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ABSTRACT

Objectives: To evaluate the percentage of cases/types of cases/factors influencing the use of microimplants in India.

Materials and methods: Seven hundred copies of a structured opinion-based questionnaire were distributed among the delegates attending the Indian orthodontic conference (IOC). The obtained data was evaluated using Rensis Likert method to know the preferential percentiles of observed readings. Based on the questionnaire the factors influencing use of microimplants was studied under scientific and non-scientific factors.

Results: Response rate was 85.7%. A total of 66.6% of all practicing orthodontists used microimplants. Out of the practicing orthodontists who used microimplants, 66% treat up to 25%, 24% treat up to 50%, whereas 10% treat up to 75% of their cases using microimplants. The most frequent treatment indication was anterior intrusion followed by bimaxillary protrusion, missing molars/molar extraction and crowding. Among the scientific factors for microimplant use - absolute anchorage control was very highly significant; reduction in complication and satisfactory results were highly significant; reduction in treatment time was insignificant. Among the non-scientific factors for microimplant use—referral of journals for case selection was very highly significant, economical factor had very high significance, patient demand was insignificant, on the other hand orthodontist’s inclination toward the use of microimplants in cases that could otherwise be treated without using microimplants was very highly significant.

Conclusion: With increasing number of orthodontists incorporating microimplants in their practices, stringent guidelines based on clinical evidence are required for microimplant case selection.

Keywords: Microimplant, Orthodontics.

INTRODUCTION

Voluminous literature exists on the use of microimplants as a reliable source of absolute anchorage. With the first description of orthodontic microimplants by Kanomi3 as a sustaining technique for skeletal anchorage, this modality has metamorphosed, potentially transgressing the realms of a disruptive technique expanding the envelope of orthodontics beyond the conventional.5,7 More often than not, fuelled by aggressive marketing strategies, microimplants have been abused, used as a replacement for conventional procedures/anchorages.8 In the current era of evidence-based practice, it is necessary to have a scientific rationale for any treatment modality, hence, it was felt necessary to explore the use of microimplants by orthodontists in India. This questionnaire-based study was devised with the following aims and objectives as follows:

1. The percentage of use of microimplants in orthodontic practices in India.
2. Types of malocclusion where use of microimplants is more frequent.
3. Factors influencing the use of microimplants.

MATERIALS AND METHODS

A total of 700 copies of the structured questionnaire (Table 1) were distributed randomly among the delegates attending the Indian Orthodontic Conference. In order to increase the validity of the questionnaire, 100 practicing orthodontists with practice of 5 to 15 years were interviewed and the obtained information was used as a guideline for preparing the questionnaire. It should be noted here, that the questionnaire was thus based on the inputs from the target sample and not on subjective perception of the investigators.

A total of 600 orthodontists returned the completed questionnaire. The obtained data was evaluated using the Rensis Likert method to know the preferential percentiles of observed readings.

RESULTS

The response was 85.7%. Out of the 600 orthodontists who responded, 400 (66.6%) used microimplants in their practice.
Table 1: Structured questionnaire: Figure mentioned in brackets are the number of response by practicing orthodontist

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentile (%)</th>
<th>Scientific Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are you?</td>
<td></td>
<td>- Practicing orthodontist - Postgraduate</td>
</tr>
<tr>
<td>2. Are you aware of microimplants?</td>
<td></td>
<td>- Yes - No</td>
</tr>
<tr>
<td>3. If yes, do you use microimplants?</td>
<td></td>
<td>- Yes - No</td>
</tr>
<tr>
<td>4. With which all systems do you prefer using implants?</td>
<td></td>
<td>- Begg - Tip edge - PAE/Standard edgewise (400) - Lingual</td>
</tr>
<tr>
<td>5. How many percent of cases do you treat with implants?</td>
<td></td>
<td>- 0-25% (264) - 26-50% (96) - 51-75% (40) - 76-100%</td>
</tr>
<tr>
<td>6. How many percent of bimaxillary protrusion cases do you treat with implants?</td>
<td></td>
<td>- 0-25% (240) - 26-50% (108) - 51-75% (64) - 76-100% (52)</td>
</tr>
<tr>
<td>7. How many percent of crowding cases do you treat with implants?</td>
<td></td>
<td>- 0-25% (382) - 26-50% (18) - 51-75% (76) - 76-100%</td>
</tr>
<tr>
<td>8. How many percent of cases requiring anterior intrusion do you treat with implants?</td>
<td></td>
<td>- 0-25% (194) - 26-50% (142) - 51-75% (64) - 76-100% (52)</td>
</tr>
<tr>
<td>9. How many percent of cases with missing molars/molar extraction do you treat with implants?</td>
<td></td>
<td>- 0-25% (266) - 26-50% (138) - 51-75% (76) - 76-100% (16)</td>
</tr>
<tr>
<td>10. How many percent of implant cases are you treating/treated?</td>
<td></td>
<td>- 0-20% (240) - 21-40% (104) - 41-60% (56) - 61-80%</td>
</tr>
<tr>
<td>11. In how many percent of cases, do you think there is absolute anchorage control using implants?</td>
<td></td>
<td>- 0-25% (48) - 26-50% - 51-75% (182) - 76-100% (170)</td>
</tr>
<tr>
<td>12. Do you follow journals for case selection of implant?</td>
<td></td>
<td>- No (100) - Yes (300)</td>
</tr>
<tr>
<td>13. Did you get satisfactory results using implants?</td>
<td></td>
<td>- Yes, in all cases - Few of the cases (140) - Most of the cases (260) - None of the cases (160)</td>
</tr>
<tr>
<td>14. Have you encountered any complication with use of implant?</td>
<td></td>
<td>- Frequently - Rarely (234) - Depends on quality of implant (166) - There are no complications involved (166)</td>
</tr>
<tr>
<td>15. Do you think implant can be reused after sterilization?</td>
<td></td>
<td>- No (320) - Yes (80)</td>
</tr>
<tr>
<td>16. Do you think use of implant is economical?</td>
<td></td>
<td>- No (118) - Yes (282)</td>
</tr>
<tr>
<td>17. Does the patient demand for use of implant?</td>
<td></td>
<td>- Yes in all cases - Few of the cases (100) - Most of the cases (300)</td>
</tr>
<tr>
<td>18. Do you think implants reduce the treatment time?</td>
<td></td>
<td>- Yes in all cases - Few of the cases (206) - Most of the cases (194)</td>
</tr>
<tr>
<td>19. Do you think we tend to get tempted to use implants in those cases which could be treated without them?</td>
<td></td>
<td>- No (52) - Yes (340)</td>
</tr>
</tbody>
</table>

Table 2: Preferential percentile calculation for cases preferred (Rensis Likert method)

<table>
<thead>
<tr>
<th>Case</th>
<th>Weight average</th>
<th>Preferential percentile (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bimax</td>
<td>1.66</td>
<td>41.5</td>
</tr>
<tr>
<td>Crowding</td>
<td>1.045</td>
<td>28.125</td>
</tr>
<tr>
<td>Anterior intrusion</td>
<td>1.675</td>
<td>41.875</td>
</tr>
<tr>
<td>Missing molars/molar extraction</td>
<td>1.465</td>
<td>36.625</td>
</tr>
</tbody>
</table>

Percentage of Cases Treated with Microimplants (refer question 5)

Ten percent of practicing orthodontists treat up to 75%, 24% treat up to 50%, whereas 66% of the practicing orthodontists treat up to 25% of their cases using microimplants.

Types of Cases where Microimplant used (refer questions 6, 7, 8, 9)

Anterior intrusion was the most commonly reported treatment indication (41.875%), followed by bimaxillary protrusion (41.5%) and missing molars/molar extraction (36.625%), with the least for crowding (26.125%).

Factors Influencing use of Microimplants (refer questions 11-14, 16-19)

Based on the questionnaire, the factors influencing use of microimplants were categorized into scientific and nonscientific.

The scientific factors are as follows—absolute anchorage control, satisfactory results, decline of complication (thus increased acceptance) and reduction in treatment time.

The nonscientific factors are as follows—use of microimplant is economical (for the orthodontist), based on patients demand, inclination of orthodontist toward use of microimplants, case selection based on published articles.

The preferential percentiles of the scientific and nonscientific factors for use of microimplants, based on Rensis Likert method are as follows (Table 3):

**Scientific Factors**

Among the scientific factors, absolute anchorage control (question-19) was very highly significant factor (79.625%) in microimplant usage, followed by satisfactory results (question-13) (72.5%) and reduced incidence of complications (question-14) (60.375%).

Reduction in treatment time had a negative correlation because the observed reading (74.25%) is for the option—few and none of the cases (question -18).

**Nonscientific Factors**

Among the nonscientific factors, orthodontist’s inclination (question-19) was very highly significant factor (92.5%) followed by scientific evidence in case selection (question-12) (87.5%) and economical consideration (question-16) (85.25%).

Out of the 66.6% of practicing orthodontists who used microimplants the following results were extrapolated (Table 2).
Patient demand (question-17) was negatively correlated (87.5%) because the observed reading is for the option—few or none of the cases.

DISCUSSION

Few surveys have been undertaken\textsuperscript{10-12} in the United States on microimplant usage by orthodontists. The response rate (85.7\%) in our study were higher when compared to the JCO study\textsuperscript{11} (response rate, 3.5\%), who invited all American orthodontists for the survey and the AAO study who surveyed all its united states and international members\textsuperscript{10} (n = 564; response rate 6\%). However, the PRECEDENT\textsuperscript{12} survey had higher number of respondents (response rate, 80\%) in comparison to our study, but the number of participants were limited (n = 59), whereas our study had higher number of participants (n = 700).

The percentage of Indian orthodontists using microimplants (66.6\%) was much higher compared to the JCO survey\textsuperscript{11} (42\%) but lower compared to the AAO\textsuperscript{10} (80\%) and PRECEDENT\textsuperscript{12} (91\%) surveys. The higher percentage reported in the latter studies could be attributed probably to a low response rate in the AAO and less participants in the PRECEDENT survey.

The worldwide AAO survey\textsuperscript{10} study concludes that microimplant anchorage in clinical orthodontic treatment has become the norm rather than an exception. Our study indicates the following with respect to microimplant usage in India. Almost 100\% of the orthodontists use microimplants with preadjusted/standard edgewise techniques. This could be due to two reasons, one being the increased demands of anchorage in the edgewise technique and the second being the fact that most contemporary practitioners are practising edgewise mechanotherapy.

It is also noted that anterior intrusion and bimaxillary protrusion cases are being treated more with microimplants when compared to cases with missing molars/molar extraction and crowding. This could be related to the unsatisfactory results in these cases with conventional techniques partly due to increased anchorage demands. This findings are slightly different in case of PRECEDENT and AAO surveys wherein the most common indications were space closure, bodily movement (PRECEDENT);\textsuperscript{12} and bodily movement, molar uprighting (AAO).\textsuperscript{10}

The selection of a specific treatment modality, such as a microimplant could be influenced by number of factors, and the present study has broadly classified use of microimplants into scientific and nonscientific factors.

When scientific reasons were analyzed using Rensis Likert method, it was noted that absolute anchorage control using microimplants is very highly significant factor for the orthodontist to opt for microimplants, reduction in complication associated with microimplants along with satisfactory results is also a highly significant factor in the use of microimplants. In this context the PRECEDENT survey\textsuperscript{12} reports that the most commonly reported complication is screw loosening, which they conclude to be more of a failure rather than a complication. Hence, no actual serious complications discouraging mini-implant usage have been reported in the PRECEDENT group.

On evaluation of nonscientific factors influencing use of microimplants it is noted that use of journals for case selection is very highly significant factor. Similarly the economical factor seems to be important with very high significance, while only insignificant number of patients demand for the use of microimplants probably due to low public awareness of this treatment modality.

The results also divulge that the orthodontist’s inclination toward use of microimplants in cases that could otherwise be treated without using microimplants is very highly significant with preferential percentile of 92.5\%. This is a very disturbing trend and could be a result of influential marketing strategies which have led to an increase in the use of the microimplants for every possible type of malocclusion. However, it should be noted that skeletal anchorage is an additional tool to widen the orthodontic spectrum rather than a replacement for conventional anchorage.\textsuperscript{4}

It should be reiterated here, that the results of this study are based on opinion of orthodontists and may therefore not be entirely factual and suffer from the limitations of any opinion-based questionnaire study, which include difficulty in recruiting orthodontists who are not eager to participate and converse, self-selection by overenthusiastic orthodontists.\textsuperscript{12} Both factors can result lead to biased findings. Also, this study is based on the recollection of orthodontist’s experience in mini-implant usage rather than recorded documented evidence of the same leading to reduced reliability.
CONCLUSION

1. The use of microimplants in practices in India is on the rise with 66.6% of orthodontists using microimplants.
2. As much as 10% of orthodontists treat up to 75% of their cases with this method as a modality for absolute anchorage more so in anterior intrusion and bimaxillary protrusion cases.
3. The preferential percentiles of nonscientific factors for usage is comparatively greater than the scientific factors with the orthodontist’s inclination toward use of microimplants being a very highly significant factor with highest preferential percentile, thus there is sufficient reason to say that use of microimplants is overemphasized.
4. Therefore, the results of this study suggest that stringent guidelines based on clinical evidence for case selection is the need of the hour.

REFERENCES