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**ORIGINAL ARTICLE**

# ASSESSMENT OF DIFFERENT ELASTOMERIC IMPRESSION MATERIALS USED IN FIXED PROSTHODONTICS: A COMPARATIVE STUDY

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**ABSTRACT:**
**Background:** The hydrophilicity of the impression materials is fundamentally essential to wet the hard and delicate tissues in the mouth and to make precise impressions and casts. Considering the effect of hydrophilicity on precise bite the dust casting, lacking wetting brings about gypsum throws and kicks the bucket delivering pits and voids situated in basic ranges, for example, edges, stick openings, and retentive grooves. Hence; we planned the present study to compare the dimensional stability and accuracy of selected elastomeric impression materials at various time intervals. **Materials & methods:** The present study included assessment of dimensional stability and accuracy of selected elastomeric impression materials at various time intervals. All materials assessed were light-body consistency except for the polyether which is produced in just a single consistency. Light-body material was utilized on the grounds that it permits insinuate propagation when impressions are made. A round stainless steel kick the bucket was utilized to think about the examples at room temperature and stickiness. Five examples of every material were assessed. The examples were tried at prompt expulsion from shower, at 1, 24, 48, and 72 hours, and at 1 week after set. All the results were analysed by SPSS software. **Results:** Omniflex and Permlastic were the two impression materials used in the present study. At 144 hours, the deviation in Omniflex and Permlastic group was 0.55 and 0.35 respectively. **Conclusion:** Impression materials that were poured promptly and assessed utilizing a custom plate and cement reliably exhibited better outcomes in examination than those tried without the custom plate.
**Key words:** Elastomeric, Impression, Materials

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# INTRODUCTION

The hydrophilicity of the impression materials is fundamentally essential to wet the hard and delicate tissues in the mouth and to make precise impressions and casts. During establishing the connection, the material needs to stream and hold fast to the tooth structure and periodontal tissues that might be wetted by blood, salivation, and water.[1, 2] Just when the impression material is hydrophilic, can water be dislodged and can the material in a perfect world follow on these surfaces. Considering the effect of hydrophilicity on precise bite the dust casting, lacking wetting brings about gypsum throws and kicks the bucket delivering pits and voids situated in basic ranges, for example, edges, stick openings, and retentive grooves.[3-5] Hence; we planned the present study to compare the dimensional stability and accuracy of selected elastomeric impression materials at various time intervals.

## MATERIALS & METHODS

The present study was conducted in the department of prosthodontics of the dental institute and included assessment of dimensional stability and accuracy of selected elastomeric impression materials at various time intervals. **Table 1** shows various impression materials used in the present study divided into different groups. All materials assessed were light-body consistency except for the polyether which is produced in just a single consistency. Light-body material was utilized on the grounds that it permits insinuate propagation when impressions are made. A round stainless steel kick the bucket was utilized to think about the examples at room temperature and stickiness. The new mechanical assembly included just those lines required for detail generation and similarity with gypsum items. It gave cross lines which were utilized for assurance of dimensional dependability for impression materials. The kick the bucket has an exceptionally cleaned surface which dispensed with the requirement for a separator and limited cleaning operations which could harm the ruled surface of the pass on. The kick the bucket likewise has a ring which fits around the outskirts of the ruled measuring surface. This ring gone about as a plate or holder for the impression material and was viewed as another examination approach. A glass plate was squeezed against the material and the bite the dust so that overabundance material would be expelled. The glass and kick the bucket held together utilizing a C brace, was set in a water shower in a full-perceivability jolt loaded with deionized water. The shower was kept up at 32 degree Centigrade to cure for the time determined by the maker for the total polymerization in the mouth in addition to 3 minutes to guarantee finish set of the material. This was done to mimic as intently as conceivable open mouth temperatures. Readings were made with the utilization of a Gaetner voyaging magnifying instrument graduated in 0.01 mm increases with an amplification of x32. Five examples of every material were assessed. The examples were tried at prompt expulsion from shower, at 1, 24, 48, and 72 hours, and at 1 week after set. Between readings all examples were placed in a spotless box with bath powder and put away in a tidy free bureau. Room temperature and relative stickiness were recorded at each time interim. All the results were analysed by SPSS software. Chi- Square test and student t test were used for the assessment of level of significance. P- value of less than 0.05 was taken as significant.

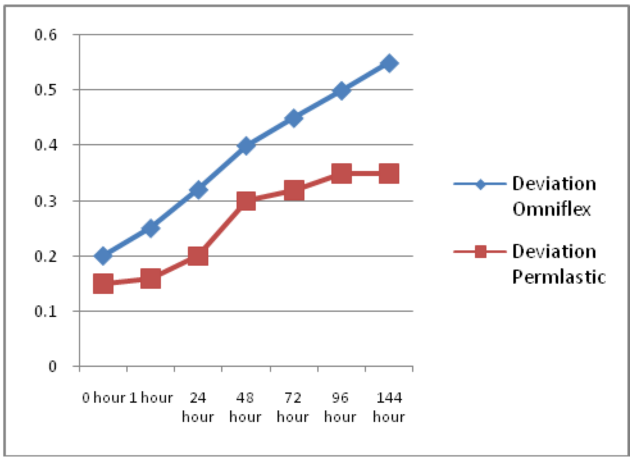
## RESULTS

The type of impression materials used in the present study is shown in **Table 1**.Omniflex and Permlastic were the two impression materials used in the present study.Percentage of deviation as a function of time for different elastomeric materials is shown in **Graph 1**. At 144 hours, the deviation in Omniflex and Permlastic group was 0.55 and 0.35 respectively.

**Table 1**: Types of elastomeric impression materials used

| Material | Group |
|---|---|
| **Omniflex** | A |
| **Permlastic** | B |

**Graph 1:** Percentage of deviation as a function of time for different elastomeric materials




## DISCUSSION

Precision and dimensional steadiness of impression materials has been the conventional objectives of specialists and clinicians.[6] Due to a large group of possibilities, numerous dental practitioners don't pour their own impressions instantly.[7, 8] Subsequently, impressions must be sufficiently steady to deliver precise throws over augmented timeframes.[9] This requirement for a more steady, precise, and versatile impression material supported the presentation of elastomers into dentistry.[10] Hence; we planned the present study to compare the dimensional stability and accuracy of selected elastomeric impression materials at various time intervals.

In the present study, we observed thatat 96 and 144 hours, the deviation observed in group A and group B was 0.55, 0.35, 0.50 and 0.35 respectively. Hosseinpour D et al investigated the interaction of water with four different dental impression materials: Aquasil (Ultra XLV Type 3), Take 1 (Wash Regular Set), Genie (Light Body, Standard Set), and ImpregumGarant (Soft Light Bodied Consistency).Apparent contact angles of de-ionized water made against thin horizontal sample films of the different materials under different conditions were measured from analysis of profile images of symmetrical sessile drops of water placed on the sample films using a Model FTA200 dynamic drop shape analysis system, which included a JAI M30 high speed CCD camera combined with a zoom microscope. Data were taken for specimens of dry ages (times following mixing) from a minimum of 20 seconds up to 1220 seconds. Imaging was started before the initial water/impression material contact, and lasted for at least 420 seconds in each case. The interval at the beginning of each run was 0.033 second, and then increased by a factor of 1.012 to the end. Microscopic images of the water/impression material interactions for fresh (uncured) materials were acquired to reveal the destructive interactions that resulted from such contact. Finally, surface tension measurements were made of water that had been contacted with material of varying dry age using the pendant drop method capability of the drop shape analysis system. These helped to assess the origin of hydrophilicity development for the different materials. For short curing times (dry ages), water showed a destructive effect on the integrity of all of the impression materials, as evidenced by the formation of a crater beneath the water drop and a scum of material at its surface. These effects diminished with dry age until a critical curing time was reached, beyond which such destructive interactions were no longer detectable. These critical curing times were determined to be 80, 140, 110, and 185 seconds for Aquasil, Take 1, Genie, and Impregum, respectively. The initial contact angle following the respective critical curing time was lowest for Impregum, at 66 degrees ; while values for Aquasil, Genie, and Take 1 were 93 degrees , 104 degrees , and 110 degrees , respectively. Beyond the critical curing times for the different materials, different degrees of hydrophilicity were observed. Aquasil showed the lowest final contact angle (<10 degrees ), with Impregum, Take 1, and Genie showing 31 degrees , 34 degrees , and 40 degrees , respectively. Measurements of the surface tension of water after contact with the different materials suggested that for Aquasil, hydrophilicity appears to be developed through the leaching of surfactant from the material, whereas for Impregum, Take 1, and Genie, hydrophilicity is developed at least in part through a change in surface structure in contact with water. Impregum and Aquasil materials of dry ages well beyond the critical curing time exhibited a stick-slip behavior in their interline movement or contact angle evolution. This was believed to be due to the slowness in the leaching of surfactant (in the case of Aquasil) or the re-orientation of unleachable surface groups (in the case of the other materials) in comparison to the inherent kinetics of water drop spreading. All materials investigated in the fresh, uncured state showed qualitative decomposition when put in contact with water through the formation of a crater beneath the water drop and a scum of material at its surface.[11]

Rupp F et al compared the initial hydrophilicity of unset and set elastomeric impression materials. Initial water contact angles were studied on thin unset and set films of one polyether and six polyvinyl siloxane (PVS) impression materials using high-resolution drop shape analysis at drop ages of 1 and 3 seconds. All unset PVS materials were very hydrophobic initially but showed different kinetics of hydrophilization. In contrast, the unset polyether was more hydrophilic initially but lacked distinct hydrophilization. All impression materials showed statistically significant contact angle differences between unset and set surfaces ($P < .05$). Dependent on the drop age, two PVS materials reached or exceeded the hydrophilicity of the polyether ($P < .05$). It can be concluded that studies on the wetting behavior of elastomeric impression materials should consider both the experimental drop age and set and unset material surfaces.[12]

## CONCLUSION

Impression materials that were poured promptly and assessed utilizing a custom plate and cement reliably exhibited better outcomes in examination than those tried without the custom plate.

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