# **ORAL STEREOGNOSTIC SCORE IN EDENTULOUS PATIENTS**

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#### ABSTRACT

The aim of this study was to evaluate the mean oral stereognostic score of completely edentulous patients. Study design was Cross-Sectional Descriptive Study. The study was conducted in Prosthodontic Department, Armed Forces Institute of Dentistry, Rawalpindi from May 2017 to October 2017 over a period of 06 months.

A total of 30 patients between age of 45-75 years were selected. Oral stereognostic ability (OSA) scores were recorded using OSA intra oral tools and noted down on the performa. Data was analyzed using SPSS version 20. Total of n=30 patients were selected out of which 56.7% (n=17) were males and 43.3% (n=13) were females. The mean + SD age of patients were 61.93 + 7.329 years. Out of these 30 patients 56.7% (n=17) were diabetic whereas 43.3% (n=13) were non-diabetic. The Mean + SD of period of Edentulism of patients was 5 + 1.965 years.

Within the limitations of this study, it is concluded that the oral stereognostic scores of patients were high resulting in a poor stereognostic ability.

Key words (MeSH): Stereognosis, Oral sensation, Edentulous

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#### INTRODUCTION

In the absence of visual or auditory information, the neurosensory ability of the oral tissues to recognize and distinguish various shapes or configuration of objects inside the oral cavity is known as Oral stereognostic ability (OSA).<sup>1,2</sup> Assessment of the effectiveness of any treatment or testing of oral dysfunctions can be among some of the dental applications of OSA.<sup>3</sup> Likewise prediction of adaptation to complete dentures by the patients may also be carried by oral stereognostic tests.<sup>1</sup> The basic concept is, that between any patient's motor coordination and it's reception of sensory stimuli, there lays a balance, lack of which results in disturbed reception of stimuli.<sup>4</sup> Oral mucosa as well as tongue, periodontal membrane, muscle spindles and tendon

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organs are the most common locations for sensory receptors related to oral stereognosis.<sup>2</sup> Interestingly there is a wide distribution of the oral region's sensory representing area compared to the rest of the human body, which marks a great significance for oral function in humans.<sup>5</sup>

In general, ageing is a risk factor for sensory and motor deterioration but the amount of deterioration is variable among individuals.<sup>6</sup> The changes in the oral status due to edentulousness or rehabilitation with prosthesis may affect OSA in addition to the effect of aging itself.<sup>3</sup> Oral function may be different from other ageing changes because of a remarkable change due to tooth loss.<sup>°</sup>However OSA is not reduced by covering the palatal mucosa with a denture rather improvements have been found in presence of a prosthetic restoration. Disturbed sensorimotor coordination is manifested by tongue's impaired OSA and is connected with its incorrect position resulting in its action with reduced precision and markedly decreased vertical movement.<sup>4</sup> Furthermore, among experienced and non-experienced denture wearers, it is needed to determine the sensory adaptation patterns to new dentures. As compared to non-experienced patients, the discrimination of thickness is superior in experienced complete denture wearers. The denture adaptation has been evaluated by OSA in various studies which may subscribe to

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understanding the correlation of OSA adaptation of dentures naturally in the population of elderly.  $^{\!\!\!\!^4}$ 

The rationale of this study was to evaluate the deterioration in motor and sensory ability of the patients in edentulous state. Provision of prosthetic treatment required a multidisciplinary approach in these patients when referred to dentist or prosthodontist. Our assumption was that since edentulism causes loss of periodontal ligaments that bear the proprioceptive ability of the teeth, oral stereognosis might also be affected. This study will help us in properly planning the prosthodontic rehabilitation of these patients.

## METHODOLOGY

Ethical approval was signed prior to conducting the study. A Cross-Sectional Descriptive study was conducted in the department of Prosthodontics at Armed Forces Institute of Dentistry (AFID), Rawalpindi over a period of 06 months (that is, May 2017- Oct 2017). Sample size of 30 patients was selected. Sample technique used was non probability consecutive sampling technique. Inclusion criteria consisted of completely edentulous patients of both genders age 45-75 years with period of edentulism not more than 10 years. Exclusion criteria consisted of patients with psychiatric disorders, neurologic deficit, craniofacial anomalies, visual impairment (blindness), Squamous Cell Carcinoma, Leukoplakia, Lichen Planus, Erythroplakia, Kaposi's Sarcoma and patients suffering from blindness or hearing deficit. Patients fulfilling the criteria were referred to Prosthodontic department. Consent for the study was obtained from the patients before carrying out history and complete oral examination.

Data collection procedure consisted of a performa, which was filled and information regarding demographic data, telephone number, period of edentulism etc. was entered. Oral Stereognosis was evaluated using an oral stereognostic (OSA) test. Oral stereognostic testing tool analogues of four different forms i.e. cube, cube with disk, ovoid with one end pointed/tear drop, ovoid with two ends pointed made in soft plaster of size 30mm x 30mm x 30mm were placed on the table of the dental unit/chair while the patient could observe each shape. (TABLE-1) During this period, the oral stereognostic testing tools made in heat cured acrylic resins were not shown to them. They were explained briefly about the shapes of each analogue and were asked to recognize each individual shape of oral stereognostic testing tools that were put intraorally and pick the corresponding shape of analogue placed on the table. Standard measures for ensuring cross infection control were strictly followed. Patients were instructed to keep his/her eyes closed while the oral stereognostic testing tools were put intraorally on the dorsum of his/her tongue by the examiner's right hand which was followed by immediate opening of the eyes. During this time, the patients were allowed to manipulate the testing tools in an attempt to recognize the corresponding shape among the oral stereognostic testing tool analogues. A stopwatch held in the examiners left hand was turned on in order to measure the time required by the patient to manipulate the stereognostic testing tool to recognize the correct corresponding shape among the stereognostic testing tools analogues. The stopwatch was turned off by the examiner at this moment and the time duration elapsed appeared on its screen. This time duration taken in seconds was entered into the data collection performa and a score was given. The procedure was repeated for each shape of the oral stereognostic testing tool individually. Maximum score of 12 (3 x 4) and minimum was zero is possible for one subject. After taking the readings, the oral stereognostic testing tools was retrieved back with the help of tweezers and disinfected in order to make them ready for the next patient.

Data was analyzed by using SPSS 20. Descriptive statistics were calculated for both qualitative and quantitative variables. For qualitative variable like gender; frequency and percentages were calculated. For quantitative variables like age, period of edentulism and oral stereognostic score; means and SD were calculated. Effect modifiers like age, gender, diabetes mellitus, duration of edentulism, and experience and non-experienced denture wearers were controlled through stratification independent sample t-test. P value of  $\leq 0.05$  was considered significant.

## RESULTS

This was a cross-sectional descriptive study in which a total of n=30 patients were selected out of which 56.7% (n=17) were males and 43.3% (n=13) were females.

The mean  $\pm$  SD age of patients were  $61.93\pm 7.329$  years. Out of these 30 patients, 56.7% (n=17) were diabetic whereas 43.3% (n=13) were non-diabetic and subjects with past denture wearing experience were 60% (n=18) and those without any experience of denture use were 40% (n=12).

The Mean and Standard deviation of period of Edentulism of patients was 5 + 1.965 years. Mean+ SD of Scores for identification of individual Stereognostic tools inserted in patients' mouth were: Tool 1: 2.9+0.890; Tool 2: 3.0+0.910; Tool 3: 2.97+0.890; Tool 4: 3.0+0.871 (Figure1-4).

Independent sample T-test was applied to determine the difference in Stereognostic scores with gender of the patients and no statistically significant difference was found with p-value of 0.819 for Tool-1, 0.693for Tool-2, 0.819 for Tool-3 and 1.000 for Tool-4.

Post stratification independent sample T test was



Fig 1: Bar Chart Showing Frequency Of Scores Of Stereognostic Tool 1



Fig 2: Bar Chart Showing Frequency Of Scores Of Stereognostic Tool 2







Fig 4: Bar Chart Showing Frequency Of Scores Of Stereognostic Tool 4





used to determine the difference of Stereognostic scores with diabetic status of the patient and no statistically significant difference was found with p-value of 0.526 for Tool-1, 0.428 for Tool-2, 0.526 for Tool-3 and 0.407 for Tool-4. Post stratification independent sample T test was used to determine the difference of Stereognostic scores of the patients in relation to denture experience and no statistically significant difference was found with p-value of 0.526 for Tool-1, 0.428 for Tool-2, 0.526 for Tool-3 and 0.407 for Tool-4. Post stratification independent sample t test of individual stereognostic tool with period of edentulism was done and statistically significant difference was found with p-value of 0.004 for Tool-1, 0.003 for Tool-2, 0.018 for Tool-3 and 0.002 for Tool-4.

## DISCUSSION

The neurosensorial ability to recognize and discriminate various shapes, character or forms of objects inside the oral cavity of the oral mucous membrane is known as Oral stereognosis (OS).8Tongue, lips, thumbs, and index fingers have greater sensorial abilities than other parts of the body.<sup>9</sup> Consequently to understand the expectations of the patients receiving complete denture treatment, it is important for a dentist to know about oral stereognosis. Decreased OS levels in edentulous patients results in the loss of periodontal ligament's tactile sensitivity.<sup>10-14</sup> So far evaluation of the possibility that chewing can present as a training modality to augment the Oral Stereognostic index has not been done.9 A series of continuous information from food characteristics i.e. shape, size and texture is transmitted to the previously listed areas during mastication which is similar to the neuronal circuitry that happens in the Oral Stereognosis tests.<sup>9</sup> Because OS may improve with proper training, it was hypothesized that the constant stimulation of the sensory and motor areas by chewing might also do it. One of the arguments that supported this study was that if with age the brain function dwindles, the mastication with well-planned prosthesis would be very practical for brain function stimulation among patients with no teeth.<sup>12</sup>

In our study, patients with wider range of age were selected as mentioned in the methodology which is in accordance with most of the studies conducted for oral stereognostic evaluation.<sup>4,8,9,11,13,15-17</sup> The scores recorded for the stereognostic tool identification in the present study was higher which is in accordance with the study conducted by Dalaya MV in which the OSA score was higher for edentulous patients.<sup>8</sup> In the present study, statistically no significant difference was found in stereognostic scores among males and females which is in accordance with a literature review by Jacob R and colleagues that states that gender is not considered as an important factor in oral stereognosis.<sup>5</sup> In our study no statistically significant difference was found in the stereognostic scores among diabetic and non-diabetic patients which is different from the

findings in the study carried out by Gnanasambandam K and colleagues showing that diabetic edentulous subjects had poor stereognostic scores.<sup>15</sup> There was no statistically significant difference noted in the scores of oral stereognostic test among subjects with previous denture experience and those with no previous denture experience which is not in accordance with the study conducted by Meenakshi S and colleagues, in which it was reported that patients with denture experience took lesser time in identification of tools as compared to those with no experience.<sup>4</sup> The present study showed that statistically significant difference was found with increased period of edentulism which was in accordance with the study conducted by Park JH.<sup>16</sup>

There are studies that showed the stereognostic scores of dentate or partially dentate individuals as compared to edentulous patients is better which highlights the importance of presence of periodontal receptors in dentate individuals.<sup>5,8,9,13</sup> A study conducted by Bilal and colleagues even showed that patients with hypodontia had poor stereognostic ability as compared to those with normal dentition.<sup>18</sup> These studies therefore highlight the fact that with edentulism the stereognostic ability of patient decreases and those patients who have been edentulous for a longer period of time will have poor stereognostic ability without any previous denture use, which has been shown in our study as well. Such patient will have difficulty in adjusting with their new dentures and dentist will have to spend ample time with them to manage their complaints.

## CONCLUSION

Within the limitations of this study, it is deduced that oral stereognosis of edentulous subjects was relatively lower in comparison to what has been observed in dentate subjects in the literature. Understanding of oral stereognosis among edentulous patients will guide dentists to fabricate adequate prosthesis that may enable these patients to perform various oral functions that include not just the purpose of mastication and chewing; but also, the function of swallowing/deglutition, speech as well as esthetics.

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#### **CONTRIBUTIONS BY AUTHORS**

1 Ali Waqar Qureshi:	Study design, Data collection, Discussion, Conclusion.
2 Shoaib Rahim:	Methodology, Statistical analysis, Results, Literature review.
3 Maria Shakoor Abbasi:	Data collection, Literature review.
4 Qayyum Akhtar:	Introduction, Data collection.
5 Saba Waqar Qureshi:	Literature review.