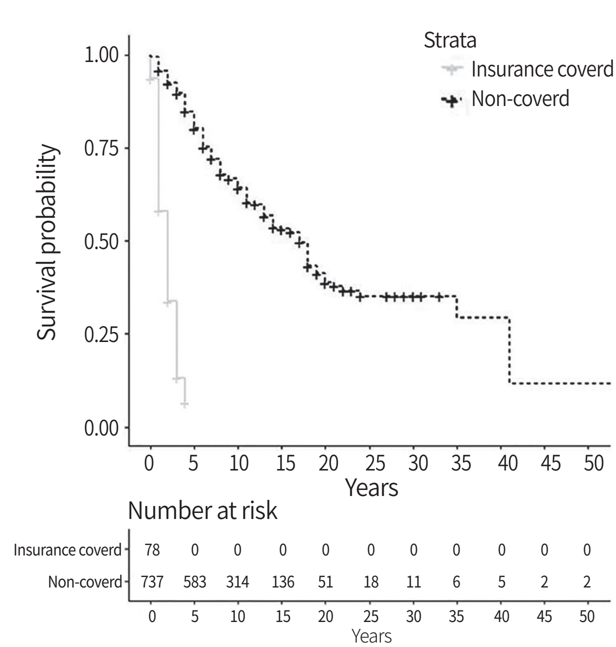

Fig. 3. Kaplan-Meier plot for insurance coverage. Survival line for insurance covered prosthesis was drawn lower than non-covered prosthesis, showing lower survival rate in patients treated with insurance. Median survival was estimated 2 years in insurance covered treatment and 17 years in non-covered treatment.

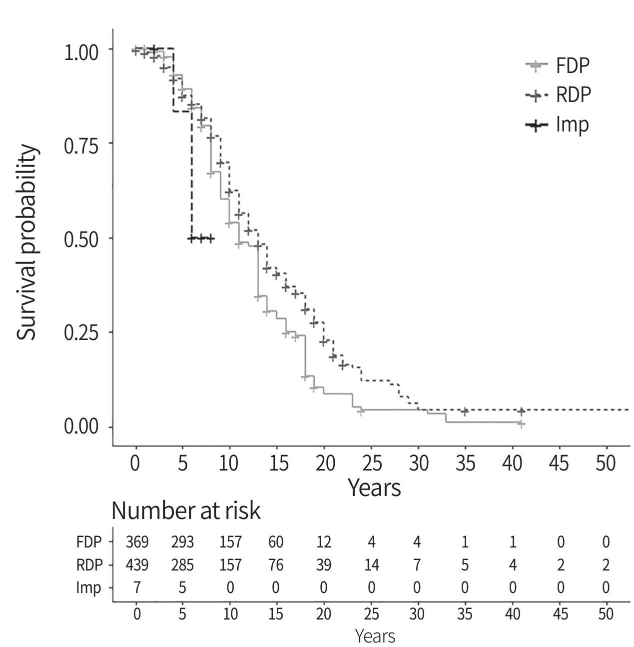

Fig. 4. Kaplan-Meier plot for type of antagonist. Removable prosthesis having FDP as an antagonist showed shorter life expectancy than those having RDP as an antagonist. Median survival was estimated 11 years in FDP antagonist, and 14 years in RDP antagonist.

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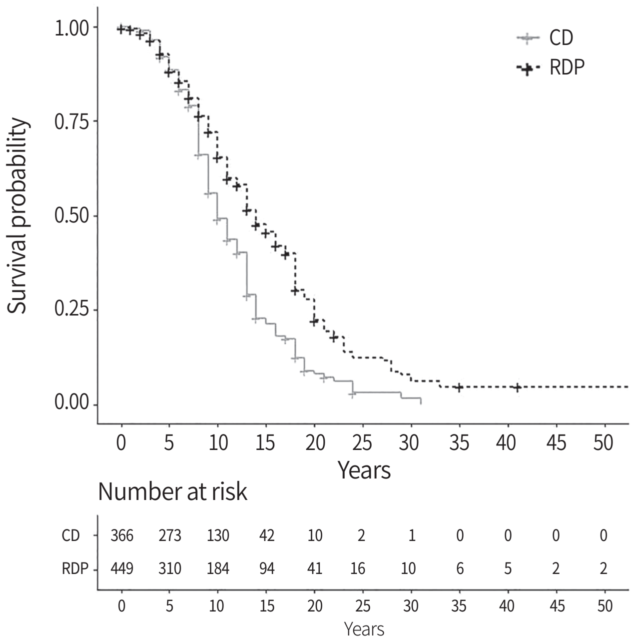

Fig. 5. Kaplan-Meier plot for type of removable prosthesis CD showed shorter life expectancy than RDP. Median survival was estimated 10 years in CD, and 15 years in RDP.

DISCUSSION

One of the distinctive features of this study is that this research involves a multi-center, large scale sample analysis with various types of variables. As the number of independent variables increases, so does the complexity of factors influencing the dependent variable. In such cases, interpretation could become very challenging. PCA is a method that calculates the similarity among variables and consolidates similar ones into one variable. Therefore, in this study, PCA was considered a more suitable technique to overcome these challenges, although it is not a commonly used method in dental studies. For prostheses judged as "success" at the time of measurement, they were considered as censored data in the accurate estimation of prosthesis lifespan. To correct this, Principal Component Analysis (PCA) was adopted to estimate the biological age that may have been either underestimated or overestimated at the time of measurement. The PCA estimation indicated that prostheses judged as "success" at the time of the survey could have continued to be used for an additional 3 years for fixed prostheses and 4.8 years for removable prostheses. This discrepancy is attributed to the conservative estimation of usage duration at the time of diagnosis, meaning those that were still able to be used were recorded as the lifespan at the time of evaluation, leading to an underestimation.

In previous studies, presence of statistical correlation between plaque index and the success rate of fixed prostheses has been controversial. While Walton[9] claimed that the presence of periodontal disease affected prosthesis success, Sailer[10] argued that there was no relationship between plaque index and the success of fixed prostheses. In this study, it is observed as the plaque index increases, hazard ratio of fixed prostheses also increases. It is noteworthy that periodontal condition of plaque index 2 and 3 does have significant effect on prosthetic success while plaque index 0 and 1 merely affects the result. Therefore, it is evident that educating patients rigorously about oral hygiene management is crucial after dental treatment, especially when they had bad oral condition or low dental IQ at the first visit.

In type of material, failure rate of all-ceramic did not show statistic significance compared to precious metal in Cox regression results. Moreover, when estimating the median survival from Kaplan-Meier

Table 6. Estimated life expectancy of removable prosthesis using principal component analysis (PCA)

	Number	Average	Standard deviation	Minimum	Maximum
Total	815	-2.16	8.79	-21.70	10.73
Success	378	-4.82	9.29	-21.70	10.73
Failure	437	0.14	7.64	-19.65	10.73

Estimation was regarded as correct in average by 95% prediction limit. Additional 4.8 years were expected for prosthesis still usable at the time of examination.

curves, lifespan of all-ceramic material appeared to be higher than precious metal. However, careful interpretation is needed because this result may be due to the relatively low sample size of all-ceramic materials (including zirconia) and even fewer cases with over 10-year usage, leading to inaccuracy in statistical results.[11] Another notable point is that all-ceramic material data collected in this study were mostly single-unit and 3-unit fixed prostheses which underwent less stress.[10,12-14] Thus, it is expected that with the increasing utilization and a broader range of application of zirconia and all-ceramic materials, as well as a growing number of multi-unit all-ceramic fixed prosthetic treatments, gathering long-term follow-up data with a larger sample size would yield more significant results and overcome the limitations of this study.

In removable dental prostheses, it is important to consider variables related to national health insurance coverage. This national health insurance program began with resin-based complete dentures for patients aged 75 and older in 2012, gradually expanding to include resin-based and metal-based complete dentures and metal-based partial dentures until 2015, lowering age limit to 65 and older. At the time of this survey, which was conducted from May 1, 2017, to April 30, 2018, the coverage duration was relatively short since the implementation of national health insurance coverage. Therefore, interpretation should be cautious. However, it is worth noting that, since the implementation of national health insurance coverage, the majority of denture treatment was performed under the coverage of health insurance, having a significant impact on the dependent variables. Therefore, despite no significant difference was shown in the univariate analysis, the multivariate analysis was done and revealed significant results. The results showed that prostheses covered by insurance had a shorter lifespan compared to those not covered, with a median survival of 2 years in insurance-covered treatment and 17 years in non-covered treatment. Once again, the results above should yet only be considered as a reference since period between the application of health insurance and this study was very short. Since the end of data collection for this study in 2018, the number of insurance-covered denture treatments has steadily increased. Therefore, it is believed that a follow-up research on this topic will overcome the limitation of this study and undoubtedly derive meaningful results in the near future. Additionally, insurance-covered treatments primarily apply to patients 65 and older, and for partial dentures, surveyed crowns are not covered with insurance. These factors should be considered when comparing insurance covered and non-covered prostheses.[15,16]

Having RDP as an antagonist for removable dental prostheses showed lower hazard ratio compared to FDP. However, when implant-supported prostheses were used as an antagonist, increase of hazard ratio did not show statistical significance. This suggests that while careful application is advised with having implant-supported prostheses as an antagonist,[17] it may not be strictly contraindicated.

Reviewing previous studies, it is observed that the results of this study generally show longer lifespans. Possible reasons for this include the time gap between this study and previous ones since large-sample studies are rare, leading to advancements in dental treatment techniques and the proliferation of implant technology resulting in a decrease in long-span prostheses.[10,12-14] Furthermore, this study was confined to the Korean population, where dental treatment accessibility is high, which could also contribute to the observed differences. Thus, it should be considered that results of this study may not be directly applicable to other regions or healthcare systems. The dental prostheses examined in this study were primarily treated at various treatment facilities, including local clinic and even unlicensed providers. However, the data was collected at the point when patients visited university hospitals, indicating that these patients were relatively attentive to oral hygiene management and had a desire to receive higher-level treatment at the time of visit. This could also be a contributing factor to the extended lifespan of dental prostheses. Lastly, reliance on patient-reported information for certain data points in the absence of dental records could have influenced the longevity data results, introducing the risk of recall bias. Though it did not take great portion or whole data, more delicate application could be considered in following research to rule out this limitation.

Longevity of prosthesis can be affected by various factors, and each factor has different degree of contribution. Factors contributing on life expectancy of a prosthesis were mostly manageable either by a patient or a dentist. Thus, dentists should evaluate a patient carefully before settling a final treatment plan since life expectancy of a prosthesis can vary significantly by a choice dentist makes. Patients should be educated in clinic that life expectancy of a prosthesis will be affected considerably by oral hygiene care, and regular check up after treatment is mandatory.

CONCLUSION

This study provides valuable insights into the lifespan prediction of dental prostheses and underscores the importance of oral hygiene education after dental treatments, the significance of materials and types of prostheses, and the impact of national health insurance coverage as well as type of antagonist on treatment outcomes. However, it's important to consider the limitations and potential confounding factors when interpreting the results.

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