

## DOES THE LEVEL OF KNOWLEDGE OF DENTURE HYGIENE AFFECT THEIR MAINTENANCE?

¿El nivel de conocimiento de higiene protésica afecta el mantenimiento de estas prótesis?

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Does the level of knowledge of denture hygiene affect their maintenance?

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### ABSTRACT:

**Introduction:** The lack of knowledge about denture hygiene can negatively affect their maintenance. On the other hand, good oral hygiene can reduce the chances of plaque accumulation.

**Objective:** To determine if there is a relationship between knowledge of hygiene and denture maintenance.

**Material and Methods:** A questionnaire was applied to 67 patients who wore partial and/or total removable prostheses daily to evaluate their knowledge of denture hygiene. For the evaluation of denture maintenance, clinical inspection of the removable prosthesis was carried out using the Vigild criterion to observe the amount of plaque that was adhered to it. Data were statistically processed with Spearman's correlation test to determine the relationship between hygiene knowledge and denture maintenance.

**Results:** The patients presented a medium (37.3%) and low (56.7%) denture hygiene knowledge; and fair (68.7%) and poor (11.9%) maintenance of their prosthesis. There is a statistically significant relationship between hygiene knowledge and denture maintenance ( $p < 0.001$ ).

**Conclusion:** There is little knowledge of denture hygiene. This level of knowledge has a statistically significant relationship with the maintenance of the prostheses.

### KEYWORDS:

*Knowledge; hygiene; maintenance; dental prosthesis; oral hygiene; surveys and questionnaires.*

## RESUMEN:

**Introducción:** El desconocimiento sobre la higiene de prótesis, de los pacientes portadores de estas, puede afectar negativamente en el mantenimiento protésico, una correcta higiene puede disminuir las probabilidades de acúmulo de placa.

**Objetivo:** Determinar si existe relación entre el conocimiento de higiene y el mantenimiento protésico.

**Material y Métodos:** Para la evaluación del conocimiento en higiene protésica se aplicó un cuestionario a 67 pacientes que utilizaban diariamente prótesis removibles parciales y/o totales; y para la valoración del mantenimiento protésico se realizó la inspección clínica de la prótesis removable mediante el criterio de Vigild, observando la cantidad de placa que se encontraba adherida. Se procesaron los datos estadísticamente con la prueba de correlación de Spearman para determinar la relación entre el conocimiento de higiene y el mantenimiento protésico.

**Resultados:** Los pacientes presentaron un conocimiento de higiene protésica medio (37,3%) y bajo (56,7%); y un mantenimiento de la prótesis de forma regular (68,7%) y malo (11,9%). Existiendo relación estadísticamente significativa entre el conocimiento de higiene y el mantenimiento protésico ( $p < 0,001$ ).

**Conclusión:** Existe un bajo conocimiento de higiene protésica, teniendo este nivel de conocimiento una relación estadísticamente significativa con el mantenimiento que evidenciaban las prótesis.

## PALABRAS CLAVE:

*Conocimiento; higiene; mantenimiento; prótesis dental; higiene bucal; encuestas y cuestionarios.*

## INTRODUCTION.

The global prevalence of edentulism has seen a decrease in recent years, although it continues to be a problem in developing countries, which is why removable prostheses or dentures still play a significant role.<sup>1</sup> Previous studies have reported that the adherence of microorganisms to prostheses is caused by the lack of knowledge of denture hygiene.<sup>2-4</sup>

Plaque accumulation is strongly related to denture stomatitis<sup>5</sup> and even systemic diseases. Vigild<sup>6</sup> proposed a criterion to evaluate the actions carried out by a subject wearing a denture regarding its maintenance, and classified it as good, fair, and poor according to the amount of plaque observed on the surface of the prosthesis.

There are mechanical and chemical hygiene methods to ensure proper maintenance of remo-

vable dentures and subsequently successful treatment over time.

The mechanical method consists of using a toothbrush; however, it can lead to abrasion of the surface of the dentures, which is undesirable for aesthetic and biological reasons.<sup>7</sup> The chemical method consists of the use of disinfectant tablets, sodium hypochlorite, chlorhexidine, and other agents that help remove microorganisms that adhere to the prosthesis.<sup>8</sup> According to studies, the most effective technique against the reduction of microorganisms is one that combines the mechanical with the chemical methods.<sup>9,10</sup>

The best way to control the various diseases caused by poor hygiene is the informed patients themselves, who practice effective daily self-treatment, accompanied by constant monitoring by the oral health professional.<sup>2</sup>

Based on the above, the aim of this study was to determine if there is a relationship between knowledge of denture hygiene and prosthesis maintenance in patients with removable dentures treated at a Dental Center in Lima, Peru.

## **MATERIALS AND METHODS.**

The present study had an observational design as none of the two variables (level of knowledge of denture hygiene and prosthesis maintenance) were controlled. The data of these variables were correlated, and prospective cross-sectional data were analyzed according to the collection of data and measured only once.

The sample consisted of 67 patients with ages ranging between 30 and 90 years, who had used prosthesis for 1 to 5 years, with partial and/or total removable dentures, of the conventional type, who sought treatment for a period of three months at the diagnostic unit of the Dental Center at Universidad de San Martín de Porres, Lima, Peru. Patients who did not use their prosthesis daily and who presented motor or mental disability were excluded.

### **Questionnaire preparation**

Based on previous research,<sup>2-4</sup> a specific questionnaire was prepared for this study, with the aim of evaluating the level of knowledge of denture hygiene in patients with partial and/or total removable dentures. The questionnaire contained nine questions covering three dimensions: type and material of dentures used, information received about hygiene control, and prosthesis cleaning habits.

The questionnaire was submitted to expert judgment by eight professionals, specialists in oral rehabilitation, with more than 5 years of experience, to validate the questions regarding their clarity, sufficiency, coherence, and relevance. The statistical test of V of Aiken was applied to the results obtained from the experts, resulting in a value of 0.938, which qualifies as an adequate research instrument.

## **Calibration for the evaluation of Denture Maintenance**

For the calibration in the evaluation of the maintenance of dentures, advice was given by an oral rehabilitation specialist. The specialists gave tutorials and training for approximately six hours (on three different days) on the practical procedure of observation and qualification of the maintenance of the prosthesis according to Vigild's criteria.<sup>6</sup> After the tutorial, ten cases were recorded simultaneously in the data collection form of the results provided by the specialist and the lead researcher with the purpose of evaluating the homogenization of the collection of results of this variable by the lead researcher. To determine the measure of inter-rater agreement, the weighted Kappa Index statistical test was used, since these were ordinal categories, giving a result of 0.865.

### **Application of the Survey**

Once the questionnaire had been validated and the calibration had been carried out, the study began at the diagnostic unit of the Dental Center with the patients who met the selection criteria. Participants were individually explained the purpose of the study and asked to sign the informed consent. After that, they were given 20 minutes to answer the questionnaire privately.

### **Clinical Examination**

A clinical examination was carried out, for which the patient was asked to remove his/her denture from the oral cavity. If the patient had a removable upper and lower prosthesis, the one with the greatest amount of plaque was recorded. The prosthesis was washed with plenty of water to remove any excess food residue that might have been present.

It was later examined and evaluated using the criteria proposed by Vigild,<sup>6</sup> observing the amount of bacterial plaque on the fitting surface (the surface in contact with the palate mucosa). Observations were recorded in the data collection form as: good, if there was no visible bacterial plaque; fair, if there was visible bacterial plaque, or bad, if visible bacterial plaque was abundant.

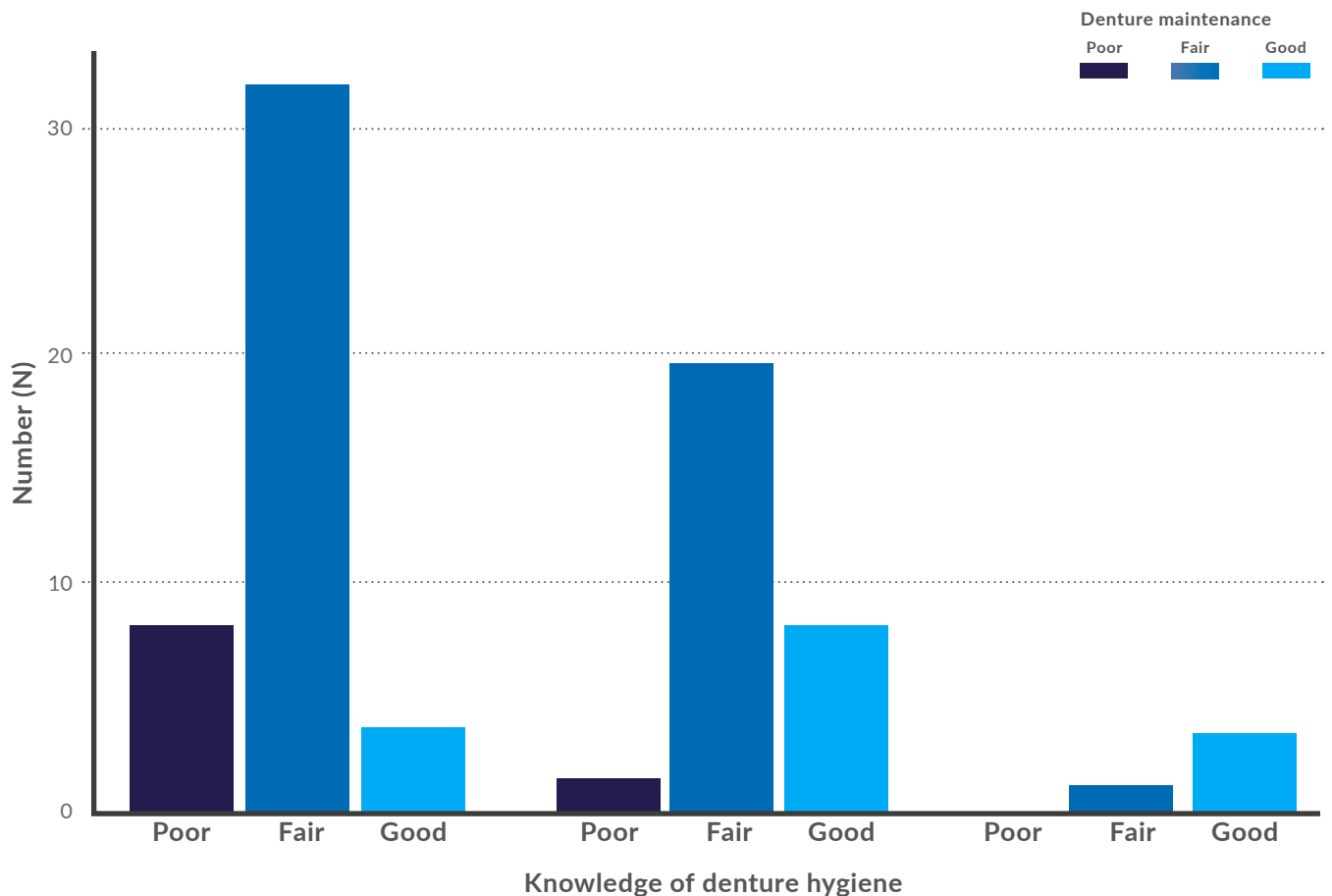
### Data analysis

The database was created using Microsoft Excel version 16.13.1 and results were analyzed using the SPSS version 23 in Spanish. The analysis of the variables was performed descriptively using measures of central tendency and dispersion; the categorical variables were reported with relative and absolute frequencies. The results were analyzed with Spearman's non-parametric correlation test. All statistical methods used a significance level of  $p < 0.05$ .

### Ethical considerations

The study had no ethical implications and there were no conflicts of interest. Prior to the clinical examination, the patients who met the inclusion criteria, both for the pilot study and the research itself, signed the informed consent, giving his/her approval to participate in this study. The research was reviewed and approved by the Research Project Review Committee (ACT No. 028-2018), by the Research Ethics Committee (ACT No. 007-2018) of the School of Dentistry at Universidad de San Martín de Porres.

**Figure 1.** Relationship between levels of hygiene knowledge and denture maintenance criteria.



Spearman's correlation test ( $p < 0.001$ ). Statistically significant correlation ( $p = 0.001$ ). Spearman's Rho correlation coefficient: 0.407 (moderate magnitude).

**Table 1.** Description of the indicators of knowledge of denture hygiene.

	Items	N	%
Do you know what type of denture you use?	No	45	67.2
	Yes	22	32.8
Do you know what material your denture is made of?	No	52	77.6
	Yes	15	22.4
Did you receive information about regular visits to your dentist for hygiene checks?	No	38	56.7
	Yes	29	43.3
How often do you visit your dentist?	When I have discomfort	49	73.1
	Every 6 months	8	11.9
	Once a year	10	14.9
Did you receive information on the hygiene of your denture(s)?	No	24	35.8
	Yes	43	64.2
Do you use a toothbrush to sanitize/clean your denture(s)?	No	0	0
	Yes, only with water	2	3
	Yes, with soap	10	14.9
	Yes, with toothpaste	55	82.1
How many times a day do you brush your denture(s)?	One time	5	7.5
	More than twice	62	92.5
Do you use some sort of disinfectant solution to clean your denture(s)?	No	50	74.6
	Yes, vinegar	3	4.5
	Yes, sodium bicarbonate	4	6
	Yes, disinfectant tablet	8	11.9
	Yes, hydrogen peroxide	1	1.5
	Yes, sodium hypochlorite	1	1.5
Do you sleep with your denture(s) on at night?	Yes	20	29.9
	No, I leave it/them in a glass of water	32	47.8
	No, I leave it/them on a surface	15	22.4

**Table 2.** Statistical description of the level of knowledge of hygiene and denture maintenance.

		Frequency	Percentage (%)
Knowledge of Denture Hygiene	Level		
	Low	38	56.7
	Medium	25	37.3
	High	4	6
	<b>Total</b>	<b>67</b>	<b>100</b>
		Frequency	Percentage (%)
Denture Maintenance	Vigild's Criterion		
	Poor	8	11.9
	Fair	46	68.7
	Good	13	19.4
	<b>Total</b>	<b>67</b>	<b>100</b>

Correlation coefficient 0.407

## RESULTS.

### Descriptive

There were 67 patients evaluated in this study, with a mean age of 69.52 years (SD 12.35), with a minimum of 37 and a maximum of 90 years of age. Males accounted for 31.3%. Regarding the level of education, 16.4% of cases were found at the primary level, 43.3% at the secondary level, and 40.3% higher.

### Analysis of the indicators of Knowledge of Denture Hygiene

The distribution of the answers per question of the Questionnaire on Knowledge of Denture Hygiene (Table 1). It is noteworthy to mention that more than 60% are not familiar with the type and/or material of the prosthesis they wear; however, more than 80% of the patients brushed their prosthesis more than two times a day using toothpaste.

### Level of Knowledge of Prosthesis Hygiene and Prosthesis Maintenance

Most of the patients presented a low level of knowledge of prosthesis hygiene, according to the results of the questionnaire, at the same time that they presented fair and poor prosthesis maintenance (Table 2).

### Correlation of Prosthesis Hygiene Knowledge and Prosthesis Maintenance

The non-parametric analysis using Spearman's correlation test shows a statistically significant relationship ( $p=0.001$ ), between knowledge of hygiene and denture maintenance in patients with removable prostheses. (Figure 1)

## DISCUSSION.

The materials and methods of prosthesis cleaning have been the subject of research over the years.<sup>11-13</sup> However, few studies have focused on the relationship between knowledge of denture hygiene and prosthesis maintenance, aspects that are very important to keep removable dentures in good condition.

When determining the level of knowledge of prosthesis hygiene, of the cases studied, 94% of

the patients presented a medium and low level, coinciding with previous studies,<sup>2-4,14</sup> where the majority of patients did not know how to sanitize their removable prosthesis. In the present study, 35.8% did not receive information on how to systematically clean their prostheses, a similar result (42.7%) was found in the Mushtaq study.<sup>15</sup> 67% of patients reported not knowing the type of denture they wore, 56.7% did not receive information about regular visits for hygiene checks, and 73.1% only went to the dentist when they had discomfort.

Although studies, such as the one by Natapov *et al.*,<sup>16</sup> highlight the importance of regular visits to the dentist. It should be noted that the lack of information sometimes also comes from the dentist, as shown by Suresan *et al.*,<sup>17</sup> who reported that most dentists had limited knowledge regarding information and methods of denture hygiene, so they only recommended the use of a brush and keeping prostheses in water.

In this study, 80.6% of the patients presented fair and poor denture maintenance, evidenced by the presence of bacterial plaque on the fitting surface of the prosthesis. Similar percentages have been reported in other studies.<sup>18-20</sup>

Despite the fact that all the patients in this study said that they used a toothbrush to sanitize their dentures, the use of the toothbrush and toothpaste was 82.1%, similar to the study carried out by Osmani *et al.*,<sup>2</sup> who explain that the use of toothpaste may be due to the fact that it is simple and relatively inexpensive; however, the use of the toothbrush is potentially abrasive for some of the materials of removable prostheses.

74.6% of the patients surveyed did not use any type of immersion solution to clean their dentures, a similar result was reported in the study by Akram *et al.*,<sup>21</sup> where only 7% used a disinfectant solution, which is contrary to the study of Vural *et al.*,<sup>22</sup> in which 37.5% reported the use of immersion solutions.

According to Andruccioli *et al.*,<sup>23</sup> chemical methods are not routinely applied, either due to lack of information or knowledge about them, cost, lack of

access, or because these types of products are not available on the market.

A total of 92.5% of patients in this study brushed their dentured more than twice a day, similar to the results obtained by Aoun *et al.*,<sup>24</sup> and Mushtaq *et al.*,<sup>15</sup> (93,1% y 100% respectively). However, it must be taken into account that although there is a daily cleaning, the frequency of cleaning does not necessarily indicate effectiveness.<sup>25</sup> In the process of improving the level of knowledge in patients, the oral health professional must give verbal and printed instructions for the cleaning of prostheses and keep a continuous monitoring of hygiene controls, trying to instill a habit and thus be able to better take care of oral health over time.

Due to the limitations regarding the size of the sample, it is recommended to increase the number of patients in future studies and thus achieve more significant results, including other variables, such as the design of the prostheses, as it can have an impact on its hygiene and maintenance. On the other hand, it is recommended to carry out experimental studies to determine whether improving the level of hygiene knowledge improves hygiene maintenance.

## CONCLUSION.

For all the above, it can be concluded that there is a low knowledge of denture hygiene by the patient. The level of knowledge has a statistically significant relationship with the maintenance of the prostheses by these patients. In addition, the use of a toothbrush and the frequency of brushing do not indicate a high level of knowledge about denture hygiene.

**Conflict of interests:**

The authors declare no conflict of interest.

**Ethics approval:**

Approved by the Research Project Review Committee (ACT No. 028-2018), by the Research Ethics Committee (ACT No. 007-2018) of the School of Dentistry at Universidad de San Martín de Porres, Peru.

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Writing – proofreading and editing: Janet-Ofelia Guevara-Canales, Rafael Morales-Vadillo.

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