

The Correlation of Total Particles Recollected and Ungrounded Particles While Using Sieve Method- A Pilot Study

¹Julia T Thomas, ²Dr. Elias M Kuriakose*.

¹Lecturer (on contract), ² Postgraduate Student

¹ Department of Mathematics, Baselius College, Kottayam, Kerala-686001.

².Department of Prosthodontics, JSS Dental College and Hospital, Mysuru-570015.

Abstract:

Introduction: Sieve method of testing masticatory efficiency has been in practice over five decades. Many test foods have been tested using the sieve method to analyze the masticatory efficiency. This study tries to find any correlation if it exists, between the total recollected test food and residue in the sieve with highest pore size.

Methodology: The test food was collected from the subject's mouth after 3min of chewing cycle and weighed after disinfection and dry filtration. Weight of residue in No.10, No.22 and total particle weights are tabulated separately for each subject.

Result:The study shows a high positive correlation ($r= 0.97$) between the weight of residue in No.10 size sieve and weight of total particle collected.

Conclusion: Within the limitation of the article, it may be concluded that the increase in quantity of recollected test particle will give an early sign that the masticatory efficiency of the subject is not up to the mark.

Keywords: *Sieve Method, Complete Dentures, Edentulousness*

Introduction:

Masticatory efficiency in complete denture patients has always been a subject of debate since the beginning. Many methods have been devised for the same like sieve method, chewing gums, calorimetric method, image analysis, subjective assessment etc. Of these, the sieve method has been used as a gold standard test for checking the masticatory efficiency of subjects since past 50 decades. The key point of this method is that the more particles ground by mastication reach the smaller diameter sieves, the better is the individual masticatory efficiency rated^[1]. This greatly depends on the quantity of test food retrieved from the subject's mouth. This study tries to find the correlation between the total particles collected and the ungrounded particle while using sieve method.

Materials and Methods:

The study was carried out with 30 subjects (15 males and 15 female) after obtaining ethical clearance. Inclusion criteria was set as subjects who signed informed consents and who were satisfied denture wearers for 6 months at least and with no history of TMJ problems, neurological problems and mental disabilities.

Subjects with metal-based dentures or dentures associated with maxillofacial defects were excluded. Masticatory efficiency of the subjects was tested using sieve method ^[2].

In sieve method, subject was given 3g of pre-weighed peanut and asked to chew for 20 seconds and to expectorate into a glass. Subject was made to rinse his/her mouth and expectorate into the same glass to retrieve the whole of the test food. The recollected particles were separated out using filter paper and disinfected using chlorhexidine and subjected to dry sieving. The collected particles were weighed and passed through No.10 sieve and the filtrate was passed through No. 22 size sieve. The weight of the residue of No. 10 size sieve and No.22 size sieve were measured and recorded.

Result:

The filtrate obtained from size 10 sieve was tabulated. This value is taken in grams and the range obtained is 0.327-2.089. The weight of the recollected particles after drying was tabulated and found to be in the range 0.639-2.497. This measurement is in grams. Then the Pearson's correlation coefficient of filtrate obtained from size 10 sieve and weight of recollected particles is obtained and a positive correlation of 0.97 is recorded. The scatter diagram of the observation is given in Figure 1.

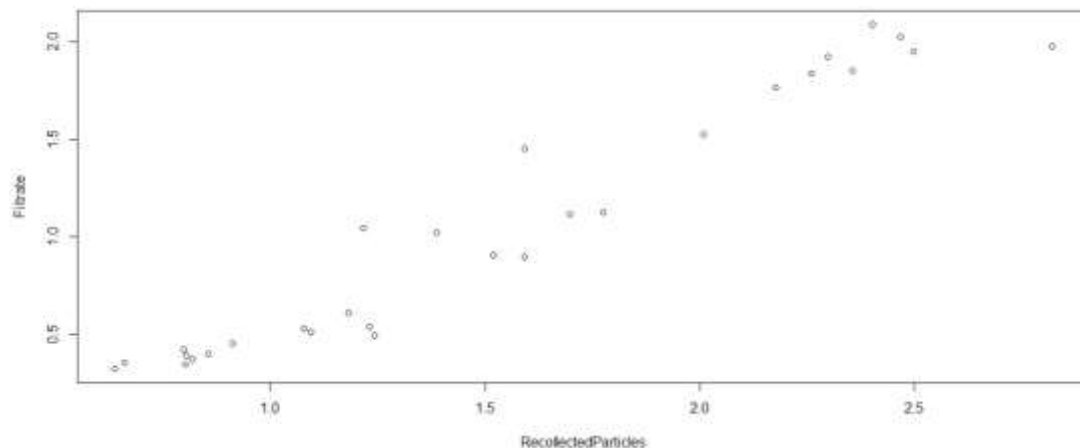


Figure 1. Scatter diagram of filtrate in size 10 sieve and weight of recollected particles

Discussion:

Methods to check for the masticatory efficiency can be broadly divided into objective and subjective methods ^[3]. Objective methods are resulted from different tests and subjective methods are those perceived by the patient. Food preference questionnaire and patient satisfaction questionnaire are examples of subjective analysis. S C De Lucena et al [2011] found no correlation between the objective method and the subjective method ^[4].

Sieve method is an objective method of assessing masticatory efficiency and was proposed as early as in 1950 by Manley and Braley ^[5]. Kapur et al suggested the usage of homogenous foods like nuts, sausages and sardines for its relative easiness to chew for checking the masticatory efficiency of denture wearers ^[2]. Masticatory efficiency tested using the test food showed high degree of repeatability and reliability and is considered as the Gold standard. The present study uses peanuts because of its homogenous nature, ease in handling and availability.

The weight of the test food is determined according to the standards as 3g^[2] and is chewed for 20 seconds. Particles are filtered using a filter paper instead of sieves for the specificity. Chlorhexidine at 2% concentration is used for disinfecting the particles as recommended by ADA and CDC^[6, 7, 8]. This also prevents the clumping of the particles due to saliva. The particles obtained were dry sieved because of its procedural simplicity. The present study utilized the method put forward by Kapur&Yurkstas^[2], where a set of sieves were used. The present study has used particles which are sieved out of the No. 10 sieve and correlated with the actual weight of retrieved test food. This method of using the bigger particles to assess the masticatory efficiency helps in easy recollection of the particles from the sieve and ease in handling the samples.

Conclusion:

Within the limitation of the article, it may be concluded that the increase in quantity of recollected test particle will give an early sign that the masticatory efficiency of the subject is not up to the mark.

Reference:

1. Feine JS, Lund JP. Measuring chewing ability in randomized controlled trials with edentulous populations wearing implant prostheses. *Journal of Oral Rehabilitation*. 2006; 33: 301-308.
2. Kapur K, Yurkstas. A test food for measuring masticatory performance of denture wearers. *J Prosthet Dent* 1964; 14:483-491.
3. Katsuhiko Kimoto, Takahiro Ogawa, Neal R. Garrett, Minoru Toyoda. Assessment of Masticatory Performance-Methodologies and Their Application. *Prosthodont Res Pract*2004 ; 3(1) : 33-45.
4. Lucena SC, Gomes SG, Silva WJ, Cury AA. Patients' satisfaction and functional assessment of existing complete dentures: correlation with objective masticatory function. *J Oral Rehab* 2011; 38: 440-6.
5. Manly Rs, Braley Lc. Masticatory Performance And Efficiency. *J Dent Res*. 1950; 29(4): 448-62.
6. Inglis T. Sterilization, Disinfection and Infection Control (3rd ed). *Australian Infection Control*. 1999;4(1):24.
7. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, et al. Guidelines for infection control in dental health-care settings. *MMWR Recomm Rep* 2003; 52(17): 1-61.
8. ADA Council (1996) Infection control recommendations for dentaloffice and the dental laboratory. ADA council on scientific affairs and ADA Council on dental practice. *J Am Dent Assoc* 127(5):672-680.