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#### **Original Research Article**

# Role of third molars in anterior crowding: Delusion or vindication?

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#### **Abstract**

Aim: The aim of this study was to perceive the viewpoint of orthodontists with respect to role of third molars in crowding of anterior teeth in both upper and lower arches, whether they are in favour of prophylactic removal of third molars or not, the position of third molars most commonly responsible for crowding in the anterior teeth region and the variation of opinion among orthodontists with respect to years of experience.

Materials Required: Online questionnaire (Google documents), Offline questionnaire, Microsoft excel.

Method: Orthodontists in India registered with the Indian Orthodontic Society were sent an online questionnaire via social media applications and email. The questionnaire included questions based on their opinion on role of third molars in crowding of teeth in the anterior segment in context with which arch would more likely be affected, whether they support prophylactic removal of third molars, which position of impacted third molar is most commonly responsible and whether the years of experience of the orthodontist affects their viewpoint. The results were evaluated and on the basis of it an opinion of the orthodontists in India, registered with the Indian Orthodontic Society was established.

Results: According to the data received, the orthodontists believe that maxillary third molars are not responsible for crowding in maxillary anterior teeth but their opinion differed when considering mandibular third molars. A majority of 68.9% of the respondents favoured the fact that mandibular third molars are responsible for crowding of mandibular anterior teeth. They also supported that mandibular third molars should be extracted to prevent crowding in mandibular anterior region but prophylactic removal of third molars were acceptable only in 48.5% of the interviewed orthodontists. A significant difference was noted with respect to age of experience. The younger dentists proposed to prophylactically extract the third molars whereas the senior dentists did not accept this theory

**Conclusion:** The aim of this study was perceive the viewpoint of orthodontists with respect to role of third molars in crowding of anterior teeth in both upper and lower arches, whether they are in favour of prophylactic removal of third molars or not, the position of third molars most commonly responsible for crowding in the anterior teeth region and the variation of opinion among orthodontists with respect to years of experience.

Keywords: Third molars, Third molars in crowding, Orthodontists opinion, Position of third molars effecting crowding

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### 1. Introduction

It seems that there are two schools of thought on the subject of third molars and dental crowding in the incisor region of the upper and, more often, lower arches. Multitudinous times, this theory has been appreciated<sup>1-4</sup> but has also been criticised<sup>5-6</sup> in almost equal amount of studies. A matter of consistent debate has been going on about this for almost the past century. The purpose of this study is to perceive the viewpoint of orthodontists in India about whether the third

molars can or cannot be held responsible for crowding seen in the anterior part of both the arches. Also, in case the clinician agrees to this theory, then which position<sup>8,9</sup> of third molar would they most commonly hold responsible for crowding. In theory, decision making for a clinician is usually driven by hypothesis. But taking into consideration, the years of experience, each clinician may think differently.

A great deal of information, from a variety of sources changes and develops quickly which may lead to

\*Corresponding author: Abha Chansoria Email: abhachansoria@gmail.com inconsistencies or questions about its validity and trustworthiness, all of which impact decision-making. Hence it is by far the most essential aspect while forming an opinion about a certain subject. A clinician with  $\dot{x}$  amount of years of experience may process and act on a situation in a different way and a clinician with  $\dot{x}$ -5 or  $\dot{x}$ -10 years. He may not necessarily be right in his decision making but will surely be more certain about his choices than the less experienced.

This study has been conducted to firstly form an opinion of what the 'life members' of the Indian Orthodontic Society surmise about the role of third molars in anterior crowding the form of a questionnaire. They have also been asked to share their views about which jaw is more affected due to the third molar. They have also been interrogated about the position in which the third molars would be more culpable for causing crowding in the anterior region and do they believe in the theory of prophylactic extraction of third molars for achieving a more stable occlusion.

### 1.1. Method of study

Orthodontists in India registered with the Indian Orthodontic Society only under the category of 'life members' were sent an online questionnaire via social media applications and email. Also, a printed format of the same questionnaire was filled by a few among them.

The questionnaire included questions based on their opinion about how the third molars would be culpable of causing crowding of teeth in the anterior segment in context with which arch would more likely be affected, whether they are in favour of removing the third molars for prophylactic purposes, the orientation (position, angulation etc.) of impacted third molar is most commonly responsible and whether the years of experience of the orthodontist affects their viewpoint.

The results were evaluated and on the basis of it an opinion of the orthodontists in India, registered with the Indian Orthodontic Society was established.

## 1.2. Inclusion criteria

Registered orthodontists with the Indian Orthodontic Society (Life members are included in the study). This was done to maintain uniformity and legitimacy of the study and also due to the fact that 'Life members' would have a definite amount of years of experience in their practise and hence, their opinion would be of greater value.

#### 1.3. Exclusion criteria

- Orthodontists not registered with Indian Orthodontic Society.
- Other members of Indian Orthodontic Society except life members.
- 3. Other practicing dental surgeons.

The questionnaire included the following parameters:-

- 1. Consent (tick mark).
- 2. Are you a Life Member of Indian Orthodontic Society?
- 3. Name
- 4. IOS membership number:- (LM\_\_\_\_)
- 5. Years of experience (A) Less than 10 years (B) 10-20 years (C) More than 20 years
- 6. Is crowding of the anterior teeth in the maxillary arch caused by the maxillary third molars?
- 7. When the front teeth of the jaw get crowded, do you believe it's because of the mandibular third molars?
- 8. To avoid crowding, do you believe it's necessary to remove the third molars in the upper jaw?
- 9. Would you recommend extracting the mandibular third molars to avoid crowding? Do you support the theory of extraction of third molars prophylactically?
- Which orientation of third molars w.r.t. position and angulation do you consider to be responsible for anterior crowding? (Winter's Classification).
- 11. Remarks/Explaination.

#### 2. Results

- 1. According to the age of the clinicians who were questioned, Of the 505 study respondents evaluated for the role of third molar in anterior crowding, the mean age reported was 37.1980 + 8.3262 as seen in **Table 1**.
- 2. Gender distribution of the study respondents: Male orthodontists were predominantly observed in the current study with 340 (67.3%) while females accounted to 165 (32.7%) as observed in **Table 2**.
- 3. Location wise distribution of study population: Majority of the respondents were from the Central part of the country with 44.4% and the least from the eastern section totalling to 5.5% as seen in **Table 3**.
- 4. Evaluation of the subject "Do you think the crowding of maxillary anterior teeth is caused by the maxillary third molars?" No significant difference was detected between the groups at p=0.767 when queried about the role of maxillary third molars in crowding the maxillary front teeth based on years of orthodontic treatment. But a great majority reported, i.e, 387 (76.6%) opined against this question, while only 23.4% favoured it as seen in **Table 4**.
- 5. Evaluation of "Do you believe that crowding of mandibular anterior teeth is caused by mandibular third molars?" When asked who should be held accountable for crowding the anterior teeth in the mandibular arch, 68.9% of respondents said the mandibular third molars. Dentists with lesser years of experience, i.e, <10 years (72.2%) and 10-20 years (69.5%) favoured more regarding mandibular third molar role as compared to 57.3% of >20 year's experience, which was statistically significant at p=0.040 as seen in **Table 5**.
- 6. Assessment of "Do you think maxillary third molars should be extracted for preventing crowding in maxillary anterior teeth?" When evaluated for the

study population responses on whether maxillary third molars ought to be extracted for prevention of crowding, only a quarter (25.1%) of them reported "yes" while 74.9% were against the concept. On comparing between the years of experience, no significant difference was noted at p=0.767 as seen in **Table 6**.

- 7. Assessment of "Do you think mandibular third molars should be extracted for preventing crowding in mandibular anterior teeth?" Study result for the extraction of mandibular third molars were conflicting among the interviewed orthodontists with 57.6% favouring while another 42.4% against the concept. No significant differences were noted between the years of experience at p=0.465 as observed in **Table 7**.
- 8. Assessment of "Do you support prophylactic removal of third molars?" Prophylactic removal of third molars were acceptable in 48.5% of the interviewed orthodontists overall. A significant difference was noted in the age of experience with younger dentists proposing to retain as compared to their seniors (54.3% in <10 years versus 39.0% in >20 years) as seen in **Table 8**.
- 9. Assessment of "Which position of third molars do you consider responsible for anterior crowding?" Mesioangular positioning of the third molars was majorly proposed to be responsible for crowding by 62.0% of study respondents followed by horizontal positioning in 26.1%. The least thought of was the inverted position as suggested by 1.8% of orthodontists as seen in **Table 9**.

**Table 1:** Distribution of years of experience of the study population.

| Variab | N  | Mean   | S.D    | Minimu | Maximu |
|--------|----|--------|--------|--------|--------|
| le     |    |        |        | m      | m      |
| Age    | 50 | 37.198 | 8.3262 | 28.00  | 57.00  |
|        | 5  | 0      | 1      |        |        |

<sup>\*=</sup>Significant; NS=Not Significant

Table 2: Gender distribution of the study sample.

| Gender Frequency (N) |     | Percentage (%) |
|----------------------|-----|----------------|
| Males                | 340 | 67.3           |
| Females              | 165 | 32.7           |
| Total                | 505 | 100.0          |

Table 3: Location wise distribution of study population

| Location | Frequency (N) | Percentage (%) |
|----------|---------------|----------------|
| North    | 91            | 18.1           |
| South    | 98            | 19.4           |
| East     | 28            | 5.5            |
| West     | 64            | 12.6           |
| Central  | 224           | 44.4           |
| Total    | 505           | 100            |

**Table 4:** Comparative assessment of "Do you think maxillary third molars are responsible for crowding of maxillary anterior teeth?"

| Variable   | <10 years  | 10 – 20   | >20    | Total   |  |
|------------|------------|-----------|--------|---------|--|
|            |            | years     | years  |         |  |
| Yes        | 66 (24.5)  | 33 (21.4) | 19     | 118     |  |
|            |            |           | (23.2) | (23.4)  |  |
| No         | 203 (75.5) | 121       | 63     | 387     |  |
|            |            | (78.6)    | (76.8) | (76.6)  |  |
| Total      | 269 (53.3) | 154       | 82     | 505     |  |
|            |            | (30.5)    | (16.2) | (100.0) |  |
| Chi Square | 0.530      |           |        |         |  |
| statistic  |            |           |        |         |  |
| df         | 2          |           |        |         |  |
| P value    |            | 0.767 (N  | (S)    | •       |  |

<sup>\*=</sup>Significant; NS=Not Significant

**Table 5:** Comparative assessment of "Do you think mandibular third molars are responsible for crowding of mandibular anterior teeth?" based on experience.

| Variable  | <10    | 10 – 20    | >20       | Total   |  |  |
|-----------|--------|------------|-----------|---------|--|--|
|           | years  | years      | years     |         |  |  |
| Yes       | 194    | 107 (69.5) | 47 (57.3) | 348     |  |  |
|           | (72.1) |            |           | (68.9)  |  |  |
| No        | 75     | 47 (30.5)  | 35 (42.7) | 157     |  |  |
|           | (27.9) |            |           | (31.1)  |  |  |
| Total     | 269    | 154 (30.5) | 82 (16.2) | 505     |  |  |
|           | (53.3) |            |           | (100.0) |  |  |
| Chi       | 6.460  |            |           |         |  |  |
| Square    |        |            |           |         |  |  |
| statistic |        |            |           |         |  |  |
| df        | 2      |            |           |         |  |  |
| P value   |        | 0.04       | 10*       |         |  |  |

**Table 6:** Comparative assessment of "Do you think maxillary third molars should be extracted for preventing crowding in maxillary anterior teeth?" based on experience.

| Variable  | <10       | 10 - 20    | >20    | Total   |
|-----------|-----------|------------|--------|---------|
|           | years     | years      | years  |         |
| Yes       | 74        | 32 (20.8)  | 21     | 127     |
|           | (27.5)    |            | (25.6) | (25.1)  |
| No        | 195       | 122 (79.2) | 61     | 378     |
|           | (72.5)    |            | (74.4) | (74.9)  |
| Total     | 269       | 154 (30.5) | 82     | 505     |
|           | (53.3)    |            | (16.2) | (100.0) |
| Chi       | 0.530     |            |        |         |
| Square    |           |            |        |         |
| statistic |           |            |        |         |
| df        | 2         |            |        |         |
| P value   | 0.767 (NS | )          |        |         |

**Table 7:** Comparative Assessment of "Do you think mandibular third molars should be extracted for preventing crowding in mandibular anterior teeth?"

| Variable  | <10    | 10 – 20    | >20    | Total   |  |
|-----------|--------|------------|--------|---------|--|
|           | years  | years      | years  |         |  |
| Yes       | 161    | 87 (56.5)  | 43     | 291     |  |
|           | (59.9) |            | (52.4) | (57.6)  |  |
| No        | 108    | 67 (43.5)  | 39     | 214     |  |
|           | (40.1) |            | (47.6) | (42.4)  |  |
| Total     | 269    | 154 (30.5) | 82     | 505     |  |
|           | (53.3) |            | (16.2) | (100.0) |  |
| Chi       | 1.530  |            |        |         |  |
| Square    |        |            |        |         |  |
| statistic |        |            |        |         |  |
| df        | 2      |            |        |         |  |
| P value   |        | 0.465 (    | (NS)   | ·       |  |

<sup>\*=</sup>Significant; NS=Not Significant

**Table 8:** Comparative assessment of "Do you support prophylactic removal of third molars?"

| Variable  | <10 10 - 20 |            | >20    | Total   |  |
|-----------|-------------|------------|--------|---------|--|
|           | years       | years      | years  |         |  |
| Yes       | 146         | 67 (43.5)  | 32     | 245     |  |
|           | (54.3)      |            | (39.0) | (48.5)  |  |
| No        | 123         | 87 (56.5)  | 50     | 260     |  |
|           | (45.7)      |            | (61.0) | (51.5)  |  |
| Total     | 269         | 154 (30.5) | 82     | 505     |  |
|           | (53.3)      |            | (16.2) | (100.0) |  |
| Chi       | 8.077       |            |        |         |  |
| Square    |             |            |        |         |  |
| statistic |             |            |        |         |  |
| df        | 2           |            |        |         |  |
| P value   |             | 0.01       | 8*     |         |  |

**Table 9:** Comparative assessment of "Which position of third molars do you consider responsible for anterior crowding?"

| Variable     | <10       | 10 – 20 | >20     | Total   |
|--------------|-----------|---------|---------|---------|
|              | years     | years   | years   |         |
| Mesioangular | 160       | 96      | 57      | 313     |
|              | (59.5)    | (62.3)  | (69.5)  | (62.0)  |
| Distoangular | 3 (1.1)   | 2 (1.3) | 2 (2.4) | 7 (1.4) |
| Vertical     | 18 (6.7)  | 7 (4.5) | 5 (6.1) | 30      |
|              |           |         |         | (5.9)   |
| Horizontal   | 77        | 43      | 12      | 132     |
|              | (28.6)    | (27.9)  | (14.6)  | (26.1)  |
| Transverse   | 8 (3.0)   | 1 (0.6) | 5 (6.1) | 14      |
|              |           |         |         | (2.8)   |
| Inverted     | 3 (1.1)   | 5 (3.2) | 1 (1.2) | 9 (1.8) |
| Total        | 269       | 154     | 82      | 505     |
|              | (53.3)    | (30.5)  | (16.2)  | (100.0) |
| Chi Square   | 16.055    |         |         |         |
| statistic    |           |         |         |         |
| df           | 10        |         |         |         |
| P value      | 0.098(NS) |         |         | ·       |

<sup>\*=</sup>Significant; NS=Not Significant

### 3. Validation of Questionnaire

A 6 variable questionnaire was framed by investigator with the help of mentors. Primarily the construction of the questionnaire was evaluated for validity testing as follows:-

- Face Validity The expert validation team used Cohen's Kappa to evaluate the face validity test. The exam was administered by an 8-person expert panel. The experts' satisfactory inter-rater agreement for the questionnaire items was indicated by a rating of 0.82.
- 2. Content Validity Ratio of content validity and expert panel validation was evaluated.
- a. Expert Panel Validation: After ensuring the questionnaire's reliability, the same panel was used to assess the questionnaire's adequateness and adequacy in measuring. All the experts viewed all the items that were necessary.
- b. Content validity ratio (CVR) This ration was evaluated using the Lawsche's method, calculated by the formula, CVR = ne (N/2) N/2,
- This is where N is the total number of expert panel members and 'ne' is the number of members who have indicated "essential.".
- 4. Every one of the twelve elements was given a score between one and three, with "not necessary," "useful but not essential," and "essential" being the most important.
- 5. A final CVR score of 0.88 was achieved. Since all of the categories were deemed "essential," the final questionnaire contained all of the questions.
- c. Content Validity Index –was calculated for each of the items and was found to be summative. A total of six items' Item-Content Validity Index (I-CVI) scores falling within the 0.95–1 range indicated full agreement. Based on the results of the I-CVI index, the questionnaire was determined to be relevant with a Scale level-Content Validity Index (S-CVI) score of 0.92.
- Construct validity could not be tested as no previous literature was available with which we could associate or correlate our constructed questionnaire to the existing developed questionnaire.
- 7. Pilot testing The questionnaire assessed was then pilot tested on a group of 20 orthodontist who were life members of their society to ensure the feasibility.

## 3.1. Data analysis

An analysis was performed on the gathered data using SPSS Version 23, which is a statistical package developed by Chicago Inc., IL, USA. In order to determine if the

comparisons were statistically significant, we used a battery of predetermined statistical tests on the collected data.

The Kolmogorov-Smirnov test was used to analyse the normality of the data and determine the involvement of the third molars in anterior crowding. Since there were no discernible discrepancies, we may safely assume that the data followed a normal distribution.

We also compared variables using percentages and numbers. We used a chi-square test to compare each variable across the groups that were defined by years of experience. For statistical purposes, a p-value less than 0.05 was deemed significant.

#### 4. Discussion

The topic is still up for debate among specialists in the area, even as neoteric evident literature has shed light on the modest involvement of third molar eruption in the development of anterior crowding. Though there was no proof of statistically significant variations in responses among the three groups, the poll did reveal that many members of the Indian Orthodontic Society continue to associate crowding with the eruption of third molars. When it comes to the mandible in particular, a large percentage of individuals (68.9%) have spoken out in favour of this connection, even if the vast majority of orthodontists did not.

This fits nicely with the findings of the research by Lindauer et al.<sup>10</sup> who used a comparable questionnaire to gather data from US practitioners. Surprisingly, they found that over half of the US orthodontists and oral surgeons blamed the strength of the lower third molar eruption for causing upper dental crowding. Truly, a statistically significant difference between physicians was discovered by Lindauer et al. While orthodontists are more likely to recommend braces to correct crowding of the front teeth, oral surgeons are more likely to recommend keeping the third molars. Amusingly, when it comes to oral surgeons, the opinions of Italian and American practitioners are almost incompatible. Those Italians are probably not on board with the crowding idea. Specifically, when asked about the possibility of mandibular third molars causing incisor crowding, 78.2% of US oral surgeons and 36.2% of Italian oral surgeons reached this conclusion.

The same holds true for the findings presented by Tüfek.i et al. 11 who analysed the views of orthodontists in the US and Sweden. Swedish dentists who specialise in orthodontic treatment were divided on whether the lower third molar had a strong enough force to crowd incisors (65% vs. 35%). As an example of the data supporting the idea that a third molar is one cause of this kind of crowding, Richardson (1989) 12 performed a study. Briefly, he said that the presence of the third molar and pressure from the back of the arch are the reasons for crowding in the lower arch in the late stages. This in no way rules out the possibility that other

variables contributed to the problem. The reason for late crowding might vary from one topic to another or, any one individual can have a combination of elements that contribute to its growth. A related research by Zawawi et al. (2014)<sup>13</sup> looked at how third molars contributed to crowding and relapse after orthodontic treatment for the front teeth. It was not possible to get a conclusive statement about the function of the third molars in the progression of crowding on the front teeth. The majority of the studies showed a significant risk of bias, and the outcomes were inconsistent. Unfortunately, the majority of studies did not support a cause-and-effect link; thus, it is not justified to remove the third molars to avoid crowding in the area of the front teeth or following orthodontic treatment. To avoid crowding in the front tooth area, the second series of questions concerned the extraction of a healthy third molar as a preventative measure. Neither the National Institute of Clinical Excellence (NICE) in 2000 nor the Scottish Intercollegiate Guidelines Network (SIGN) in 1999 revisited in 2005 contemplated possible tertiary crowding as a justification to justify the preventative extraction of third molars. There was no credible evidence to justify the preventive removal of pathology-free or healthy (asymptomatic) third molars, they found, due to the financial costs and possible drawbacks of the procedure. As an alternative to extraction, a recent study on asymptomatic third molars suggested that it may be more prudent to just assess these teeth on an as-needed basis. A related research by Garrocho A. et al. (2017)<sup>14</sup> reviewed the dental literature on the topic of preventing illness by removing impacted third molars in young adults and adolescents who do not have any symptoms of the condition. But they thought that the evidence-based literature from well-done clinical studies and systematic reviews didn't go far enough to justify the regular preventative extraction of impacted third molars. Conducting active investigations at regular periods was determined to be an improved management method. To sum up, regardless of the patient's age, surgical extraction of impacted third molars was only warranted in certain pathological instances. According to the study conducted by Michela Gavazzi et al., the majority of orthodontists and surgeons believe that it is unnecessary to remove the third molars in order to avoid crowding in the upper and lower arches. The percentages for the maxilla and mandible are similar: 89.7% and 81.4%, respectively. The surprise part of this research is the stance taken by oral surgeons, who are not as conservative as orthodontists. In Italy, they are now in agreement not to recommend the preventive removal of teeth.

In the present study which included orthodontists in India ('life members' of Indian Orthodontic Society) it was seen that there is a significant number of orthodontists who were of the opinion that mandibular third molars were culpable for causing crowding in anterior region of the mandibular arch while they did not agree upon the same theory with respect to the maxillary arch.

Most orthodontists also favoured the suggestion that mandibular third molars should be removed for preventing crowding in mandibular anterior teeth. As far as extraction of third molars for prophylactic purpose was concerned, there was a significant difference between the age groups of the orthodontic practitioners. While the orthodontic practitioners with less than 10 years of experience believed that third molars should be extracted, the others desisted themselves from believing in this theory.

While being interrogated about the position of third molars which could be culpable for crowding in anterior teeth region, 'mesioangular' positioning of the third molars was majorly proposed to be help responsible for causing potential crowding by 62.0% of respondents who were included in the study followed by 'horizontal' positioning in 26.1%. The inverted position was thought of as the position which was least responsible for causing crowding as suggested by 1.8% of orthodontists.

#### 5. Conclusions

The purpose of this study was to find out how orthodontists feel about the following: the role of third molars in crowding of front teeth in the maxillary and mandibular arches, whether or not they think it's a good idea to remove third molars before they cause problems, which position and angle of the molars are most responsible for crowding, and how opinions vary among orthodontists based on their level of experience.

After collecting the opinions of all the orthodontists by the means of online and offline questionnaire, the data was evaluated and there were significant differences seen in the results that were obtained.

- When questioned about the maxillary arch with respect to third molar impactions affecting the crowding in anterior teeth, no significant results were obtained among the three groups. Although a sound majority voted against the theory.
- When questioned about mandibular third molar impactions in context with crowding, a statistically significant result was obtained among the age groups.
- 3. While the orthodontist with less than 10 years and 10-20 years of experience were of the opinion that mandibular crowding is affected by the impacted third molars, the orthodontists with greater years of experience opposed this concept.
- 4. When evaluated for the study population responses on whether maxillary third molars ought to be extracted for prevention of crowding, only a quarter of them reported "yes" while 74.9% were against the concept.
- 5. Study result for the removal of mandibular third molars were contradictory among the orthodontists who participated in the questionnaire with 57.6% being in favour while another 42.4% against the concept. No significant differentiation was noted between the years of experience in their respective practices at p=0.465.

- 6. Prophylactic extraction of third molars were acceptable in 48.5% of the interviewed orthodontists overall. A significant difference was noted in the age of experience with younger dentists proposing to retain as compared to their seniors (54.3% in <10 years versus 39.0% in >20 years).
- 7. Mesioangular positioning of the third molars was majorly proposed to be responsible for crowding by 62.0% of study respondents followed by horizontal positioning in 26.1%. The least thought of was the inverted position as suggested by 1.8% of orthodontists.

Although there is scope and need of further study regarding this subject, a certain amount of opinion based on clinical experience of orthodontists has been noted in this study. More thorough investigation and comparative evaluation between treatment with and without dis-impaction of third molars radiographically, and pre and post treatment must be done.

## 6. Source of Funding

None.

### 7. Conflict of Interest

None.

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