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Original Research Article

# Occlusal indicators: A key to achieve occlusal equilibration - A Questionnaire for dental practitioner in Maharashtra

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ABSTRACT

**Background**: Knowledge about occlusion and occlusal contacts is indispensable for dental practitioners to have a successful dental practice. But its implication has been neglected in curriculum. To practice occlusal equilibration techniques the clinician needs to observe a number of accurate steps and conventional and digital aids being used for clinical application.
**Objectives:** This survey was done to evaluate awareness, knowledge of dental practitioner towards different occlusal indicators and their proper implication to achieve occlusal equilibration used in prosthodontics.
**Materials and Methods:** An online survey was conducted amongst the prosthodontist and dental practitioner across Maharashtra. It was in the form of questionnaire consisting of 19 open and multiple-choice questions concerning the awareness and use of occlusal equilibration techniques by prosthodontist and dental practitioners in Maharashtra which was sent to them through electronic communication.
**Results:** This survey was focused on evaluating the awareness of occlusal equilibration techniques ranging from conventional to newer digital aids. Though the articulating paper still remains the gold standard, the appropriate use with proper thickness and knowledge at what stage is performed is of great importance.
**Conclusion:** Prosthodontists were aware of the different thicknesses of articulating paper however the discretion in the use of articulating paper and their thickness and interpretation are nonconfirmatory. The choice of articulator preferred by prosthodontists is a semi-adjustable articulator. Awareness of T scan is more in Prosthodontist when compared with general dental practitioners.



## 1. Introduction

Occlusion is the fundamental concern of prosthetic and restorative dentistry. Occlusal harmony is an important entity for success. Occlusal contacts should not only be able to be examined but to be able to record, store, and transfer the information as well. The ultimate goal of any restorative treatment is to establish dental occlusion that is in harmony with the stomatognathic system. Occlusal interference is any tooth contact that inhibits the remaining occluding surfaces from achieving stable and harmonious contacts (according to GPT9).[1]

Full mouth rehabilitation presents the clinician with many challenges and pitfalls. One of the most demanding aspects of FMR involves the development of sufficient restorative space with optimum occlusion. While simultaneously fulfilling esthetic and functional parameters to long-term success. Occlusal balance is one of the key factors for maintaining the harmony of the stomatognathic system. Emphasis must be placed on the recording of muscle deprogramming as well as occlusal prematurities preventing condylar seating into centric relation position.[2,3]

Premature occlusal contacts in prostheses or dental restorations may lead to devastating alterations in the craniomandibular system. Articulating papers were

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traditionally used to identify any occlusal interferences.[4] Occlusal articulating media are made from paper, wafers, ribbon, foils, silks, silicon, irreversible hydrocolloid material, lacquer, sprays, and indicating waxes. Recently, films, chips, and computer analyzing systems have been added to the list.[5] There are a variety of muscle deprogrammers that have been used in practice with different range of results. Rapid advancements in technology have occurred in these modern digital eras and devices are used to evaluate and analyze occlusion such as T-scan. Unlike articulating paper, which can only determine location, T-Scan can identify both force and timing, two of the most fundamental parameters for measuring occlusion.[6] Therefore, this study was conducted to assess and evaluate the awareness, knowledge, and attitude of prosthodontists and general practitioners towards occlusal equilibration techniques as well as the need for them to be used in full mouth rehabilitation and removable and fixed dental prosthesis cases.

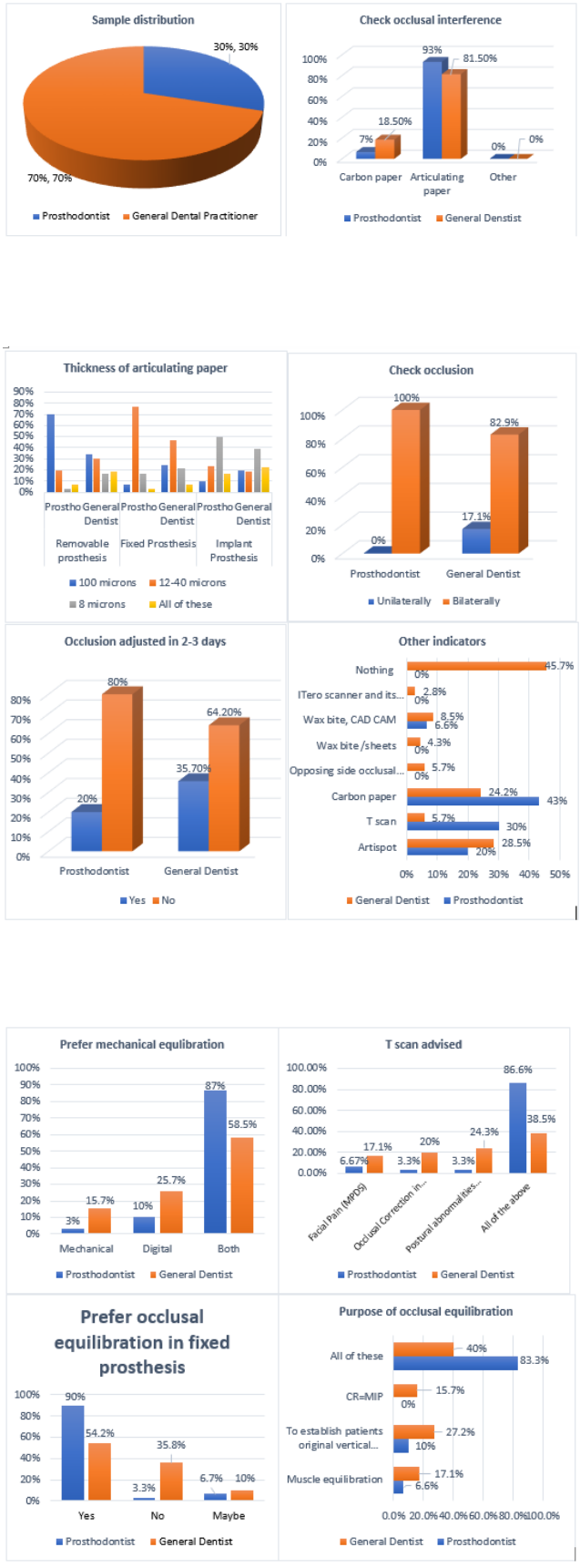
## 2. Material and Methods

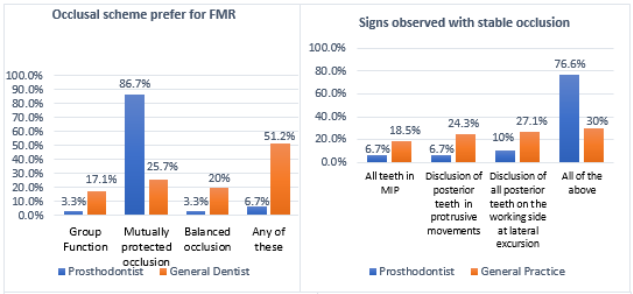
An online survey consisting of 19 questions was conducted and sent to dentists in Maharashtra via SMS and WhatsApp. Link sent to 100 dentists in Maharashtra. The purpose of the study was also specified at the beginning of the questionnaire. Communication takes place via e-mail or WhatsApp. Responses are strictly limited. The participants were prosthodontists and general practitioners from different parts of Maharashtra with different experience, age and gender. The questionnaire was designed and explicit in English on the Google Forms platform. It consists of 19 open and closed questions on participants' knowledge, attitudes and practices regarding occlusal balance techniques used in restorative dentistry.

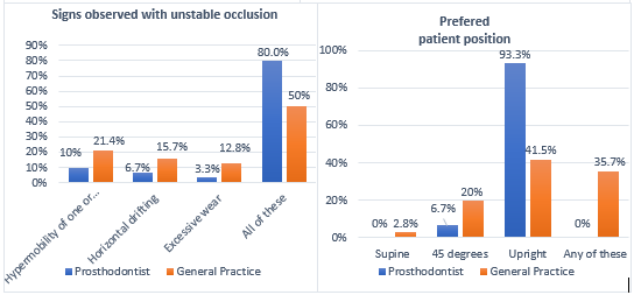
Data was compiled into a Microsoft Office Excel spreadsheet. Data were compiled and used for statistical analysis. For categorical data, descriptive statistics such as numbers and percentages (n(%)) were used. Numerical data were expressed as mean and standard deviation (M ± SD). Frequency comparisons for different groups between groups were made using the $\chi 2$ test. For all tests, $p < 0.05$ was considered significant, keeping an $\alpha$ error of 5% and a $\beta$ error of 20%, giving the study a power of 80%.

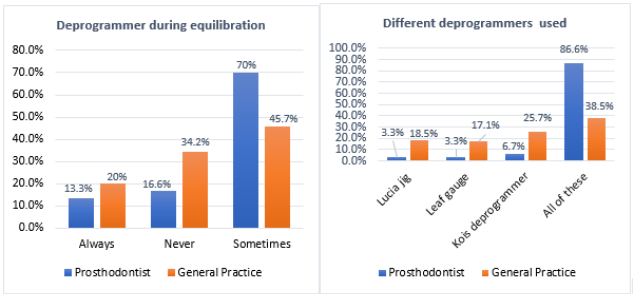
## 3. Results

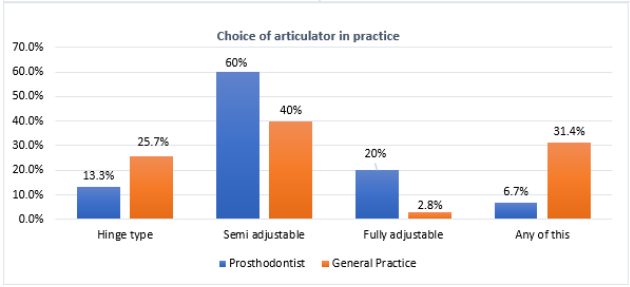
This survey had a sample size of 100 dentists who completed the questionnaire with the majority of the population of dental surgeons (70) followed by prosthodontists (30). The results of the Questionnaire used in the survey in graph form.






Questionnaire used in survey with the results in tabular format: Question Answers Results %

1. How do u check occlusal interference in your clinic?
   **Ans:** Articulating paper -93% prosthodontist and 81.5 % general practitioner
2. What thickness of Articulating paper do you use for removable prostheses?
   **Ans:** 100 microns - 70% prosthodontist and 34.2% general practitioner
3. What thickness of Articulating paper do you use for Fix prostheses?
   **Ans:** 12- 40 microns - 76.6% prosthodontist and 47.1% general practitioner
4. What thickness of Articulating paper do you use for Implant prostheses?
   **Ans:** 8 microns - 50% prosthodontist and 38.5% general practitioner
5. Which movement do you ask the patient to do to check Occlusal interference with Articulating paper?
   **Ans:** Tap Tap, Protrusive Movement, Lateral Movement All of these movements are done by 90% of prosthodontists and 35.7% % of general practitioners
6. How to check occlusion?
   **Ans:** Bilaterally -100% Prosthodontist and 82.9% General Dental practitioner
7. Have you ever told a patient that Occlusion will get adjusted on its own in 2-3 days?
   **Ans:** No by 80% of Prosthodontist and 64.2% of General Dental practitioners
8. Other than Articulating Paper what else can be used to check Occlusal interference?
   **Ans:** Artispot -20% prosthodontist,T scan by 30% prosthodontist.
   Carbon paper by 24.2% General Dental practitioner
9. Do you prefer mechanical equilibration techniques or digital ones?
   **Ans:** Mechanical, Digital both used by 86.7% of Prosthodontist and 58.5% of General Dental practitioners
10. In which cases T scan is advocated?
    **Ans:** Facial Pain (MPDS) , Occlusal Correction in FMR cases, Postural abnormalities affecting spine in all these cases - 86.6% Prosthodontist and 38.5% General Dental practitioner
11. Do you prefer using occlusal equilibration techniques in fixed prostheses?
    **Ans:** Yes -90% Prosthodontists and 54.2% General Dental practitioners
12. What is the purpose of occlusal equilibration?
    **Ans:** Muscle equilibration,To establish patients' original vertical dimension, CR=MIP in All of these by 83.3% Prosthodontists and 40% by General Dental practitioner
13. Which occlusal scheme do you prefer for full-mouth rehabilitation?
    **Ans:** Mutually protected occlusion by 86.7% Prosthodontists and 25.7% General Dental practitioner
14. Which signs do you observe in patients with stable occlusion?
    **Ans:** All teeth in MIP, Disclusion of posterior teeth in protrusive movements, Disclusion of all posterior teeth on the working side at lateral excursion all of these movements are done by 76.6% of Prosthodontists and 30% of General Dental practitioners
15. Which signs do you observe in patients with Unstable occlusion?

**Ans:** Hypermobility of one or more teeth, Horizontal drifting, Excessive wear all of these movements are observed by 80% of Prosthodontist and 50% of General Dental practitioners

16. Which patient position will you prefer for occlusal equilibration?
    **Ans:** Upright by 93.3% Prosthodontists and 41.5% General Dental practitioner
17. Do you use a deprogrammer during occlusal equilibration?
    **Ans:** Sometimes by 70% of Prosthodontist and 45.7% of General Dental practitioners
18. What are the different deprogrammers you have used in your practice?
    **Ans:** Lucia jig 1 (3.3%) 13 (18.5%) Leaf gauge 1 (3.3%) 12 (17.1%) Kois deprogrammer all of these deprogrammers are used by 86.6% Prosthodontist and 38.5% General Dental practitioner
19. What is your choice of Articulator in practice?
    **Ans:** Semi adjustable Articulator by 60% of Prosthodontist and 40% by General Dental practice

## 4. Discussion

The mandibular neuromuscular complex has a strong adaptive capacity that allows the work and protection of the masticatory system (Dawson, 1989, 2006). The occlusal interference induces an irritating state in the neuromuscular system which continues with each closure by proprioceptive feedback. This condition (engram) can cause changes in all aspects of the digestive system, such as the teeth, muscles, periodontium, gingival mucosa, and temporomandibular joints. Occlusal dysfunction can be treated by the deprogramming method (Popa S, 2004).[7]

For better occlusion, simultaneous, bilateral and uniform contact between the upper and lower teeth should be observed without interference or premature contact. In prosthetic and restorative medicine, it is necessary to understand the static and dynamic contact patterns of teeth in order to perform accurate occlusion testing and avoid contacts that spread inconsistently. The presence of an occlusal discrepancy may not be readily apparent on examination. Therefore, the occlusion must be evaluated further. Occlusal indicators play an important role in detecting occlusal problems.[8]

Occlusal equilibration techniques are generally divided into conventional and digital methods. The most commonly used method is the conventional method of articulating paper. In this study, Prosthodontists and general practitioners both used articulating paper only sometimes general practitioner uses carbon paper also. There are different papers to precisely analyze tooth contact relations in static and dynamic occlusion ranging from 100 microns to 8-12 microns. 100 microns is exclusively used for complete denture patients and 40 microns and shim stock articulating paper are used in fixed prosthodontics. Most of the participants preferred 40-micron size articulating paper in fixed prosthodontics (P value = 0.113).[9,10] According to some researchers, articulation with silk is the best means of registering occlusal contacts.[11,12]

Various deprogrammers are used in prosthodontics like the Lucia jig, leaf gauge, and Kois deprogrammer while performing full mouth rehabilitation and are used by prosthodontists mostly.

A recent advance in the field of occlusal balance is the use of T-scans for accurate and precise digital measurements of occlusion. A T-scan provides a picture of energy as a function of time. Over the years, T-Scan has various software and hardware versions that have been tried, tested, and improved. Based on the current state of technology, T- scan has revolutionized the occlusal equilibration techniques but does not present itself as a cost-effective option. There is little conflict with their ritual use and most prosthodontists prefer T-scan during bite correction in FMR cases.[13–15] The dentist receives information that allows it to perform accurate occlusal adjustment when using the T-Scan system.[4]

The occlusal scheme generally preferred by both prosthodontists and general practitioners has mutually protected occlusion. Signs of stable occlusion consist of common stable stops on all teeth in MIP, disocclusion during protrusive and lateral movement, and for unstable occlusion was excessive wear, horizontal drifting, and hypermobility of teeth which was considered the most accepted among the respondents

## 5. Limitation

The limitation of the study is the sample size. Only 100 dentists were included in the study. Also, a dentist from Maharashtra was included in the study. So, for more significant results, large sample size and area should be included in the study.

## 6. Conclusion

Prosthodontists were aware of the different thicknesses of articulating paper however the discretion in the use of articulating paper and their thickness and interpretation are nonconfirmatory. The choice of articulator preferred by prosthodontists is a semi-adjustable articulator. Awareness of T scan is more in Prosthodontist when compared with general dental practitioners

Among Prosthodontists awareness and usage of Lucia jig and Kois deprogrammer and leaf gauge is more significant when compared with general dental practitioners but its use is limited.

This study focused on measuring awareness of occlusal balance technology from traditional assistive devices to new digital assistive devices. Articulating paper is still the gold

standard, but it is very important to use it correctly, knowing the thickness and how to use. A better knowledge of modern digital techniques is necessary for clinical practice.

## 7. Data Availability

he results of the study were collected through an anonymous questionnaire for the study of the methods for registration of occlusal contacts.

## 8. Conflict of Interest

None.

## 9. Source of Funding

None.

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