A CLINICAL STUDY TO CORRELATE ORAL STEREOGNOSIS AND DENTURE SATISFACTION IN COMPLETE DENTURE PATIENTS

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In the partial fulfillment of the requirement for the degree of

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PROSTHODONTICS AND CROWN & BRIDGE

2010 - 2013

CERTIFICATE

This is to certify that this dissertation titled **"A CLINICAL STUDY TO CORRELATE ORAL STEREOGNOSIS AND DENTURE SATISFACTION IN COMPLETE DENTURE PATIENTS"** is a bonafide record of work done by **Dr. A. Sakthi Devi** under my guidance during her postgraduate period between 2010- 2013. This dissertation is submitted to **THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY**, in partial fulfilment for the Degree of **Master of Dental Surgery in Prosthodontics and Crown & Bridge (Branch I).**It has not been submitted (partial or full) for the award of any other degree or diploma.

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DECLARATION

I, **Dr. A.SAKTHI DEVI**, do hereby declare that the dissertation titled "**A CLINICAL STUDY TO CORRELATE ORAL STEREOGNOSIS AND DENTURE SATISFACTION IN COMPLETE DENTURE PATIENTS"** was done in the Department of Prosthodontics, Tamil Nadu Government Dental College & Hospital, Chennai-600003. I have utilized the facilities provided in the Government dental college for the study in partial fulfilment of the requirements for the degree of **Master of Dental Surgery** in the specialty of **Prosthodontics and crown & bridge (Branch I)** during the course period **2010-2013** under the conceptualization and guidance of my dissertation guide**, Dr. A. Meenakshi, MDS.**

I declare that no part of the dissertation will be utilized for gaining financial assistance for research or other promotions without obtaining prior permission from the Tamil Nadu Government Dental College & Hospital.

I also declare that no part of this work will be published either in the print or electronic media except with those who have been actively involved in this dissertation work and I firmly affirm that the right to preserve or publish this work rests solely with the prior permission of the Principal, Tamil Nadu Government Dental College & Hospital, Chennai 600 003, but with the vested right that I shall be cited as the author(s).

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And

Mrs. Dr. A. Meenakshi aged 42 years working as **professor** in the Department of Prosthodontics at the college, having residence address at No. 137, fifth street, secreteriat colony, Kelleys,Chennai-10 (herein after referred to as the 'PG guide)

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Ms. Dr.A.Sakthi Devi aged 30 years currently studying as **Post Graduate Student** in the Department of Prosthodontics, Tamil Nadu Government Dental College and Hospital, Chennai-03 (herein after referred to as the 'PG Student and Principal investigator').

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Witness PG Guide

1.

2.

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ABSTRACT

Title: A CLINICAL STUDY TO CORRELATE ORAL STEREOGNOSIS AND DENTURE SATISFACTION IN COMPLETE DENTURE PATIENTS.

Aim: To correlate oral stereognosis and denture satisfaction in complete denture patients.

Objectives:

(1)To find out difference in oral stereognosis in patients with satisfied and dissatisfied complete denture (2)To find out whether oral stereognosis tests can be used as one of the diagnostic aids in predicting patients' performance with the complete denture.

Oral stereognosis is defined as the identification of forms solely through the use of oral receptors. Controversy exists between oral stereognosis ability and denture satisfaction.High oral perception is thought to contribute to poor adaptation to dentures.

Method:

Two groups of patients, 40 in Group A and 20 in Group B participated in the study. Group A are completely edentulous patients who were experienced denture wearers on an average of 4 years. Group B were patients who seek complete denture for the first time. For assessing patient's opinion about their dentures, a questionnaire was prepared. Custom made heat cure acrylic resin test forms were made to test oral stereognosis ability. Both the groups went through the oral stereognosis test and denture satisfaction questionnaire .Based on the mean scores, both the groups were divided into satisfied and dissatisfied; high and low oral stereognosis score group.

Results:

Spearman's analysis showed negative correlation between oral stereognosis and satisfaction of complete denture prosthesis

Conclusion:

Results showed that patients who were satisfied with their dentures showed low oral stereognosis score. And patients who were dissatisfied with their denture had high oral stereognosis score.

Key words: Oral stereognosis, test form, complete denture, satisfaction.

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"No law or ordinance is mightier than understanding" – PLATO

Stereognosis is the ability of perceiving and understanding the form and nature of objects by the sense of touch[1]. The subject is required to identify familiar objects by hand manipulation with the eyes closed. Tactile stimulation produces an awareness to the presence of stimulus. Stereognosis tests are used to evaluate the integrity of sensory feedback .The neurologic evaluation of central nervous system integrity frequently employs stereognostic tests.

The physiologic function of the masticatory system is primarily dependent upon the integration of sensory feedback and motor neuron response. The process of perception as it relates to oral function involves the sensory innervations of the periodontal membrane, the epithelial surfaces of the oral cavity, the muscles of the tongue, the muscles of mastication, and the temporomandibular joints.

The loss of the natural teeth results in the complete loss of the sensory input that was provided by the periodontal ligament. It is compensated by sensory signals from the joints and receptors in the denture foundation. The success or failure of a prosthodontic restoration or replacement is also dependent upon the integration of proper proprioceptive feedback and motor responses

Oral stereognosis is defined as identification of forms solely through the use of oral receptors. It involves identification of forms of objects without the

aid of vision but by oral manipulation. Stereognostic ability testing is indeed not designed to detect specific receptor groups, rather, it reflects an overall sensory ability.

A good score in a stereognosis test indicate that the subject receives full and accurate information about what is going on in the mouth. It has been established that this kind of sensory testing is an indicator of functional sensibility, including the synthesis of numerous sensory inputs in higher brain centres[2]. Oral stereognosis is used to investigate the relationship of oral perception to diagnostic and therapeutic procedures in dental treatment.

"Adaptation and adjustment to the dentures" play an important role in patient satisfaction with complete dentures. There may be several factors that play role in patients' adaptation and adjustment to dentures to cause satisfaction or dissatisfaction of dentures. Level of education, self-perception, quality of life, denture-wearing experience, the oral condition, the patient-dentist relationship, the patients' attitude towards dentures, the patients' personality, socio-economic factors, demographic variables, previous denture experience and oral motor ability, patient's skill, oral stereognosis are all related to patients' satisfaction.

Some studies have demonstrated that denture wearing is a matter of skilled performance and the belief that, once this skill is acquired, the patient relies much less on purely physical factors such as adhesion and

cohesion for denture control. Hence oral perception plays a crucial role in patient adaptation to dentures.

With increasing life span complete denture wearers are forming a large group of dental patients. Though there are many advances in dentistry still conventional complete dentures remain an imperative means for the restoration of the oral function of edentulous adults. The main objectives of restoring an edentulous mouth are to preserve the health of remaining structures of the masticatory apparatus, to improve the efficiency of mastication, to assist the phonation, to improve the aesthetics, to give physiological, psychological and social comforts to the patient.

The ability to predict patient's performance with complete denture is still difficult no matter which approach and level of clinical proficiency is employed in the fabrication of a prosthesis. Any dentist who wants to provide good denture service will evaluate carefully each patient. Hence a distinct need exists for dentists to be able to identify problem patients before actually beginning prosthodontic treatment.

The level of oral stereognosis sbility demonstrated a definite relationship with denture performance.

Mantecchini et al [3] and **Berry et al** [4] found a strong relationship between oral stereognosis and denture satisfaction, that the patients with high

oral stereognostic score had less degree of satisfaction and more problems in denture usage than that of patients with low stereognostic scores. While **Van et al**[5] found no correlation between oral stereognostic ability and denture satisfaction.

The satisfaction of the patient is a strong determinant of success in complete denture service. Therefore it is the duty of dentist to have knowledge of the determinants, and approach patient for a successful treatment.

"There is no greater challenge than to have someone relying upon you; no greater satisfaction than to vindicate his expectation"

Kingman Brewster.

Hence this study is conducted to find any correlation between oral stereognosis among patients with satisfied and dissatisfied complete denture.

Aim of the study:

To correlate oral stereognosis and denture satisfaction in complete denture patients.

Objectives:

- To find out difference in oral stereognosis in patients with satisfied and dissatisfied complete denture.
- To find out whether oral stereognosis tests can be used as one of the diagnostic aids in predicting patient's performance with the complete denture.

Brill N, Tryde G, Schubeler S (1959)[6] performed an investigation supporting the concept that exteroceptors of the oral mucous membrane are concerned with the purposive behaviour of the muscle of cheeks, lips, and tongue. With the method described it is possible to compare the effect of the muscles about the mouth with the effect of other retaining forces. It was concluded that muscle activity transcends in importance to all other factors responsible for denture retention.

Langer A, Michman J, Seifert I (1961)[7] analysed the factors influencing satisfaction with complete denture in geriatric patients and concluded that an almost perfect relationship was found between satisfaction with dentures and the patient's report on his chewing efficiency. A high correlation was found between the patient's satisfaction and his comfort in using the dentures in speaking, working, leisure time, and other activities.Almost no correlation between clinical fit of the dentures and the patient satisfaction. Some evidence indicated that satisfaction of the patient might be related to the personality and ability of the dentist.

Seifert I, Langer A, Michmann J (1962)[8] investigated the role of four psychologic factors in determining satisfaction or dissatisfaction with complete denture. This study showed that intelligence and previous denture experience played little or no part in determining satisfaction with present dentures but that the patient's personality and his relation to the dentist were associated with the patient's satisfaction.

Brill N, Schubeler S, and Tryde G (1962)[9] stated that the occlusal sense, which they determined as the ability to perceive loads applied to the occlusal and incisal surfaces of teeth, following loss can be restored to some degree in edentulous patients by complete dentures. They reported that in contrast to dentulous patients, who could determine difference as small as 0.02 mm, complete denture patients were able to perceive thickness of 0.06 mm. They concluded that after loss of natural teeth the exteroceptors of the oral mucosa took over receiving and transmitting of the stimuli to their respective centers of the central nervous system. This projection of sensory stimuli through complete dentures was probably the most important factor for retention.

Kapur K, Soman S, Yurkstas A (1964) [10] conducted a study to determine the procedures and test foods which would be most reliable for measuring the masticatory performance of denture wearers. They concluded that mastication with complete dentures is a non-preferential process, where in particles of all sizes are ground at random. This difference between persons with dentures and those with dentitions maybe attributed to changes resulting from loss of natural teeth and their replacement. The efficiency of food transport by the tongue and cheeks may be reduced because of their added function of retaining the dentures.

Grossman RC (1964)[11] suggested the first oral stereognostis test by placing small plastic objects on the dorsum of tongue of patients. He concluded that all normal individuals could identify 70 per cent of the shapes and three

subjects with cerebral palsy responded inconsistently.He also demonstrated the regional differences of oral surface sensory elements in the oral cavity.

Berry DC and Mahood M (1966)[4] related the oral stereognostic ability as well as oral motor ability to prosthetic treatment.They reported considerable variation in scores, as the younger subjects showed better scores. There was, however, a poor correlation between the separate scores, except for those who did very well in both tests and concluded that the successful denture wearers had poorer oral sensory abilities than unsuccessful denture patients.

Carlsson GE, Otterland A, Wennstrom A (1967)[12] performed an examination of patients who wear complete denture 1 to 4 years , in order to investigate the relationship between appreciation of the dentures and personal, social, anatomical and prosthetic factors. They concluded that dentists assessment does not show significant correlation while retention and stability of the upper denture was considerably more correlated with the patients appreciation than corresponding factors in the lower denture.

Hochberg I & Kabcenell J (1967)[13] concluded that oral stereognostic ability in cleft palate individuals is significantly inferior than the normal individuals and the presence of prosthetic appliances in cleft palate individuals appears to facilitate oral stereognosis

Fish SF (1969)[14] showed that the acceptance of dentures depends on adaptation by the patient. The design of full dentures and the

introduction of the patient to them should take account of the demands on learning, muscular skill and habituation. He described procedures that were found helpful in minimizing the demands on patient tolerance and taking account of changes in functional response. He concluded that the facility of these responses diminishes with age, especially in the treatment of elderly patient, for an attempt to graduate the demands on adaptation to his or her tolerance and moreover to retain the opportunity to modify the appliances in accordance with the observed changes in function.

Litvak H, Silverman SI, Garfinkel L (1971)[15] performed an oral stereognostic test to determine levels of oral perception in 42 dentulous and 48 complete denture subjects. Three dimensional test forms fabricated from base metal alloy were used under various test conditions to assess the subject's ability to identify forms in the mouth. They concluded that the critical evaluation of a prosthesis should include not only all of the dentists objective skills of treatment and patient's subjective judgment about oral health, function and esthetics, but also the patients oral perceptive skills.

Crum RJ and Loiselle RJ (1972)[16] described that the success or failure of a prosthodontic restoration or replacement is dependent upon the integration of proper proprioceptive feedback and motor responses.The denture bearing areas and other surfaces of the oral cavity that come in contact with the denture send perceptive sensations to higher centres.

Hirsch B, Levin B, Tiber N (1973)[17] determined the effects of dentist authoritarian on patient evaluation of dentures. The results indicate that patients treated by low authoritarian dentists reacted much more favourably to the denture setups they received than did patients treated by high authoritarian dentists. Patients treated by low authoritarian dentists rated their dentures from very good to best. Patients treated by high authoritarian dentist rated their dentures as ok. To evaluate this, the authors compared the choices of dentists and patients and found little or no correlation. They concluded that those patients treated by high authoritarian dentist were less satisfied with their dentures than were patients treated by low authoritarian dentists.

Culver PAJ, Watt I (1973)[18] examined 44 subjects by cinefluorography for denture movement and control. They found that tongue moved up to contact the upper denture in most of these cases and in some actively assists in seating the denture. It was noted that incising and swallowing took longer in denture patients than in those with natural teeth and swallowing a liquid bolus was less efficient in denture cases where leakage occurs into buccal and lingual sulci. They concluded that subjects with denture problems showed less movement of the denture than those content with their denture

. **Chauvin JU, Bessete RW (1974)**[19] did a study by comparing oral stereognostic scores in patients who had difficulty in adapting to complete

dentures to scores in patients who had adapted more readily. They concluded that there is a relationship between oral stereognosis and successful adaptation to complete dentures. Individuals with higher scores find it more difficult to make the adjustment to a prosthesis despite careful fabrication. Knowledge of this prior to denture fabrication could be of value to the clinician.

Landt H, Fransson H (1975)[20] investigated possible differences between a group of dentulous young adults and a group of dentulous elderly individuals when attempting to recognize forms orally and to carry out tasks which demand a fine coordination of the oral muscular apparatus. They concluded that older group had reduced ability for both forms of tests used in this study. Furthermore, individual differences in this respect were more obvious for the older than for the younger examiners.

Michman J, Langer A (1975)[21] studied the influence of denture changes occurring during a period of use ranging from 1 to 15 years, in a group of 35 complete denture subjects. No correlation was found between denture serviceability on one hand and the masticatory performance and muscular coordination during chewing of test food. However a significant correlation was found between a subject's satisfaction and his masticatory performance as well as his muscular coordination during chewing of test food. They concluded that as soon as the time linked and insidious imperfections of complete dentures are compensated by feedback controlled

neuromuscular adaptation, the subjects adjusted pattern of function does not affect his performance and comfort and consequently his satisfaction.

Silverman S, Silverman SI, Silverman B, Garfinkel L (1976)[22] conducted a study to determine whether a relationship exists in geriatric patients between self image and the denture acceptance. They concluded that the study provided corroborative evidence of the need for the dentists to make an initial assessment of those personality factors in his patients which might limit his ability to provide adequate dental services.

Catalanotto FA , Henkin RI (1977)[23] investigated manual and oral Sensation in patients with Cushing's Syndrome. Thresholds for light touch detection and two point discrimination on the hand and in the mouth, and oral and manual stereognosis ability were measured in patients with untreated Cushing's syndrome and normal volunteers.Results indicated that patients with Cushing's syndrome displayed decreased two point discrimination on the tongue and palate and decreased oral stereognosis.

Guckes AD, Smith DE, Swoope CC (1978)[24] conducted a study in which they divided patients into two groups on the basis of their scores on the Cornell medical index (CMI). Patient denture satisfaction was measured with a questionnaire 6 weeks after placement of new dentures. They concluded that patient ranked factors important in denture satisfaction in following order from most important to least important that is comfort, chewing, retention, appearance, other people's opinion.

Grasso JE and Catalanatto FA (1979)[25] studied the effects of age and full palatal coverage on oral stereognostic ability. The results suggest that there were no significant differences in results for the younger and older subjects with or without palatal coverage. However, the older patients correctly identified significantly fewer forms orally than the younger subjects and slightly but not significantly longer recognition times.

Zarb GA (1982)[26] showed that the mechanism of support for oral prostheses varies qualitatively and quantitatively, depending on the type of prostheses worn. Non dental prosthetic support demonstrates progressive longitudinal changes and poses special problems for the denture wearer. It was concluded that the masticatory system is considered as a biomechanical interaction of three components: function/dysfunction, adaptive responses and TMJs. It appears that oral behavior is related to all three components, but its role is not completely understood..

Davis EL, Albino JE, Tedesco LA, Portenoy BS and Ortman LF (1986)[27] performed a study to determine the expectations and satisfaction of patients before and after denture treatment. The results show that patients' expectations before treatment were unrealistically high and increased significantly from pre-treatment to post-treatment for both groups in the study. While it is likely that this increase in satisfaction reflects a change from poor to excellent denture status, this finding may also be attributed to cognitive

dissonance theory; that is, high satisfaction may represent the means by which patients justify the expenses of their denture treatment.

Weinstein M, Schuchman J, Lieberman J and Rosen P (1988)[28] examined the relationship between age and past experience with complete dentures on patients' acceptance of their new dentures by using self evaluation questionnaires.They concluded that patients generally had a high evaluation of their dentures, with the highest scores given to appearance , age was not a significant predictor of denture success.Also patients receiving their first dentures consistently had more difficulties in all categories of function, comfort, and appearance than patients with past experience with dentures.

Van Waas MAJ (1990)[29] performed a study to investigate the relationship between satisfaction with complete dentures and several casual factors. New dentures were made for 130 patients who were investigated during their treatment. The patient dentist relationship was evaluated by asking patient their opinion about the treatment and patient attitude towards denture in general and their expectation toward the new dentures were evaluated by means of a questionnaire. He concluded that the quality of the dentures, the patients attitude towards dentures prior to receiving them appears to play an important role. Those who thought negatively were more often dissatisfied, and conversely, patients with positive opinions before getting new dentures more often had positive responses after receiving

them. Thus satisfaction with dentures must be individually determined and is often unpredictable for both the dentist and patient.

Van Aken AAM, Kalk W, Van Rossum GMJM (1991)[5] performed a study including 86 patients to understand patients' relative satisfaction with complete dentures, differences in oral stereognostic perception. He concluded that the oral stereognosis test applied is reliable for measuring patients' oral stereognostic perception. However, the positive correlation of other studies concerning the relationship between oral stereognosis and satisfaction with complete dentures was not confirmed in this study.

Slagter AP,Olthoff WL,Bosman F,Steen WHA (1992)[30] investigated the relationship between the ability of 38 patients with complete dentures to comminute a tough artificial test food and their answers to questions about the chewing experience. He concluded that dentists cannot rely on asking denture wearers about chewing problems and clinical responses with respect to oral conditions and denture quality for predicting those patients masticatory ability.

Berg E (1993)[31] performed a research showing that wearing of even technically perfect full dentures is associated with a significant deterioration of most, if not all, oral functions. In the research variables which claimed to play an important role in patient acceptance of full dentures such as quality of the dentures, the oral condition, the patient dentist relationship, the patient attitude toward dentures, the patient personality

socioeconomic factor, previous denture experience and oral stereognosis have no or negligible effect. Therefore the clinician has still no option but to base his prediction on an individual estimate of his patients adaptive ability.

Garret NR, Kapur KK and Jochen DG (1994)[32] examined the relationship between masticatory performance and oral stereognostic ability in 71 dentate individuals and 64 denture wearers.The results showed that no relationship was seen between stereognostic ability and masticatory performance, in both the groups, and also both the groups were able to identify approximately 68% of the items.

Muller F, Link I, Fuhr K, Utz KH (1995)[33] conducted a study to evaluate the oral and manual motor abilities which were compared with patient's ability to adapt in 60 experienced denture wearers who had new dentures inserted 2-3 weeks before the experiment. They concluded that a patient's age only roughly indicates the capability of adaptation. In contrast to the manual motor ability, the oral motor ability seems to correlate to the patients adaptation to new dentures.

Muller F, Sander IH, Hupfauf L (1995)[34] did a study to evaluate the oral stereognosis and tactile sensibility in edentate subjects and relate these to patient age and capability of adaptation to new prosthesis. They concluded that the results cannot support a relationship between high oral stereognosis and adaptation problems. However, good denture retention facilitates the adaptation process.

Greksa LP, Parraga I, Clark CA (1995)[35] performed the study which tested the null hypothesis that there are no differences in dietary patterns or adequacy between edentulous patients and individuals with nearly complete dentition. Although edentulous subjects were more likely to claim that they had trouble chewing their food, they were not more likely to select easy to chew food. They concluded that there are no differences in dietary patterns or dietary inadequacy between edentulous patients and individuals with nearly complete dentition.

Demers M, Bourdages J, Brodeur JM, Benigeri M (1996)[36] examined how a simple questionnaire on the reported capacity to chew certain food can predict the masticatory performance of edentulous elderly patients. They concluded that even though the measure of prosthesis retention / stability is related to the masticatory performance, it was not a good predictor.

Al-Rifaiy MQ, Sherfuddin H and Abdullah MA (1996)[37] compared the level of oral stereognosis with post insertion complaints of subjects rehabilitated with complete dentures and concluded that the subjects with high stereognostic score had more subjective complaints than those with lowest mean score.They showed that oral stereognosis may be used in predicting patients' performance to a prosthesis.

Peltola MK, Raustia AM, Salonen MAM (1997)[38] evaluated the effect of complete denture renewal on oral health both subjectively and clinically at follow up 30 months (says 19-36 month) after completion of treatment. They concluded that the main effects of denture renewal are seen in patient satisfaction and clinically in the improved condition of oral mucosa and better fit and acceptable occlusion of dentures.

Carlsson GE, Odont , Odont he (1998)[39] showed that wearing complete dentures may have adverse effects on the health of both the oral and the denture supporting tissues. Correlations between anatomic conditions and denture quality and patient satisfaction are weak. Psychologic factors seem to be extremely important in the acceptance of and adaptation to removable dentures. They concluded that in addition to clinical and technical skills, insight into patient behaviour and psychology and communication techniques are also necessary.

Mantecchini G, Bassi F, Pera P and Preti G (1998)[3] analyzed oral stereognostic ability in a group of edentulous patients with relation to age, duration of edentulism, quality of denture, degree of acceptance of and satisfaction with the denture. Stereognosis was evaluated with and without the denture in place. The results showed that the older subjects had poorer stereognostic ability than the younger ones, whereas the duration of edentulism appeared not to influence this ability. The presence of a correct prosthetic rehabilitation appeared to improve stereognostic ability. Subjects with poorer

stereognostic ability appeared more satisfied with their rehabilitation than did those with better stereognostic ability.

Sato Y, Hamada S, Akagawa Y and Tsuga K (2000)[40] conducted a study to quantify overall satisfaction of complete denture patients . They concluded that the seven satisfaction factors [chewing, speech, pain (lower), esthetics, fit (upper), retention (lower), and comfort (upper)] were highly correlated to the overall satisfaction of complete denture patients. Based on the weights of these seven factors, a quantitative assessment of satisfaction with complete dentures has been developed.

Jang K, Kim YS (2001)[41] compared the differences of part of the oral sensory functions among natural dentition, complete denture wearers and implant supported prosthesis wearers in which tactile and pressure awareness were measured. Tactile sense was estimated by the thickness perception threshold between upper and lower dentition. They concluded that an Osseo integrated root form implant helped towards restoration of oral sensory functions

Pow EH, Leung KC, McMillan AS, Wong MC, Li LS and Ho S (2001)[42] measured oral stereognostic ability in partially dentate and edentulous patients with stroke, Parkinson's disease, and an age and gender-matched control group. Stereognostic measures were poorer in edentulous stroke patients with and without dentures compared with the edentulous control

group. Partially dentate stroke patients are less likely to have impaired oral stereognosis than edentulous stroke patients.

Engleen L,Prinz JF, Bosman(2002)[43] studied the influence of density and material, role of the tongue and palate on oral perception of ball size with and without palatal coverage.The experiment was performed with and without a custom-made plastic palate on fully dentate young adults. The results revealed that size itself determines the size perception, and that material and weight are negligible factors.

Smith PW and McCord JF (2002)[44] analyzed a group of edentulous individuals who had been rehabilitated with conventional complete dentures and in a group of dentate subjects. The results showed that significant differences existed between the dentate and the edentulous individuals in shape recognition.

Leung KCM, Pow ENH, McMillan AS, Wong MCM, Li LSW, and Ho SL (2002)[45] assessed oral perceptions and oral motor ability in edentulous patients with stroke, Parkinson's disease, and an age and gender matched control group. Standard stereognosis and oral motor ability tests were performed, with and without complete dentures in situ. Stereognostic measures were better in all groups when dentures were worn. There were no differences in oral motor ability between groups. Oral stereognosis was significantly impaired in stroke patients. Oral stereognostic ability was better in all groups when dentures were worn.

Wolff A Gadre A,Begleite A, Moskona D,Cardash H(2003)[46] conducted a study to examine the correlation between patient satisfaction with complete dentures and parameters of denture quality, oral condition, and flow rate of the submandibular and sublingual salivary glands.They concluded that submandibular/sublingual salivary flow rate is an important factor in denture satisfaction. The retention of the maxillary denture was correlated to the oral musculature characteristics, and the mandibular denture comfort was correlated to the mandibular ridge shape. Denture satisfaction was not affected by other anatomic or denture quality–related parameters.

Hirano K, Hirano S and Hayakawa I (2004)[47] investigated the relation between masticatory performance and oral stereognostic ability score. It was revealed that positive correlation existed between oral stereognosis ability and masticatory ability. It was suggested that the role of oral sensorimotor function might affect the masticatory function.

Kaiba Y, Hirano S and Hayakawa I (2006)[48] evaluated the palatal coverage disturbance in masticatory function. Positive correlation between masticatory efficiency and the oral stereognostic ability score was found only without the plate. It was suggested that coordination between mastication and the sensorimotor function was disturbed by palatal coverage

Eitner S, Wichmann M, Schlegel A, Holst S (2007)[49] used an oral stereognosis test to evaluate possible intraoral /sensorimotor causes in patients with psychologic diagnosis of psychogenic prosthesis incompatibility, and to

evaluate possible correlations between oral stereognosis and the psychologic diagnostic tools symptom checklist and center of epidemiological studies depression scale. The results revealed no significant differences in oral stereognostic ability between patients with diagnosed psychogenic dental incompatability and the control groups.

Boliek CA, Reiger JM, Li SYY, Mohamed Z and Kickham J (2007)[50] conducted a study on tongue sensation in which light touch discrimination seemed to be influenced by the location of stimulation on the tongue and force applied, whereas stereognosis was influenced by stimulus complexity.

Ikebe K, Amemiya M, Morii K, Matsuda K, Furuya-Yoshinaka M, Yoshinaka M and Nokubi T (2007)[51] conducted a study to find the association between the oral stereognostic ability and the masticatory ability in aged edentulous individuals wearing complete dentures.They concluded that there is reduced oral sensory function ,low occlusal force and hyposalivation appear to be associated with impairment of masticatory performance in aged complete denture wearers.

Tanaka A, Kodaira Y, Ishizaki K and Sakurai K (2008)[52] studied the influence of the palatal surface shape of dentures on food perception. Result showed that when polished surface of the anterior region of palatal base is customized for a patient, the time required for food recognition during eating is reduced.

Kawagishi S, Kou F, Yoshino K, Tanaka T, Masumi S(2009)[53] investigated the effect of age on the stereognostic ability of the tongue by comparing the abilities of young adults and seniors without dysfunction of eating or swallowing. The findings indicate that seniors show decreased stereognostic ability of the tongue compared with young adults and suggest the possibility of recovering the ability using training method.

Bhandari A, Hegde C & Prasad K (2010)[54] evaluated the possible association between the oral stereognostic ability and masticatory efficiency and stated that oral stereognostic ability improves with time, which might be due to adaptation to the denture. As adaptation towards denture improves, masticatory efficiency improves as well. This study showed that there might be a weak association between oral stereognosis and masticatory efficiency.

Patel J R , Sethuraman R , Chaudhari J (2010)[55] conducted a study to evaluate the effect of complete dentures on oral stereognosis in completely edentulous patients. Results showed that covering the palatal mucosa with a denture does not reduce oral stereognostic ability and the presence of a prosthetic restoration is determinant in improving oral stereognostic ability and the score in the oral stereognosis test administered without any denture in place shows a negative correlation with the degree of satisfaction and adaptability to the rehabilitation.

Kumamoto K,Kaiba Y, Imamura S,Minakuchi S(2010)[56] investigated the influence of palatal coverage on masticatory efficiency and

oral stereognostic ability , and the relationship between these two functions. Results suggested that the full palatal coverage had reduced masticatory efficiency and oral sensorimotopr function than the horse shoe shaped palatal coverage .and might have an effect on the relationship between oral stereognostic ability and mastication in young dentate adults.

Neto A F,Junior W M, Carreiro A P,(2010)[57] conducted a study to measure the masticatory efficiency in denture wearers with bilateral balanced occlusion and canine guidance. The study was carried out to find out if bilateral balanced occlusion is the most appropriate occlusal concept in complete dentures to achieve greater masticatory efficiency .The results suggested no significant difference between the two groups . Therefore, there is no clinical evidence to support bilateral balanced occlusion as the ideal occlusion for CD wearers.

Amarasena J ,Jayasinghe V, Amarasena N, Yamada Y(2010)[58] conducted a study to investigate the changes in oral stereognosis ability that occur with the insertion of a new denture in experienced and non-experienced complete denture wearers. Age and gender-matched 8 experienced and 8 non-experienced complete denture wearers were tested. Oral stereognosis ability was assessed by measuring the accuracy of solid object size perception at 3 stages, namely, just before (pre-treatment), 30 min after (30 min post-treatment) and one month after (1 month post-treatment) the insertion of new

dentures. Results suggested no significant difference in Oral stereognosis between experienced and non-experienced groups.

Ladha K G, Verma M (2011)[59] studied the effect of oral submucous fibrosis on oral stereognostic ability. The study group comprised 14 patients having oral submucous fibrosis with no tongue involvement or any restriction in tongue mobility; the control group comprised 15 patients free from any oral symptoms.Results indicated no difference in oral stereognostic ability between the two groups.

Koike T, Ishizaki K, Ogami K, Ueda T and Sakurai K (2011)[60] conducted a study to determine whether an opening in an anterior palatal base enhanced oral perception and the effect of the size of the opening on retention.They concluded that providing an opening in the anterior palatal portion of a complete denture may improve oral perception and sufficient retention.

STUDY DESIGN:

This in-vivo study was performed to correlate oral stereognosis and denture satisfaction in complete denture patients. A total number of 60 completely edentulous patients of both male and female were selected from the outpatients attending department of Prosthodontics, Tamil Nadu Government Dental College & Hospital, Chennai. Ethical clearance was obtained from the institution ethical committee. Patients were given a brief explanation of the study and their consent was obtained.

INCLUSION CRITERIA

- Systemically healthy patients.
- Patients with healthy oral mucosa.
- Completely edentulous patients with age group between 45 to 60 years.
- Completely edentulous patients wearing complete denture prosthesis for a period of 1 to 4years.
- Completely edentulous patients who seek complete denture prosthesis for the first time.

EXCLUSION CRITERIA

- Patients with systemic diseases.
- Patients with oral cavity defects.
- Patients who are habituated with the use of denture adhesives.
- Patients wearing tooth or implant supported complete dentures.
- Patients with TMJ dysfunction.

ARMAMENTARIUM:

1. Kidney tray.
2. Mouth mirror.
3. Explorer.
4. Tweezer.
5. Gauze.
6. Custom made resin test forms.
7. Identification form of test forms.
8. Edentulous trays.
9. Custom made special trays.
10. Articulator.
11. Wax knife.
12. Wax carver.
13. Rubber bowl and spatula.
14. Measuring jar.
15. Metal flask and clamp [brass].
16. Acrylic trimmers.
17. Sand paper with different grits.
18. Pumice.

MATERIALS

S.No	Commercial name	Form of the material	Manufacturer details
1.	DPI	Heat cure acrylic resin- pink and clear. [Power and liquid]	DPI Mumbai.
2.	DPI	Self cure acrylic resin.[powder and liquid]	DPI Mumbai.
3.	DPI Impression compound	Impression Compound	DPI Mumbai.
4.	DPI Tracing sticks	Low fusing impression compound.	DPI Mumbai.
5.	DPI Impression paste	Zinc oxide eugenol	DPI Mumbai.
6.	DPI modelling wax	Modelling wax	DPI Mumbai.
7.	Acry-Rock	Acrylic teeth[semi anatomic form]	Ruthinium Groups PVT, New Deihi.
8.	Kalstone	Dental stone type 3	Kalabhai, Mumbai.
9.	White Gold	Dental plaster type 2	Asian Chemicals,Chennai
10.	Cidex	Glutraldehyde 2%	Alliance Formulation Pvt. Ltd,

Preparation of test forms:

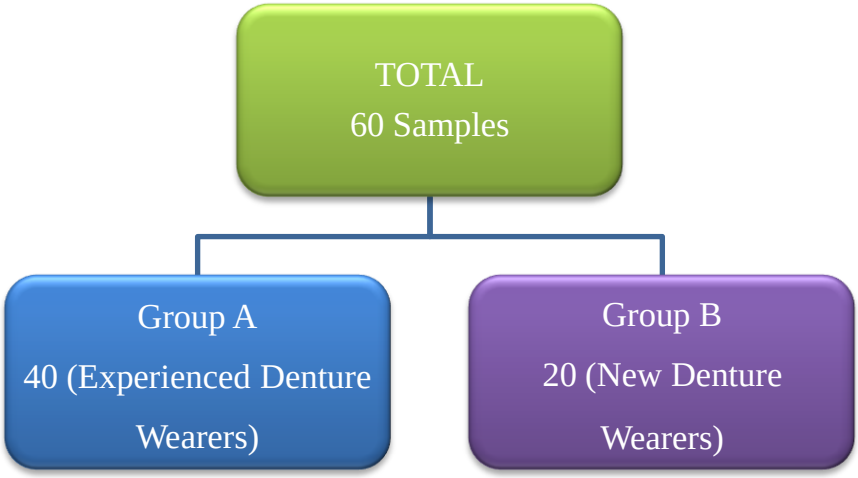
Modelling wax was made into different shapes- rectangle, square, circle, semicircle and triangle with dimensions 6×12 mm. Modelling wax cubes of dimensions 12×12 mm were made. Then the wax forms were processed with heat cure clear acrylic resin in conventional laboratory procedure. Finally the resin test forms were trimmed and polished to the specified dimension of 5×10 mm for different shapes and 10×10 mm cubes.

Preparation of identification forms:

Identification forms were made in Type II gypsum product, modelling plaster were made similar to that of the test forms with dimensions five times larger than that of the test form.

Grouping of patients:

60 completely edentulous patients were randomly selected. Depending upon their experience with complete denture they were divided into two groups 40 in group A (experienced denture wearers) and 20 in group B(new denture wearers)



METHODOLOGY

GROUP A:

Forty completely edentulous patients wearing complete dentures were randomly selected for the study. Their age ranged from 50 to 65 years with average of 57.5 years. They had received prosthesis 1 to 4 years before the time of investigation. Patient's opinion about their dentures, and patient's oral stereognosis ability were assesed in the following way.

Assessment of patient's opinion on their denture :

Patients were requested to complete a questionnaire regarding their opinion on appearance, retention of maxillary denture ,retention of mandibular denture, chewing ability,taste,speech and comfort of the denture.This shows a quantitative degree of satisfaction with their denture. The satisfaction by the patient regarding each of the above said factors were scored on a three point scale: Good, fair and poor with scores of 3,2, and 1 respectively. Thus each patient can get a maximum score of 21 and a minimum score of 7.

Assessment of patient's oral stereognostic ability:

For assessing the oral stereognosis, custom made ten test forms made from heat cure clear acrylic resin were used . The ten forms to be tested are divided into two series. In one series, five forms representing varying alterations in basic shape i.e.square, circle, triangle, rectangle and semicircle of dimension 10 × 5 mm. and second series representing varying degrees of surface alteration made by forming depression on one side of the cube ranging from 1 line to 5 lines were used. This incorporates both shape and surface modification in testing oral perception. Plaster duplicates of the test form were

constructed approximately five times as large as the test forms and were used for the purpose of identification.

Patients were made to sit comfortably in the dental chair. They were first oriented to the procedure and sufficient time was allotted for familiarization of the plaster identification forms. After removing the patients' dentures, the test form was placed on the tongue using a tweezer and patients were asked to describe each test form after manipulating them in the mouth. The patients were permitted to move the test forms in the mouth during the identification. Scores were given for the identification on a three point scale: 3 point if the identification was correct, 2 points if it was partly correct, 1 point if the identification was wrong. The answers given by patient on each form were then summed. Hence, each subject can have a total stereognosis score varying from 30 for all correct answers and 10 for all wrong answers.

GROUP B:

Twenty completely edentulous patients who seek complete denture prosthesis for the first time were randomly selected and used for this study. Their age ranged from 49 to 62 years with average of 55.5 years. Here patients' oral stereognostic ability was assessed first and scores obtained by the fore mentioned method. Then conventional complete denture was fabricated using conventional clinical and laboratory procedures. After the initial review period patients were recalled at the end of six weeks and evaluated for denture satisfaction and oral stereognosis using the questionnaire and test forms by the above said method.

STATISTICAL ANALYSIS

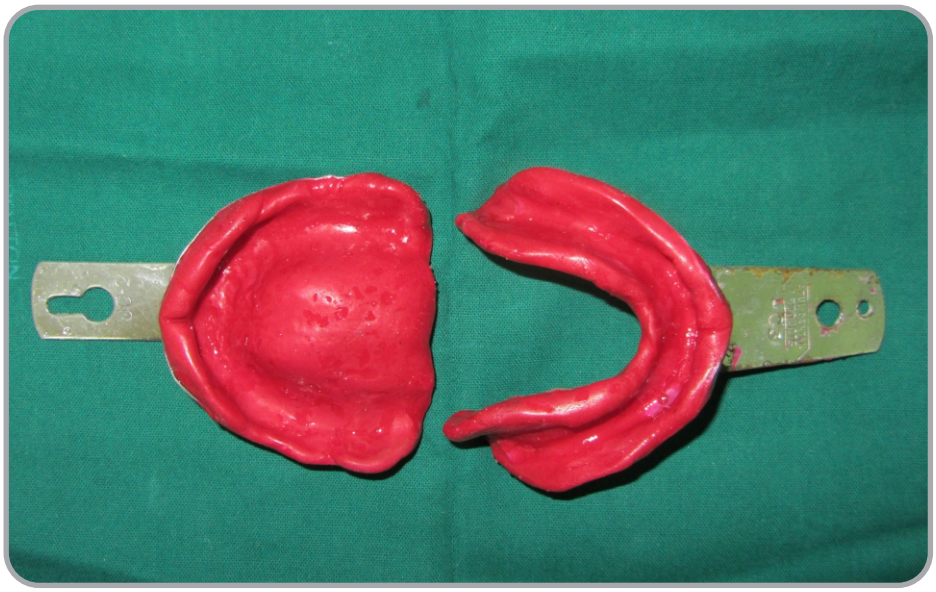
1. t – test to find out the level of significance for overall satisfaction score and overall oral stereognosis score.
2. chi-square test to find out the significance between the scores and between the groups.
3. Spearman's-rho analysis to find the relationship between the satisfaction scores and the oral stereognosis score.
4. Crombach's analysis to find the reliability of the test used in this study.

1. Armamentarium for clinical examination

2. Armamentarium for primary impression

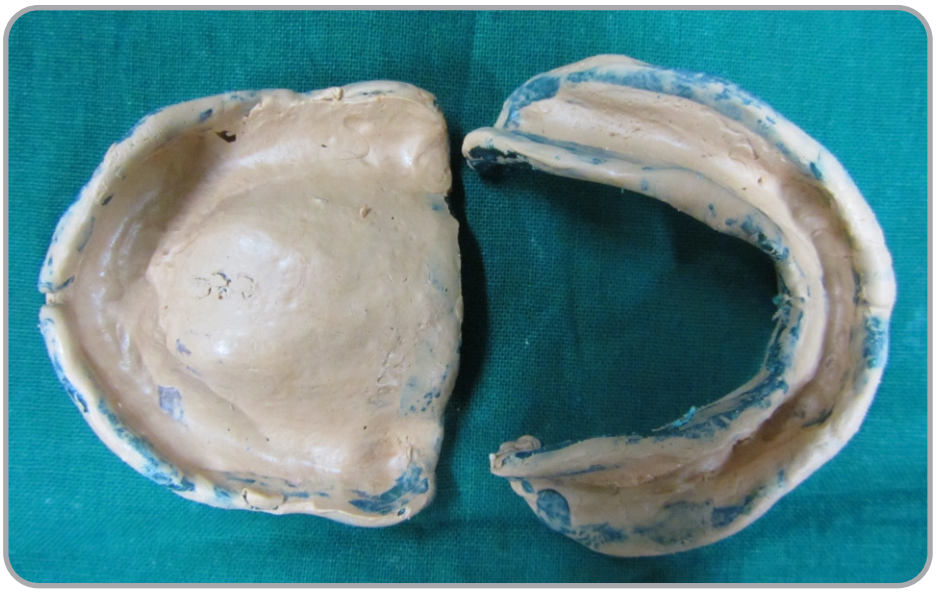
3. Armamentarium for secondary impression

4. Primary impression



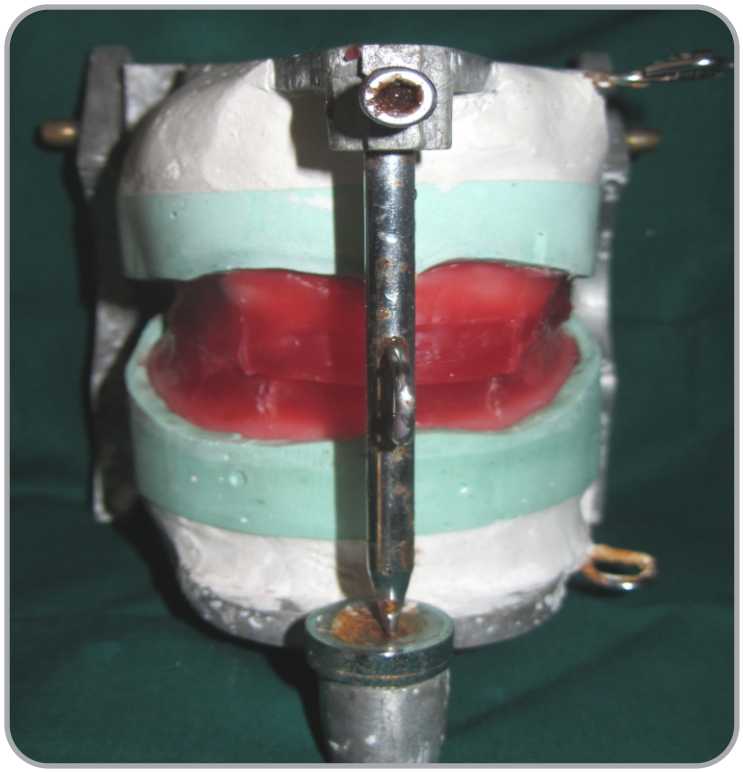
5.Primary Cast

6. Secondary impression

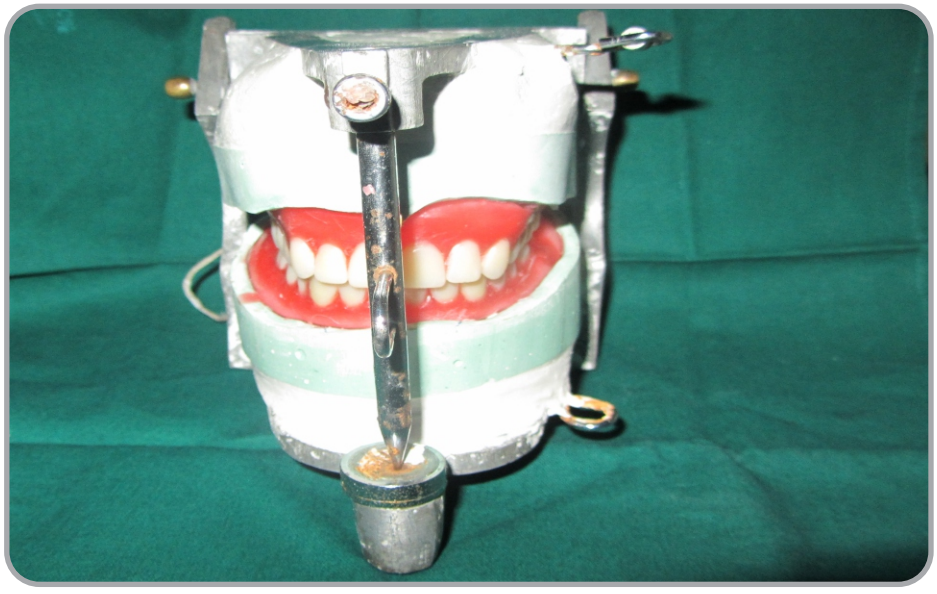


7. Secondary Cast

8. Jaw relation articulated



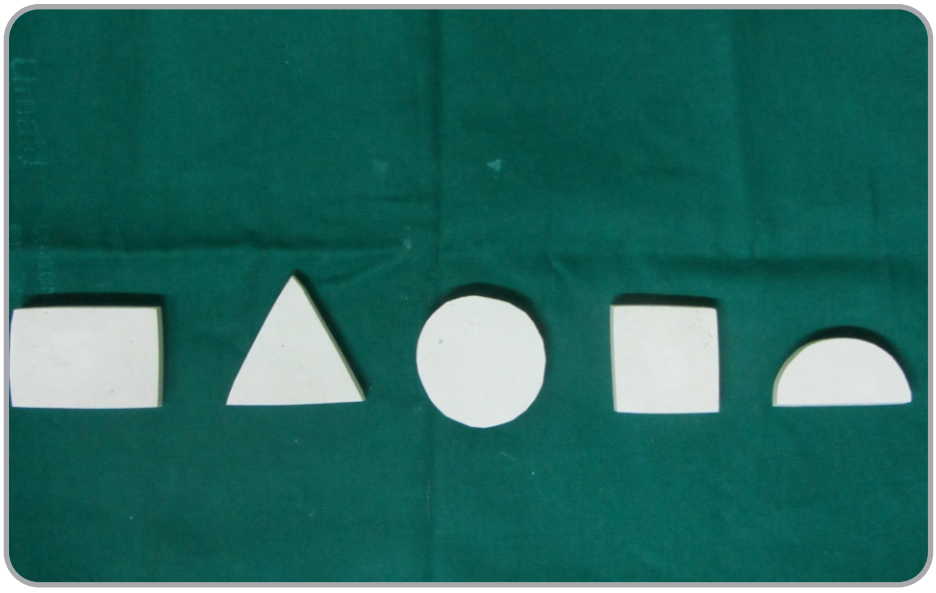
9. Wax trial



10. Complete denture prosthesis

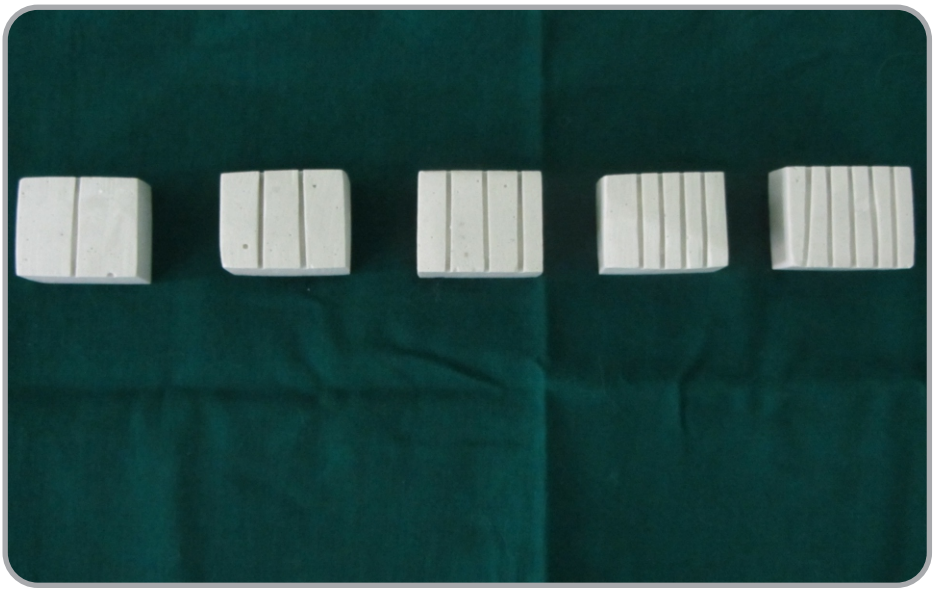
11. Resin test forms for different shape

12. Identification forms for different shape



13. Resin test forms for surface irregularities

14. Identification forms for surface irregularities



15. Patient being familiarised with identification forms

16. Test form being placed in patient's mouth

17. Manipulation of test form by the patient

In the present study total of 60 completely edentulous patients participated. Depending upon their denture experience patients were divided into Group A and Group B. Group A consists of patients who have experience in denture wearing on an average of 4 years. Group B consists of patients who seek complete denture prosthesis for first time. All the patients in both the groups went through the questionnaire evaluation for denture satisfaction and oral stereognosis test.

Based on the mean score in both the questionnaire evaluation and oral stereognosis test,each group was divided into satisfied and dissatisfied for denture satisfaction ; high and low for oral stereognosis.

Table 1: Distribution of satisfaction Scores of Group A

Questions	Poor		Fair		Good	
	Count	%	Count	%	Count	%
Q1	5	12.50%	13	32.50	22	55.00
Q2	2	5.00%	19	47.50	19	47.50
Q3	8	20.00%	21	52.50	11	27.50
Q4	8	20.00%	20	50.00	12	30.00
Q5	3	7.50%	12	30.00	25	62.50
Q6	5	12.50%	18	45.00	17	42.50
Q7	5	12.50%	15	37.50	20	50.00

Table 2: Distribution of Oral Sterognosis scores of Group A

Test forms	Incorrect		Partially correct		Correct	
	Count	%	Count	%	Count	%
Square	0	0	22	55.00	18	45.00
Circle	4	10.00	15	37.50	21	52.50
Triangle	0	0	13	32.50	27	67.50
Rectangle	0	0	21	52.50	19	47.50
Semi circle	7	17.50	19	47.50	14	35.00
Three lines	0	0	28	70.00	12	30.00
Two lines	2	5.00	18	45.00	20	50.00
Four lines	0	0	26	65.00	14	35.00
One line	5	12.50	7	17.50	28	70.00
Five lines	0	0	34	85.00	6	15.00

Table 3: Distribution of Satisfaction scores of groups B

Questions	Poor		Fair		Good	
	Count	%	Count	%	Count	%
Q1	2	10.00	9	45.00	9	45.00
Q2	0	0	9	45.00	11	55.00
Q3	9	45.00	7	35.00	4	20.00
Q4	5	25.00	10	50.00	5	25.00
Q5	0	0	13	65.00	7	35.00
Q6	4	20.00	9	45.00	7	35.00
Q7	2	10.00	12	60.00	6	30.00

Table 4: Distribution of oral Stereognosis scores of Group B

Test forms	Incorrect		Partially correct		Correct	
	Count	%	Count	%	Count	%
Square	1	5.00	7	35.00	12	60.00
Circle	1	5.00	12	60.00	7	35.00
Triangle	1	5.00	11	55.00	8	40.00
Rectangle	0	0	5	25.00	15	75.00
Semi circle	4	20.00	10	50.00	6	30.00
Three lines	3	15.00	11	55.00	6	30.00
Two lines	6	30.00	6	30.00	8	40.00
Four lines	1	5.00	17	85.00	2	10.00
One line	6	30.00	5	25.00	9	45.00
Five lines	0	0	18	90.00	2	10.00

Table5: t-Test for overall satisfaction scores between group A and group B

Overall Satisfaction Score				
	Mean	S.D	t-Value	p-Value
Group A	16.25	3.643	0.909	0.367
Group B	15.35	3.558		

Table6: t- Test for overall oral stereognosis scores between group A and group B

Overall Stereognosis Score				
	Mean	S.D	tp-Value	p-Value
Group A	24.03	3.661	1.384	0.172
Group B	22.6	3.952		

Table 7: Distribution of Satisfied and dissatisfied scores within group A

Questions	Satisfied (21)			Not Satisfied (19)		
	Poor	Fair	Good	Poor	Fair	Good
Q1	0	5	16	5	8	6
Q2	0	5	16	2	14	3
Q3	0	12	9	8	9	2
Q4	0	11	10	8	9	2
Q5	0	1	20	3	11	5
Q6	0	6	15	5	12	2
Q7	0	3	18	5	12	2

Table 8:Distribution of high and low oral Srereognosis scores within Group A

Test forms	High(21)			Low(19)		
	Incorrect	Partially correct	Correct	Incorrect	Partially correct	Correct
Square	0	4(19.05%)	17(80.95%)	0	18(94.74%)	1(5.26%)
Circle	0	4(19.05%)	17(80.95%)	4(21.05%)	11(57.89%)	4(21.05%)
Triangle	0	3(14.29%)	18(85.71%)	0	10(52.63%)	9(47.37%)
Rectangle	0	4(19.05%)	17(80.95%)	0	17(89.47%)	2(10.53%)
Semi-circle	0	9(42.86%)	12(57.14%)	7(36.84%)	10(52.63%)	2(10.52%)
Line 1	0	1(4.76%)	20(95.24%)	5(26.32%)	6(31.58%)	8(42.11%)
Line 2	0	4(19.05%)	17(80.95%)	2(10.53%)	14(73.68%)	3(15.79%)
Line 3	0	10(47.62%)	11(52.38%)	0	18(94.74%)	1(5.26%)
Line 4	0	10(47.62%)	11(52.38%)	0	16(84.21%)	3(15.79)
Line 5	0	15(71.43%)	6(28.57%)	0	19(100%)	0

Table 9 : Distribution of Satisfied and dissatisfied scores within group B

Questions	Satisfied(09)			Not Satisfied(11)		
	Poor	Fair	Good	Poor	Fair	Good
Q1	0	2	7	2	7	2
Q2	0	0	9	0	9	2
Q3	1	4	4	8	3	0
Q4	0	4	5	5	6	0
Q5	0	4	5	0	9	2
Q6	0	2	7	4	7	0
Q7	0	3	6	2	9	0

Table 10 : Distribution of high and low oral Srereognosis scores within Group B

Test forms	Low(12)			High(8)		
	Incorrect %	Partially correct %	Correct %	Incorrect%	Partially correct %	Correct %
Square	8.33	58.33	33.33	0	0	100
Circle	8.33	66.67	25.00	0	50	50
Triangle	8.33	83.33	8.33	0	12.5	87.5
Rectangle	0.00	41.67	58.33	0	0	100
Semi-circle	33.33	50.00	16.67	0	50	50
Line 1	41.67	41.67	16.67	12.5	0	87.5
Line 2	50.00	41.67	8.33	0	12.5	87.5
Line 3	25.00	66.67	8.33	0	37.5	62.5
Line 4	8.33	91.67	0.00	0	75	25
Line 5	0.00	100.00	0.00	0	75	25

Table 11: Chi-square test of satisfied scores between Group A Group B

Questions	Group A			Group B			Chi-square	P-value
	Satisfied (21)			Satisfied(09)				
	Poor	Fair	Good	Poor	Fair	Good		
Q1	0	5	16	0	2	7	.009	.925
Q2	0	5	16	0	0	9	1.57	.109
Q3	0	12	9	1	4	4	2.53	.283
Q4	0	11	10	0	4	5	.159	.690
Q5	0	1	20	0	4	5	7.14	0.008*
Q6	0	6	15	0	2	7	.13	.719
Q7	0	3	18	0	3	6	1.43	.232
* SIGNIFICANT DIFFERENCE AT P < .05								

Table 12: Chi-square test of dissatisfied scores between Group A Group B

Questions	Group A			Group B			Chi-Square	P-Value
	Not satisfied (19)			Not satisfied(11)				
	Poor %	Fair %	Good %	Poor %	Fair %	Good %		
Q1	26.32	42.11	31.58	18.18	63.64	18.18	1.31	.519
Q2	10.53	73.68	15.79	0.00	81.82	18.18	1.24	.537
Q3	42.11	47.37	10.53	72.73	27.27	0.00	3.09	.214
Q4	42.11	47.37	10.53	45.45	54.55	0.00	1.25	.536
Q5	15.79	57.89	26.32	0.00	81.82	18.18	2.53	.282
Q6	26.32	63.16	10.53	36.36	63.64	0.00	1.39	.498
Q7	26.32	63.16	10.53	18.18	81.82	0.00	1.70	.427

* SIGNIFICANT DIFFERENCE AT P < .05

Table 13: Chi-square test of high oral stereognosis scores between Group A and Group B

Test forms	Group A			Group B			Chi-square	P-value
	High(21)			High(8)				
	Incorrect %	Partially correct %	Correct %	Incorrect %	Partially correct %	Correct %		
Square	0.00	19.05	80.95	0.00	0.00	100.00	1.768	.184
Circle	0.00	19.05	80.95	0.00	50.00	50.00	2.778	.096
Triangle	0.00	14.29	85.71	0.00	12.50	87.50	.016	.901
Rectangle	0.00	19.05	80.95	0.00	0.00	100.00	1.768	.184
Semi-circle	0.00	42.86	57.14	0.00	50.00	50.00	.120	.730
Line 1	0.00	4.76	95.24	12.50	0.00	87.50	3.043	.218
Line 2	0.00	19.05	80.95	0.00	12.50	87.50	.174	.677
Line 3	0.00	47.62	52.38	0.00	37.50	62.50	.240	.624
Line 4	0.00	47.62	52.38	0.00	75.00	25.00	1.756	.185
Line 5	0.00	71.43	28.57	0.00	75.00	25.00	.370	.847

* SIGNIFICANT DIFFERENCE AT P < .05

Table14: Chi Square test between low Oral Stereognosis of Group A and Group B

Test forms	Group A			Group B			Chi-square	P-value
	Low(19)			Low(12)				
	Incorrect %	Partially correct %	Correct %	Incorrect %	Partially correct %	Correct %		
Square	0.00	94.74	5.26	8.33	58.33	33.33	6.39	.041
Circle	21.05	57.89	21.05	8.33	66.67	25.00	.88	.644
Triangle	0.00	52.63	47.37	8.33	83.33	8.33	6.13	.047
Rectangle	0.00	89.47	10.53	0.00	41.67	58.33	8.16	0.004*
Semi-circle	36.84	52.63	10.53	33.33	50.00	16.67	.25	.882
Line 1	26.32	31.58	42.11	41.67	41.67	16.67	2.22	.329
Line 2	10.53	73.68	15.79	50.00	41.67	8.33	5.99	0.05*
Line 3	0.00	94.74	5.26	25.00	66.67	8.33	5.55	.062
Line 4	0.00	84.21	15.79	8.33	91.67	0.00	3.53	.172
Line 5	0.00	100.00	0.00	0.00	100.00	0.00		

* SIGNIFICANT DIFFERENCE AT P < .05

Table 15 Descriptive Statistics for Group A

GROUP A	Mean	Std. Deviation	Numbe
Questions	2.327	.5287	40
Shapes	2.402	.3662	40

Table 16: Spearman's rho correlation for Group A

Group A		Questions	Shapes
Questions	Correction coefficient	1.000	-.886**
	Sig.(2 tailed)	.000	.000
	N	40	40
Shapes	Correlation coefficient	-.886**	1.000
	Sig. (2 tailed)	.000	.
	N	40	40

** correlation is significant at the 0.01 level (2 tailed)

Table 17: Descriptive Statistics for Group B

GROUP B	Mean	Std. Deviation	Number
Questions	2.193	0.5083	20
Shapes	2.260	0.3952	20

Table18: Spearman's rho correlation for Group B

Group B		Questions	Shapes
Questions	Correction coefficient	1.000	-.935**
	Sig.(2 tailed)	-	.000
	N	20	20
Shapes	Correlation coefficient	-.935**	1.000
	Sig. (2 tailed)	.000	.
	N	20	20

** correlation is significant at the 0.01 level (2 tailed)

Table 19: Cronbach's analysis for questionnaire

Cronbach's Alpha	Cronobach's alpha Based on standardized items	Number
.884	.885	7

Table 20: Cronbach's analysis for oral stereognosis

Cronbach's Alpha	Cronobach's alpha Based on standardized items	Number
.851	.848	10

INTERPRETATION OF RESULTS

Table 1 shows the distribution of denture satisfaction scores of group A which shows maximum number of good score for taste perception by 62% followed by appearance by 45% and maximum number of poor score for mandibular denture retention and chewing ability by 20%.

Table 2 shows the distribution of oral stereognosis score of group A which shows maximum score of correct identification of square by 67 % and 1 line by 70% , 70% and 50% found difficulty in identifying triangle and 5 lines respectively. Semicircle and 1 line were not identified by 17.5% and 12.5% respectively.

Table 3 shows the distribution of denture satisfaction score of group B which shows maximum number of good score for maxillary denture retention by 55% and maximum number poor score for mandibular denture retention by 45%.

Table 4 Shows the distribution of oral stereognosis score of group B which shows maximum score of correct identification of rectangle by 75% and 1 line by 45%.60% found difficulty in identifying circle and 90% found 5 lines to be difficult. Semicircle and 1 line were not identified by 20% and 30% respectively.

Table 5 shows the t –test to assess the significance of difference in overall satisfaction score between group A and group B. Results showed insignificant difference between the two groups.

Table 6 describes t-test to assess the significance of difference in overall oral stereogonosis score between group A and group B. Results showed insignificant between the two groups.

Table 7 shows the distribution of satisfied and dissatisfied within group A, (which was obtained from the mean value, 16.25 from the satisfaction scores given by group A), of which 21 were satisfied and 19 fall into dissatisfied group.

Table 8 shows the distribution of high and low within group A, (which was obtained from the mean value, 24.03 from the oral stereognosis scores given by group A), of which 21 were high and 19 fall into low group.

Table 9 shows the distribution of satisfied and dissatisfied within group B, (which was obtained from the mean value, 15.35 from the satisfaction scores given by group B), of which 9 were satisfied and 11 fall into dissatisfied group.

Table 10 shows the distribution of high and low within group B, (which was obtained from the mean value, 22.60 from the oral stereognosis scores given by group B), of which 21 were high and 19 fall into low group.

Table 11 is chi-square test to find significance of difference among satisfied people of group A and group B . Results showed no significant difference for all criteria except in taste perception which showed significant difference P=0.008 between experienced and new denture wearers.

Table 12 is chi-square test to find significance of difference among dissatisfied people of group A and group B. Results showed no significant difference between the various questions of satisfaction among dissatisfied people group A and group B at significant level $p<0.05$.

Table 13 is chi square test to find significance of difference among the people who scored high in oral stereognosis test of group A and B. Results showed no significant difference in identification of the various test forms among the high scored people of group A and group B.

Table 14 is chi square test to find significance of difference among the people who scored low in oral stereognosis test of group A and group B. Results showed significant difference between the two groups in identifying certain test forms. Triangle shape significance level was p=0.047, rectangle shape significance level was p=0.004 and 2 line irregularity p=0.06.

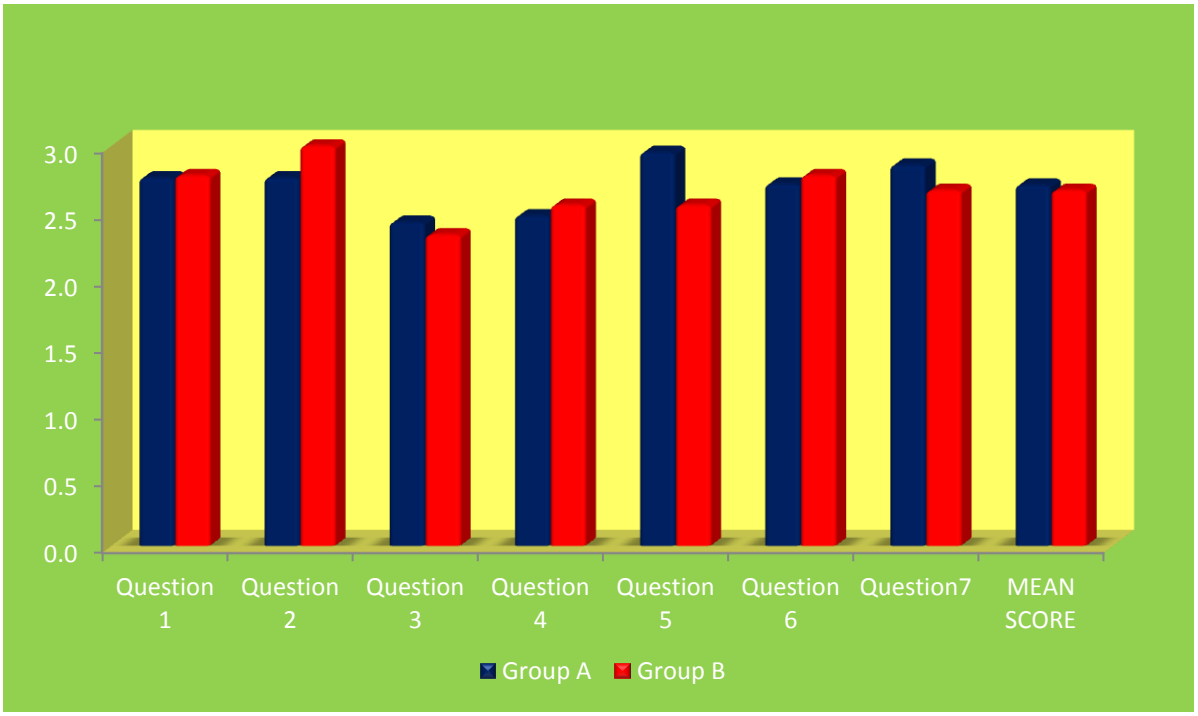
Table 16 shows spearman's rho analysis performed to assess the relationship between the denture satisfaction score and oral stereognosis score of group A. Results showed a highly significant negative spearman's rho correlation. Spearman's ρ is -0.886.

Table 18 shows spearman's rho analysis performed to assess the relationship between the denture satisfaction score and oral stereognosis score of group B. Results showed a highly significant negative spearman's rho correlation. Spearman's ρ is -0.935.

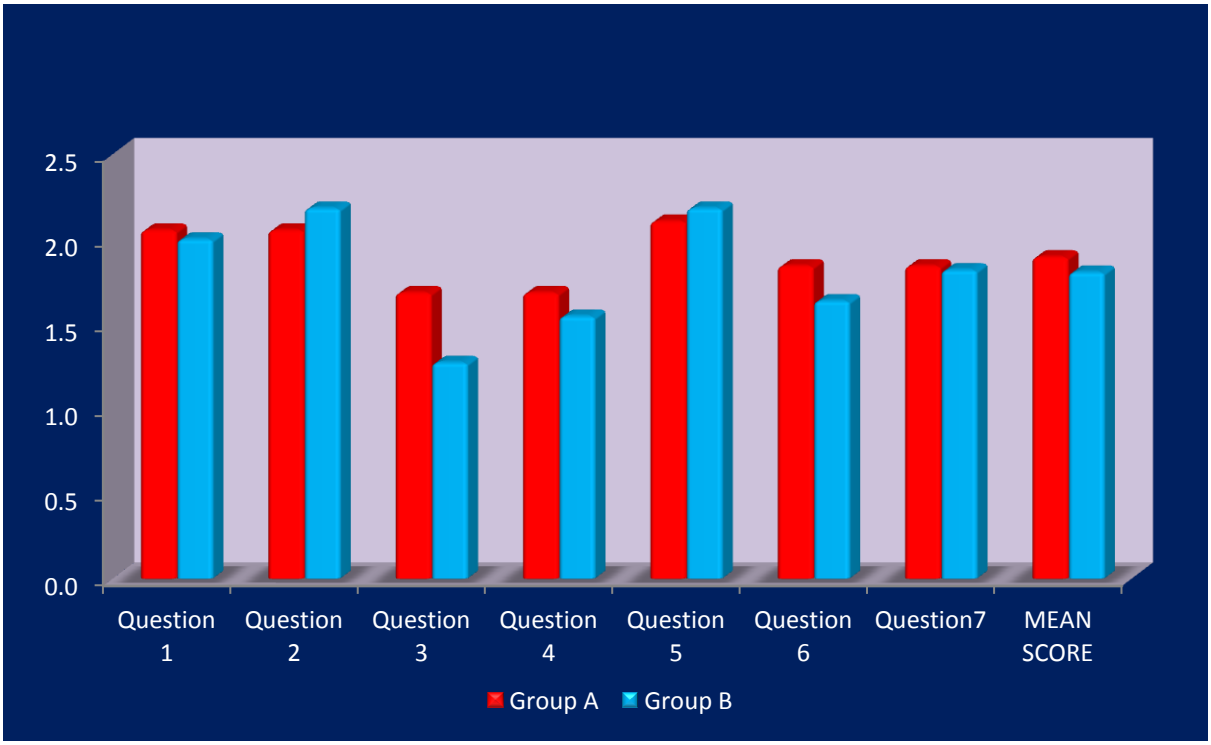
Table 19 is the Cronbach's analysis to find the reliability of the questionnaire evaluation. Results showed that the questionnaire evaluation used in this study is reliable. Cronbach's α is 0.885

Table 20 is Cronbach's analysis to find the reliability of the oral stereognosis test. Results showed the test used in this study is reliable. Cronbach's α is 0.848.

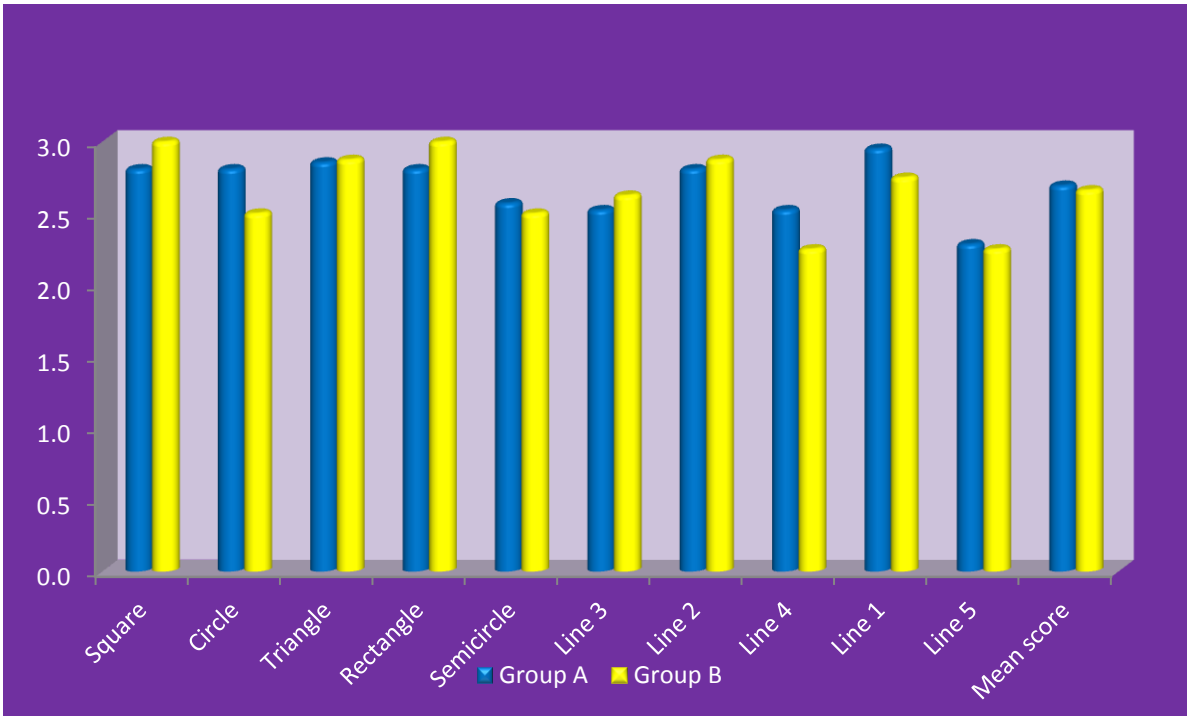
Graph 1: Comparison between satisfaction scores of group A and group B



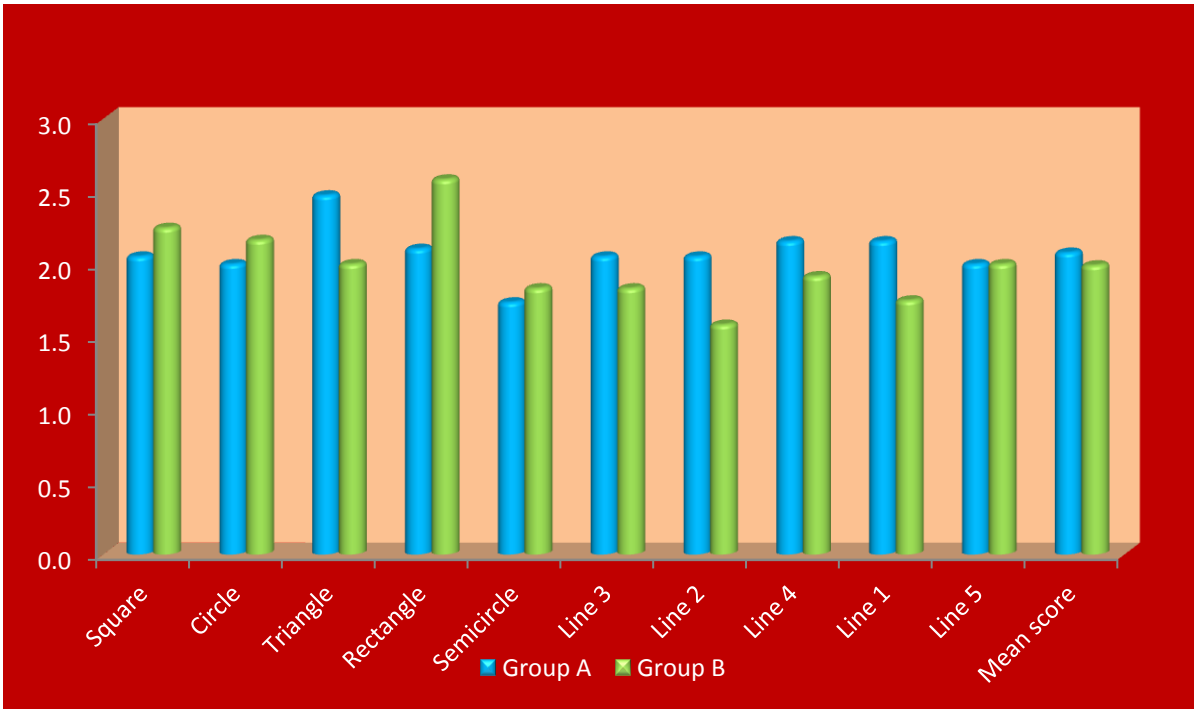
Graph 2: Comparison between dissatisfaction scores of group A and group B



Graph 3: Comparison between high oral stereognosis scores of group A and group B



Graph 4: Comparison between low oral stereognosis scores of group A and group B



Dentists consider dentures successful when they meet certain technological standards. However, patients evaluate dentures from the point of view of their own satisfaction. The ability of the patients to use the dentures for mastication or speech, considerations of esthetics, psychological factors, and the attitude of the patient all inference his ability to adjust to, accept, and even manipulate the dentures. Thus, the satisfaction of the patient is a strong determinant of success in complete denture service.[1]

One of the most baffling challenges in dentistry is to rehabilitate an edentulous mouth because the professionally assessed quality of the denture does not agree with the subjective judgement of the patient. Many patients complain about the lack of retention and stability, and they may have pain and problems with mastication. Various studies have tried to find the causes of their problems but none were conclusive. Though it is argued that the technical quality of the dentures and the condition of the oral structures play a part, not all the studies could explain the differences in dissatisfaction reasons.

Van Waas et al[29] analyzed several possible causative factors using multiple regression statistics and found that only one-third of the variance in satisfaction could be explained by the variances of these possible causal factors.

Generally it is accepted that the adaptation and adjustment to dentures is a major criteria for the success of treatment. One of these barriers to adaptation of the prosthesis is the patient's sense of perception.

Oral stereognosis is the ability to recognize three dimensional forms and shapes by oral manipulation without vision .This requires a special combination of stimulation of tactile and pressure receptors and the proprioreceptors of the muscles.

Sheppard et al[61] concluded that "the tolerance for dentures appears to increase, inspite of continuing retrogressive oral changes, the longer the dentures are worn." Patients seem to adapt to denture wearing.

On one hand, high oral stereognosis intensifies the patient's attention to minor surface irregularities that occur in the fabrication of any denture. Tactile sensibility may also support the detection of minor occlusal interferences. These irritations might lead to adaptation problems or dissatisfaction.They have such a high leveI of perception that will make the denture, itself, intolerable. On the other hand, the subject with poor perception are not overwhelmingly aware of their dentures,and hence they are successfull satisfied denture wearers.

Mantecchini et al[3] did a study on oral stereognosis tests on complete denture wearers. They tested one group of satisfied deuture wearers and one group of unsuccessful denture wearers. In the satisfied denture wearers, they found that their oral stereognosis was poor as shown by their low stereognosis score,while the oral stereognosis was very good in the group of unsuccessful denture wearers.

But, **Van Aken et al** [5] conducted a study concerning the relationship between oral stereognosis and satisfaction with complete dentures and demonstrated no such correlation.

Hence this study was conducted to find any correlation between oral stereognosis among patients with satisfied and dissatisfied complete denture so that oral stereognosis can be used as a tool in predicting the satisfaction and thereby success of the prosthesis.

Berry et al[4] has given requirements of the test forms to use in oral stereognosis.(1)Test pieces should be of basic shapes. (2)Test pieces should not have sharp corners.(3) Dimension of test pieces should be minimum of 3mm in thickness and 10 mm in length.(4)Metal pieces are not tolerated.(5)Flexible pieces are unidentifiable.(6)Number of test pieces should not be great to tire the subject, but must be sufficient to give a reasonable estimate of the test.

Litvak H et al [15] conducted oral stereognosis test using two sets of test forms.One set comprised of different basic shapes and the other had different surface alteration, Thus both shape and surface modification are used in the testing oral perception.

Engleen L et al [43] studied the influence of density and material , role of the tongue and palate on oral perception and proposed that size itself

determines the size perception, and that material and weight are negligible factors

Based on the above discussion custom made ten test forms made from heat cure acrylic resin were used in this present study.The ten forms to be tested are of two series. In one series, five forms represents varying alterations in basic shapes i.e.square , circle , triangle , rectangle and semicircle of dimension 10 × 5 mm. The second series represents varying degrees of surface alteration ranging from one line to five lines on one side of the cube. This incorporates both shape and surface modification in the testing of oral perception.

Bolender et al [62] used Cornel Medical Index as a prognostic aid for complete denture patients. He developed set of questions to interview post insertional adjustments and satisfactory level in complete denture patients,

Acharya B[63] conducted a study to evaluate complete denture wearer patients' satisfaction after insertion of the dentures over 4 years and found that the questionnaire proved to be a reliable and feasible method to evaluate complete denture wearer patients.

Hence in the present study also a questionnaire containing seven questions was developed to evaluate the satisfactory level of the patient regarding their complete denture.The questions were regarding appearance, retention of maxillary

denture, retention of mandibular denture, chewing ability, taste perception, speech and comfort of the denture.

Guckes et al[24] conducted a study to evaluate possible factors influencing satisfaction with the dentures. His study result showed that patient ranked comfort, as first factor in denture satisfaction (score 1.84 and p 0.05).

In the present study, second most satisfied patients of both, Group A and Group B were satisfied with comfort of denture by 85% and 66% respectively.

Weinstein et al[28] concluded in his study that patients give more important to their appearance in the satisfaction of dentures.

In the present study also, both in Group A and Group B high number of patients were dissatisfied with the appearance by 31% and 18% respectively.

The results of this study showed that average correct score of 47.3% in test form identification. The triangle and rectangle appeared to be easier to identify than, the semicircle, which presented a problem for 66.66 % of the subjects. This outcome was well supported by a study done by **Van Aken et al**[5], in which semicircle presented a problem for 53 % of the subjects. Only 14 % could correctly describe the semicircle.

t-test results between the experienced and new denture wearers the stereognostic score showed no significant difference in identification of test forms except few test forms, triangle shape which showed significant difference p=0.047, rectangle shape significant difference p=0.004 and 2 lines showed significant difference p=0.06.

Regarding patients' satisfaction with the dentures the **t-test** showed significant difference of p=0.008, only regarding the taste difference with dentures between the experienced and new denture wearers.

Litvak et al[15] in his study found among the experienced denture wearers patient who had problems in denture and dissatisfied with the denture , were higher than the satisfied patients($t=2.32$, $p<0.05$).

Mantecchini et al[3] in his study found a marked relation between the denture satisfaction and oral stereognosis value (b=0.52:p=0.65).

Al-Rifaiy et al[37] compared the level of oral stereognosis with post insertion complaints of subjects rehabilitated with complete dentures and found a negative correlation which was significant($p<0.001$).

The present study is also in agreement with the above relation. Results of this study also showed a negative correlation between oral stereognosis ability and satisfaction of patient with the complete denture in both experienced and new denture wearers, **Spearman's correlation rho** is negative for both the

experienced and new denture wearers. Spearman's rho for group A was -0.886. Spearman's rho for group A was -0.935.

However some other authors' results did not agree with this correlation. **Muller et al**[33] found a weak correlation(r=0.43, p=0.002). **Bhandari**[54] also found a weak but a negative correlation. The reason for this can be of the various factors involved in oral stereognosis. One being the time limit given to the patient for the identification of the test form. Since oral stereognosis is a learning ability too, when all patients irrespective of the satisfaction level if given a prolonged time period were able to identify the test form considerably with less incorrect identification. Age is also another confounding factor in oral stereognosis,

Further the **cronbach's analysis** was done to check the reliabity of the satisfaction evaluation and oral stereognosis test used in the present study. Results showed a good reliability value. Cronbach's α was 0.885 for questionnaire and Cronbach's α for the oral stereognosis test was 0.848.

Within the limitation of the present study and from the results obtained, it can be concluded that Oral stereognosis can be used as an aid in predicting patients' satisfaction towards complete denture. A negative correlation exists between oral stereognosis ability and satisfaction of patient with the complete denture.

The efficiency and success of complete dentures are difficult to measure objectively. It is well accepted that successful experience with dentures depends much on patients themselves . Changes in oral sensation occur after the loss of natural teeth and edentulous patients show difficulties, most of the time, in adaptation to their new dentures. Controversy exists over the relation between of oral stereognosis and denture adaptation and thereby denture satisfaction.

Hence the present study was conducted to find any correlation between oral stereognosis among patients with satisfied and dissatisfied complete denture and to find out whether oral stereognosis test can be used to predict patients' performance with the denture.

In the present study it was found that

1) More number of satisfied patients gave good score for the appearance of the denture.
2) Most of the dissatisfied patients gave poor score for the chewing efficiency of dentures.
3) The difference in oral stereognosis among the high scored subjects of both the experienced and the new denture wearers were statistically insignificant.
4) Both the groups of patients were not able to identify semi circle and irregularities with five lines correctly in majority of cases.

5) Among low oral stereognosis score group, rectangle and irregularities with one line was better identified than the other test forms.
6) A highly significant negative correlation between oral stereognosis ability and satisfaction of patient with the complete denture was found.

Within the limitation of the present study and from the results, it can be concluded that

- The oral stereognosis test presented, is a reliable test for measuring patient's oral stereognostic ability.
- Oral stereognosis can be used as an aid in predicting patients' performance with the complete denture.
- A negative correlation exists between oral stereognosis ability and satisfaction of patient with the complete denture.

The phenomenon of oral stereognosis is very complex. It involves sensory perception and learning ability. In future, studies can standardize the test forms with respect to the surface detail, shape ,the order of presenting the test forms,and the time duration for identification to prove the accuracy of the perceptive skills. The oral sensory ability in case of compromised tongue and palate in comparison with the general adaptation to complete dentures can be studied.The perception skill of patients with different palatal forms and tongue size can form a future study. Since Oral stereognosis is a learning ability too, training skills and activities can be given to the patient to increase the motor ability followed by stereognosis test to ascertain an accurate correlation.

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INSTITUTIONAL ETHICAL COMMITTEE

Tamil Nadu Government Dental College and Hospital, Chennai - 3
Telephone No. 044 2534 0343
Fax 044 2530 0681

Ref.No.0430/ DE/ 2010 Date: 23.11.2012

Title of the work: "Correlation between oral stereognosis and denture satisfaction in complete denture patients"

Principal investigator: **Dr.A.Sakthi Devi,**
III Year MDS

Department : Prosthodontics,
Tamil Nadu Government Dental College and Hospital, Chennai - 3

The request for an approval from the Institutional Ethical Committee (IEC) considered on the IEC meeting held on **26-07-2012** at the Principal's Chambers Tamil Nadu Government Dental College and Hospital, Chennai – 3 and subsequent to your modification letter dated 23.11.2012, You are

"Advised to proceed with the study"

The Members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above , submitted by the principal investigator.

The principal investigator and their team are directed to adhere the guidelines given below:

1 .You should get detailed informed consent from the patients / participants and maintain confidentiality

2. you should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.

3 You should inform the IEC in case of any change of study procedure , site and investigation or guide.

4. You should not deviate from the area of work for which you have applied for ethical clearance

5. You should inform the IEC immediately in case of any adverse events or serious adverse reactions. You should abide to the rules and regulations of the institution (s)

6. You should complete the work within the specific period and if any extension of time is required, you should apply for permission again and do the work.

7 .You should submit the summary of the work to the ethical committee on completion of the work.

8. You should not claim funds from the Institution while doing the work or on completion.

9.You should understand that the members of IEC have the right to monitor the work with prior intimation

10. Your work should be carried out under the direct supervision of your Guide / Professor.

S/ Jayachandr 23/11/12
SECRETARY

23/11
CHAIRMAN

1. உங்களின் முழுசெயற்கைபற் தொகுப்பின் தோற்றம் திருப்தி அளிக்கிறதா ?

☐ நன்று ☐ பரவாயில்லை ☐ மோசம்

2. உங்களின் மேல்தாடை செயற்கைபற் தொகுப்பின் பிடிமானம் எவ்வாறு உள்ளது ?

☐ நன்று ☐ பரவாயில்லை ☐ மோசம்

3. உங்களின் கீழ்தாடை செயற்கைபற் தொகுப்பின் பிடிமானம் எவ்வாறு உள்ளது ?

☐ நன்று ☐ பரவாயில்லை ☐ மோசம்

4. உங்களின் முழுசெயற்கைபற் தொகுப்பின் மூலம் உணவை அரைத்து சாப்பிட முடிகிறதா ?

☐ நன்று ☐ பரவாயில்லை ☐மோசம்

5. உங்களின் முழுசெயற்கைபற் தொகுப்பின் மூலம் உணவின் சுவை உணர முடிகிறதா ?

☐ நன்று ☐ பரவாயில்லை ☐ மோசம்

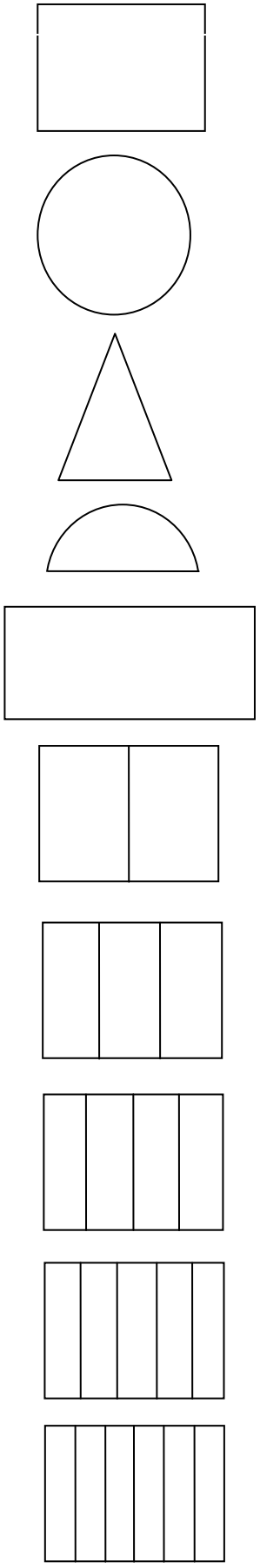
6. உங்களின் முழுசெயற்கைபற் தொகுப்பின் மூலம் நன்றாக பேச முடிகிறதா ?

☐ நன்று ☐ பரவாயில்லை ☐ மோசம்

7. உங்களின் முழுசெயற்கைபற் தொகுப்பு பயன்படுத்த சௌகரியமாக உள்ளதா?

☐ நன்று ☐ பரவாயில்லை ☐ மோசம்

Test Form **Scores**



1. Are you satisfied with appearance of your complete denture?

☐ Good ☐ Fair ☐ Poor

2. Does your upper complete denture stay in place?

☐ Good ☐ Fair ☐ Poor

3. Does your lower complete denture stay in place?

☐ Good ☐ Fair ☐ Poor

4. How are you able to chew the food with your complete denture?

☐ Good ☐ Fair ☐ Poor

5. Can you feel taste of food with your complete denture?

☐ Good ☐ Fair ☐ Poor

6 Can you speak with complete your denture?

☐ Good ☐ Fair ☐ Poor

7. Are you comfortable in using your complete denture ?

☐ Good ☐ Fair ☐ Poor

INFORMATION SHEET

- We are conducting a study on "**A CLINICAL STUDY TO CORRELATE ORAL STEREOGNOSIS AND DENTURE SATISFACTION IN COMPLETE DENTURE PATIENTS**" among patients attending TNGDCH, Chennai and for this study, we are selecting patients.

- The identity of the patients participating in the research will be kept confidential throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

- Taking part in the study is voluntary. You are free to decide whether to participate in the study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

- The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Name of the patient Signature / Thumb impression

Name of the investigator Signature Date

ஆராய்ச்சி தகவல் படிவம்

1. “முழு செயற்கைபற் தொகுப்பு நோயாளிகளுக்கு வாய்வழி தொட்டுணர்வதன் மூலம் ஒரு பொருளின் அமைப்பும் கணமும் அறியும் வலிமை மற்றும் செயற்கைபற் தொகுப்பின் திருப்தி இடையிலான தொடர்புறுதலின்’’ குறித்து ஆராய்ச்சி செய்யும் பொருட்டு தமிழ்நாடு அரசு மற்றும் மருத்துவமனைக்கு மற்றும் கல்லூரிக்கு வரும் நோயாளிகள் தேர்வு செய்யப்படுகிறார்கள்.

2. நோயாளி பற்றிய குறிப்புகள் பிறர் அறியாவண்ணம் ஆராய்ச்சி முடியும்வரை இரகசியமாக பாதுகாக்கப்படும். அதை வெளியிடம் நேரத்தில் எந்த நோயாளியின் தனி அடையாளங்களும் வெளியிட வாய்ப்பு கிடையாது.

3. இந்த ஆராய்ச்சியில் இங்கு பெறுவது நோயாளியின் தனிப்பட்ட முடிவு மற்றும் நோயாளிகள் இந்த ஆராய்ச்சியில் இருந்து எப்பொழுது வேண்டுமானாலும் விலகிக் கொள்ளலாம். நோயாளியின் இந்த தீடீர் முடிவு, அவருக்கோ அல்லது ஆராய்ச்சியாருக்கோ எந்தவித பாதிப்பும் ஏற்படுத்தாது என்பதை தெரியப் படுத்துகிறோம்.

4. இந்த ஆராய்ச்சியின் முடிவுகள் நோயாளிகளுக்கு ஆராய்ச்சி முடியும் தறுவாயிலோ அல்லது இடையிலோ தெரிவிக்கப்படும். ஆராய்ச்சியின்பொழுது ஏதும் பின் விளைவுகள் ஏற்பட்டால் அதை சரி செய்ய தகுந்த உதவிகள் அல்லது தேவையான கிகிச்சைகள் உடனடியாக மேற்கொள்ளப்படும்.

.....	.....	.....
நோயாளியின் பெயர்	கையொப்பம்/கைரேகை	தேதி

.....	.....	.....
ஆராய்ச்சியாளரின் பெயர்	கையொப்பம்	தேதி

INFORMED CONSENT FORM

STUDY TITLE:

"A CLINICAL STUDY TO CORRELATE ORAL STEREOGNOSIS AND DENTURE SATISFACTION IN COMPLETE DENTURE PATIENTS"

Name : _____ **O.P.No.:** _____

Address : _____ **Case No.:**_____

_____ **Age** : _____

_____ **Sex** : _____

Tel. no:

I, _____ Age _____ Yrs, exercising my free power of choice, hereby give my consent to be included as a participant in the clinical study. I agree to the following:

I have been informed to my satisfaction about the purpose of the study, nature of the treatment, follow-up visits and study procedures including investigations, to monitor and to safeguard by body function.

I agree to co-operative fully and inform the dentist immediately if I suffer any unusual symptoms.

I have informed the dentist, about all medications and dental treatments that I have taken in the recent past and those I am currently taking. I shall not take any medications without the concern of the dentist.

I understand that dentist may stop my participation from the clinical study for any reasons. I am also aware of my right to opt out of the study at any time during the clinical study duration without giving any reason.

I hereby give permission to use my records for research purpose and I am told that study institution and dentist will keep my identity confidential.

_____ _____

Name of the Patient **Signature & Date**

_____ _____

Name of Impartial Witness **Signature & Date**

_____ _____

Name of the Investigator **Signature & Date**

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராய்ச்சி தலைப்பு :

முழு செயற்கைபற் தொகுப்பு நோயாளிகளுக்கு வாய்வழி தொட்டுணர்வதன் மூலம் ஒரு பொருளின் அமைப்பும் கணமும் அறியும் வலிமை மற்றும் செயற்கைபற் தொகுப்பின் திருப்தி இடையிலான தொடர்புறுதலின் ஒரு மருத்துவ ஆய்வு.

பெயர் : _____ புற நோயாளியின் எண் : _____
முகவரி : _____ ஆராய்ச்சி சேர்க்கை எண்: _____
_____ வயது : _____
_____ ஆண்/ பெண்

நான் ..... வயது ..... என்னுடைய சுயநினைவுடனும் மற்றும் முழு சுதந்திரத்துடன், இந்த மருத்துவ ஆராய்ச்சியில் என்னை சேர்த்துக் கொளள சம்மதிக்கிறேன்.

எனக்கு விளக்கப்பட்ட விஷயங்களுக்கு நான் எனது சம்மத்தை தருகிறேன்.

- இந்த ஆராய்ச்சியின் நோக்கம், மருத்துவ முறைகள் பரிசோதனை முறைகள் எனக்கு திருப்தியுறும் வகையில் விளக்கப்பட்டேன்.

- நான் எடுத்து வருகின்ற மற்றும் முன் உட்கொண்ட மருந்துகள் பற்றிய விவரங்களை ஆராய்ச்சியாளரிடம் அறிவிக்க சம்மதம்.

- என் உடல்நலம் பாதிகப்பட்டாலே அல்லது எதிர்பாராத, வழக்கத்திற்கு மாறான நோய்குறி தென்பட்டாலோ உடனே அதை மருத்துவரிட தெரிவிப்பேன் என உறுதியளிக்கிறேன்.

- எனக்கும் மற்றும் மருத்துவ ஆராய்ச்சியாளருக்கும் இந்த ஆராய்ச்சியிலிருந்து எந்த ஒரு நிலையிலும் விலகுவதற்கோ அல்லது விலக்குவதற்கோ முழு உரிமை இருப்பதாக அறிகிறேன்.

- என்னுடைய மருத்துவக் குறிப்பேடுகளை இந்த ஆராய்ச்சியில் பயன்படுத்திக் கொள்ள சம்மதிக்கிறேன். ஆராய்ச்சி மையமும், ஆராய்ச்சியாளரும் என்னுடைய பெயர் மற்றும் சில விவரங்களை இரகசியமாக வைப்பதாக அறிகிறேன்.

_____	_____	_____
நோயாளியின் பெயர்	கையெழுத்து	தேதி
_____	_____	_____
ஆராய்ச்சியாளரின் பெயர்	கையெழுத்து	தேதி

GROUP A-QUESTIONNAIRE SCORES

S.No	AGE	SEX	Q1	Q2	Q3	Q4	IQ5	Q6	Q7
1.	63	F	2	2	2	2	3	3	3
2.	59	M	3	3	2	2	3	2	2
3.	58	M	3	3	2	2	2	2	2
4.	65	M	2	2	1	1	2	2	2
5.	55	F	3	3	2	2	3	3	3
6.	64	F	2	3	3	3	3	3	3
7.	65	M	1	2	1	1	2	2	2
8.	56	M	2	2	2	2	2	3	3
9.	62	M	3	3	2	2	3	3	3
10.	60	M	3	3	3	3	3	3	3
11.	54	F	3	3	3	3	3	3	3
12.	63	F	1	3	2	2	2	2	2
13.	58	M	2	2	2	2	2	3	3
14.	57	M	2	3	2	2	3	2	3
15.	65	M	1	2	1	1	2	2	2
16.	54	F	3	2	3	2	3	2	3
17.	61	F	3	3	3	3	3	3	3
18.	64	F	2	3	3	3	3	3	3
19.	59	F	3	3	2	3	3	3	3
20.	56	F	2	2	2	2	3	3	3
21.	55	F	2	2	1	1	3	1	2
22.	60	M	3	2	2	2	3	3	3
23.	56	M	2	1	1	1	1	1	1
24.	58	M	3	2	3	3	3	1	1
25.	64	F	3	2	2	2	3	2	2
26.	59	M	1	3	3	3	3	2	1
27.	62	M	3	2	2	2	2	2	2
28.	54	F	3	3	3	3	2	2	2
29.	53	M	1	1	1	1	1	1	1
30.	56	M	3	2	3	3	3	3	3
31.	54	M	3	2	2	2	2	2	2
32.	50	M	3	3	3	3	3	3	3
33.	59	M	2	2	2	2	2	2	2
34.	60	F	3	3	2	2	3	3	2
35.	55	F	2	2	1	1	1	1	1
36.	63	F	3	3	2	2	3	2	3
37.	54	M	3	3	2	2	3	2	3
38.	64	M	3	2	1	1	3	2	2
39.	64	F	3	3	2	3	3	3	3
40.	58	F	2	2	2	2	2	2	2

GROUP A –ORAL STEREOGNOSIS SCORES

S.No	AGE	SEX	Square	Circle	Triangle	Rectancle	Semicircle	3 Lines	2 Lines	4 Lines	1 Line	5 Lines
1.	63	F	3	2	3	3	2	2	3	2	3	2
2.	59	M	3	2	3	3	2	3	3	2	3	2
3.	58	M	3	3	3	2	3	2	2	2	3	3
4.	65	M	3	3	3	3	3	3	3	3	3	3
5.	55	F	2	1	2	2	1	2	2	2	3	2
6.	64	F	2	2	3	2	2	2	2	2	3	2
7.	65	M	3	3	3	3	3	3	3	2	3	3
8.	56	M	3	3	3	3	2	3	3	3	3	2
9.	62	M	2	2	3	2	2	2	3	2	3	2
10.	60	M	2	2	3	2	1	2	2	2	1	2
11.	54	F	2	3	2	2	2	2	1	2	1	2
12.	63	F	3	3	3	3	3	3	3	3	3	2
13.	58	M	3	2	3	3	2	2	3	3	3	2
14.	57	M	3	3	2	3	2	2	3	3	2	2
15.	65	M	3	3	3	3	3	2	3	2	3	3
16.	54	F	2	2	3	2	2	2	2	2	3	2
17.	61	F	2	1	2	2	1	2	2	2	2	2
18.	64	F	2	1	2	2	1	2	2	3	1	2
19.	59	F	2	1	2	2	1	2	2	2	2	2
20.	56	F	3	2	3	3	2	2	3	3	3	2
21.	55	F	3	3	3	3	3	3	3	3	3	2
22.	60	M	2	3	2	3	2	2	3	3	3	2
23.	56	M	3	3	3	3	3	3	3	2	3	3
24.	58	M	3	2	2	3	2	2	2	3	3	2
25.	64	F	2	3	2	3	2	2	2	3	3	3
26.	59	M	2	3	3	3	2	2	3	2	3	2
27.	62	M	3	3	3	2	3	3	2	2	3	2
28.	54	F	2	2	3	2	2	2	2	2	2	2
29.	53	M	3	3	3	3	3	3	3	3	3	2
30.	56	M	2	2	2	2	1	2	1	2	1	2
31.	54	M	2	3	2	2	2	3	2	2	3	2
32.	50	M	2	2	3	2	2	2	3	2	1	2
33.	59	M	2	3	2	3	2	2	2	2	3	2
34.	60	F	2	2	3	2	1	2	2	2	2	2
35.	55	F	3	3	3	2	3	3	3	2	3	2
36.	63	F	2	2	3	2	3	2	2	3	2	2
37.	54	M	2	2	3	2	3	2	3	2	2	2
38.	64	M	3	3	3	2	3	3	2	3	3	2
39.	64	F	2	3	2	2	2	2	2	2	3	2
40.	58	F	2	3	3	3	3	2	3	2	3	2

GROUP B-ORAL STEREO GNOSIS SCORES

S.No	AGE	SEX	Square	Circle	Triangle	Rectancle	Semicircle	3 Lines	2 Lines	4 Lines	1 Line	5 Lines
1.	55	M	2	2	3	3	2	2	1	2	2	3
2.	49	F	2	2	2	3	3	2	1	2	2	2
3.	58	F	3	2	3	3	2	2	3	3	2	3
4.	55	F	3	2	2	2	2	1	2	3	2	2
5.	60	F	3	3	3	3	3	3	3	3	3	3
6.	52	M	3	2	3	3	2	3	3	3	2	3
7.	55	M	1	2	2	2	1	1	1	1	2	2
8.	59	M	2	3	2	3	1	2	3	2	3	2
9.	53	F	2	1	1	2	1	3	2	2	1	1
10.	57	F	3	3	2	3	2	3	3	3	3	2
11.	54	M	3	3	3	3	3	2	3	3	3	3
12.	50	M	3	2	2	2	1	2	2	3	2	2
13.	52	M	2	3	2	3	3	2	1	2	3	2
14.	56	M	3	2	3	3	2	2	2	3	2	3
15.	58	M	3	2	3	3	3	3	3	3	2	3
16.	57	M	3	3	2	3	2	2	1	3	3	2
17.	54	M	3	2	2	3	2	2	1	3	2	2
18.	55	F	2	2	2	3	2	1	2	2	2	2
19.	49	F	2	2	2	2	2	2	2	2	2	2
20.	62	M	3	3	3	3	3	3	3	3	3	3

GROUP B-QUESTIONNAIRE SCORES

S.No	AGE	SEX	Q1	Q2	Q3	Q4	Q5	Q6	Q7
1.	55	M	3	3	1	2	2	3	2
2.	49	F	3	3	3	3	2	3	3
3.	58	F	2	3	2	1	2	2	2
4.	55	F	3	3	2	2	3	3	3
5.	60	F	1	2	1	1	2	2	2
6.	52	M	1	2	1	2	3	1	2
7.	55	M	3	3	3	3	3	3	3
8.	59	M	3	3	2	2	2	2	2
9.	53	F	2	3	3	3	2	3	3
10.	57	F	2	2	1	2	2	2	2
11.	54	M	2	2	1	2	2	1	2
12.	50	M	3	2	2	1	2	2	2
13.	52	M	2	3	1	2	2	2	2
14.	56	M	2	2	2	2	2	1	2
15.	58	M	2	2	1	1	2	1	1
16.	57	M	3	2	1	2	3	2	2
17.	54	M	2	3	2	2	3	2	2
18.	55	F	3	3	3	3	3	3	3
19.	49	F	3	3	2	3	3	3	3
20.	62	M	2	2	1	1	2	2	1