

Lifetime of Complete Dentures

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Abstract

Objective: Studying the lifetime of complete dentures in terms of age, sex and residential area.

Edentulous and methods: Only complete dentures with unprepared fractures were considered in this study.

Results: Failure time of complete dentures does not affected neither by sex nor by residential area. Lifetime of complete dentures declined rapidly after the third year of use.

Conclusion: The potential lifetime of complete dentures starts degradation after third year of use.

Keywords: *Lifetime, Complete dentures*

Introduction

Replacing missing teeth benefits both your health and your appearance. It improves speaking and eating, improves your smile and, especially in the case of a complete denture, helps support your facial muscles, providing a more youthful appearance⁽¹⁾.

It has been necessary since June 1998 for all prostheses manufactured in dental laboratories to comply with the European Union Medical Devices Directive (MDD), and for laboratories to be registered with MDD⁽²⁾.

The Medical Device Directive (MDD) does apply to medical devices and their accessories.

Medical devices are divided in classes which are treated in a different ways as defined by the Directive. The Directive defines essential requirements as well as requirements regarding design and construction.

NCHS (National Center for Health Statistics) wondered why more and more employers include a voluntary dental insurance plan with their employee benefit package. Dental benefits help keep employees working. There are an estimated 20.5 million workdays lost annually due to oral health problems⁽³⁾.

The provision of satisfactory complete dentures and partial dentures is a team approach involving clinician, technician, and patient. All should be involved in the design and construction of dentures in their respective ways. The clinician must be aware of the patient's requirements and take the ultimate responsibility for the final prosthesis. The technician should be involved with the practicalities of the design and must follow the prescription exactly. It is beneficial, where feasible, to involve the technician in the surgery where he/she can see the patient and understand any problems⁽²⁾. When you have been fitted with a new denture, there is a period of adjustment when it is especially important to visit your dentist so that he or she may make minor modifications until your denture fits comfortably. It is also important to visit your dentist periodically during the lifetime of your denture to ensure it continues to fit properly and adjustments are made as soon as they are needed. It is natural for the bone and tissue beneath the denture to change over time, so periodic adjustments will allow a continued good fit and protect the health of the underlying bone and tissue⁽⁴⁾.

Lifetime or sometimes also called failure rate was the concern of Oginni⁽⁵⁾ which investigate the failure rate and length of service of crowns and fixed partial dentures (FPDs) fabricated in a Nigerian dental school.

The effort concerning the manufacturing of partial or complete denture according to the above argument cannot be afforded for a patient always urgently. Effort as well as resources can be waste when the partial or complete denture lifetime is over earlier (within months).

Edentulous and Methods

Over a period since 1st Jan. 1998 to the 1st Jan 2005, a total of 91 complete dentures were considered. Only those dentures with unprepared fracture were considered in this study in order to estimate the dentures lifetime before broken.

Information regarding sex, age, residential area were recorded to every edentulous. Time since the complete denture was first used until broken occurred was the main concern of this research work.

Descriptive and inferential statistical techniques⁽⁶⁾ were used to analyze the data considered in this research work.

Kaplan-Meier estimators

In reliability analysis, many data sets consists of a set of failure times, which may be truncated at some limit value. The cumulative distribution function (CDF) is defined as⁷:

$$F(t) = \text{prob}(T < t)$$

where T is the lifetime of a randomly selected unit.

Given n units, which are ordered from smallest to largest, $t(1), t(2), \dots, t(n)$ where $t(i)$ can represent either a failure time or a censoring time (i.e., the unit was removed from the test before failing), then the Kaplan Meier estimates are given by:

where S is the set of all subscripts j such that $t(j)$ is a failure time (i.e., S excludes the censoring times). That is, for index i, the product is for all indices less than or equal to i that represent actual failure times.

The Kaplan-Meier plot is a plot of $\hat{R}(t_i)$ versus the failure time.

Once \hat{R} is computed, then the CDF estimates are

$$F(t(i)) = 1 - R(t(i))$$

That is, the Kaplan-Meier estimates are a way to estimate the CDF function when you have censored data.

The Kaplan-Meier estimate of the last failure time is zero, which results in a CDF value of 1. Since the reliability (= 1 - CDF) for standard reliability models asymptotically approaches 1 as time approaches infinity, a modified Kaplan-Meier estimate has been developed:

$$\hat{R}(t_i) = \frac{n + 0.7}{n + 0.4} \prod_{\substack{j=1 \\ j \in S}}^i \frac{n - j}{n - j + 1}$$

Generally, the modified form of the Kaplan-Meier plot is preferred.

The Kaplan-Meier plot can be thought of as an alternative to the empirical CDF plot that can handle data with both failure and censoring times.

Results

$$\hat{R}(t_i) = \prod_{\substack{j=1 \\ j \in S}}^i \frac{n - j}{n - j + 1}$$

The individuals considered in this research work were aged between 40 to 82 years, with mean age equals to 58.8 years and

standard deviation equals to 6.87 years. Figure 1 shows the age frequency distribution of the considered individuals.

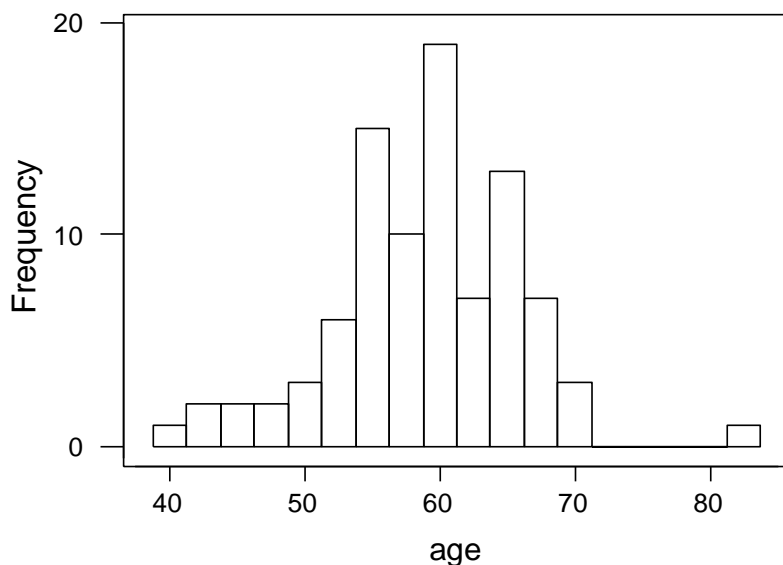


Fig. 1. Age distribution of the individuals considered in this research work.

The individuals involved 62 male and 29 female with mal to female ratio of 2.14:1. Out of the total individuals, 62.64% (57) were living in rural areas, and 37.36% (34) were living in rural areas.

The use of two-sample t-test indicated that neither sex nor residential areas influenced the failure time of the complete denture (t-test values were -1.233 and -0.30 respectively, both with p-value greater than 0.05). Two survival analysis techniques were used to investigate the lifetime or failure

time of complete denture. These two techniques are the Kaplan-Meier and ML (Maximum Likelihood). Figure 2 shows the plot for the period of wearing the complete denture with respect to the survival rate. Table 1 shows the estimated survival rate at each year of use by the two survival methods. The use of Kaplan-Meier and ML shows that the survival rate or the wearing of complete denture at 5-years of use is 10% and 19.61% respectively.

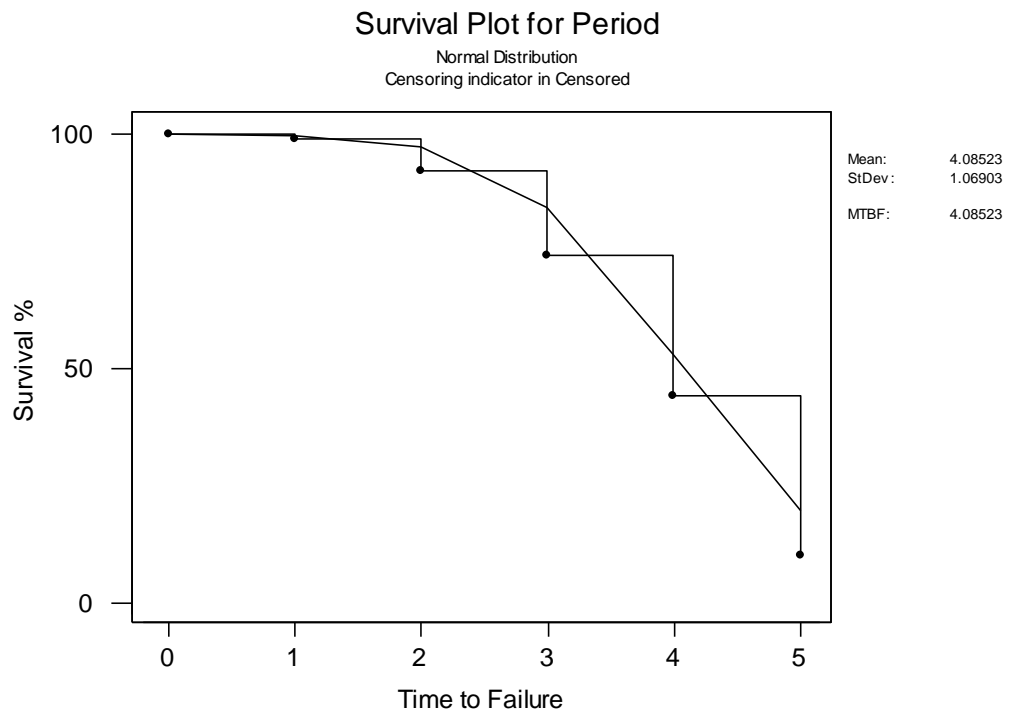


Fig. 2. Survival plot of period of wearing the complete denture.

Table 1. Kaplan-Meier and ML estimates of the survival rate

Failure time	Survival estimate	
	Kaplan-Meier	ML
1	98.90	99.81
2	92.31	97.44
3	74.30	84.50
4	44.03	53.18
5	10.00	19.61

Discussion

Complete denture reliability may vary from one dental laboratory to another depending on the procedure of casting, casting material, efficiency of technicians, accuracy of denture measurements.

In addition, personal caring with complete denture may help denture survive for longer period of time.

Despite the issue of the research, the survival rate of this research work is lower than that found by Oginni⁽⁵⁾.

Identifying a time cut-off for complete denture broken may help both dentists and technicians to improve their casting techniques in order to achieve much better results.

Dentures problems are very common, and they are not alike. Ill-fitting dentures can move and cause sore spots. Denture adhesive may be help cut down on this movement⁸.

You should always see a dentist if your dentures do not fit correctly.

Other denture tips:

- * Scrub dentures with plain soap and lukewarm water after eating.
- * Dentures should be taken out overnight to prevent sores, infections, and inflammation.
- * Dentures can be left overnight in a denture cleaner.
- * Clean, rest, and massage the gums regularly. Rinsing daily with lukewarm salt water will help clean your gums.
- * Do not use toothpicks when wearing dentures.

For the above reasons, this research work has been done, to cast light of the time distribution of dentures wearer till failures occurs.

Conclusion

According to the results of the Kaplan-Meier and ML estimates of the survival rate for the complete dentures, it's possible to state that about 50% of the complete dentures will suffer from serious problems regarding their use. It is therefore very important to call for checking or maintenance by this time.

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