Exploring the Knowledge Regarding Plasma Rich Protein (PRP) Among Orthodontist - A Cross-Sectional Survey

Dr. Revathi Somasundaram¹, Dr. Harish Ponniah², Dr. Arjun Thomas³, Dr. Aishwarya.K⁴, Dr. Poorna Devadoss⁵, Dr. Anbu Velusamy⁶, S M M. Moulvi⁷

¹Assistant professor, Department of Orthodontics and Dentofacial Orthopedics, Vivekanandha Dental College for Women, Tamil Nadu, India.
²Assistant professor, Department of Orthodontics and Dentofacial Orthopedics, Ragas Dental College and Hospital, Tamil Nadu, India.
³Assistant professor, Dept of Pedodontics & Preventive Dentistry, Karpaga Vinayaga Institute of Dental Sciences, Chengalpet, Tamil Nadu.
⁴Assistant professor, Department of Orthodontics and dentofacial orthopedics, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu.
⁵Professor, Department of Orthodontics and dentofacial orthopedics, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu.
⁶Assistant professor, Department of Orthodontics and dentofacial orthopedics, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu.
⁷Consultant oral surgeon, Chennai, Tamil Nadu.

Corresponding author
Dr. Revathi Somasundaram
Assistant professor, Department of Orthodontics and Dentofacial Orthopedics, Vivekanandha Dental College for Women, Tamil Nadu, India.

ABSTRACT

AIM- The aim of the current survey was conducted to assess the knowledge, perception and attitude regarding the role of PRP among orthodontist in India.

Methodology- This was a cross-sectional web based questionnaire survey conducted among orthodontist in India. The pilot study was conducted to estimate the sample size and final sample size is 263 participants. The predesigned and validated, self-administered, structured 10 questions related to the knowledge, perception and attitude regarding the role of PRP. The statistical analysis was done using Statistical Package for Social Sciences SPSS (V 22.0). The frequency distribution was computed.

Results- According to the current survey, 263 (100%) respondents were aware of the use of PRP in orthodontic therapy. The majority of responders (208) believed that PRP should be used in orthodontic treatment, while 19.0%, were unsure. The majority of orthodontists (77.9%) felt that they have a good understanding of the process and are aware that using it in orthodontic practise will reduce treatment time. The remaining 2 (0.8 percent) refused to accept it, while 56 (21.3 percent) were undecided. Out of 263 orthodontists, 170 (64.6 percent) agreed that the use of PRP increased the rate of orthodontic tooth movement.

Conclusion- Submucosal injection of platelet-rich protein imitates the impact of bone on orthodontic tooth movement without inducing alveolar bone loss or necessitating a surgical procedure. With more people of all ages becoming aware of orthodontic treatment, the focus has turned to improving the rate of tooth movement. The current survey concluded that orthodontist had good knowledge about the usage of PRP in orthodontic practice.

Key words: Orthodontic tooth movement, Alveolar bone, Plasma rich protein
INTRODUCTION

Platelet rich plasma (prp) is a novel technique to tissue regeneration that is widely employed in a variety of medical specialties, including head and neck surgery, otolaryngology, cardiology, and maxillofacial surgery. PPR is commonly utilised in a gel formulation, which is made by combining PRP (produced from autologous whole blood centrifugation) with thrombin and calcium chloride. PRP gel has a high quantity of platelets as well as fibrinogen in its natural state1,2.

Platelets are among the first cells to respond at a wound site during wound healing, and they are crucial to the start of the process. Platelets are a rich source of important growth factors, including platelet-derived growth factor (pdgf), transforming growth factor-b (tgf-b) 1 and 2, and vascular endothelial growth factor (vegf); all of these are involved in the angiogenic cascade, which aids in the healing of hard and soft tissue wounds3,4. Prp has been proven to be an effective healing aid in a number of dentistry and oral surgical treatments. Ablative surgical techniques, mandibular reconstruction and surgical repair of the alveolar cleft, treatment of infrabony periodontal abnormalities and periodontal plastic surgery, as well as osseointegrated implant implantation procedures, are among them. In such treatments, the adhesive nature of prp allows for better graft handling, with more predictable flap ability to adapt and hemostasis, as well as a more predictable seal than primary closure alone5,6,7.

In orthodontics, there are a variety of ways to expedite tooth movement, which can be classified as surgical or non-surgical. Alveolar decortication, corticotomy, distraction of the periodontal ligament, and distraction of the dento-alveolar orthognathic surgery, piezocision, piezopuncture, and micro-osteoperforation are some of the surgical techniques used8,9. Low-intensity laser irradiation, resonance vibration, pulsed electromagnetic fields, electrical currents, and pharmaceutical approaches such as the injection of prostaglandin or relaxin are examples of non-surgical treatments10-12. The aim of the current survey was conducted to assess the knowledge, perception and attitude regarding the role of PRP among the orthodontist in India.

MATERIALS AND METHOD

Using an online questionnaire form, a cross sectional descriptive questionnaire survey was done among practising orthodontists and postgraduate orthodontic students across India. With the help of Google Forms from the Google site, a web-based questionnaire form was created. The questionnaire was pretested on ten orthodontists at random. After removing confusing and inappropriate items, the questionnaire was completed. To estimate the sample size, a pilot research was done. After conducting a pilot study, the final sample size was determined to be 256 people. The main sample size did not include the pretesting and pilot research samples. A systematic questionnaire was created, with 10 questions about orthodontists' knowledge, perceptions, and attitudes about the role of PRP, and the link to the online questionnaire was sent to 350 orthodontists. A simple sampling method was employed. From March to April 2021, all participants answered surveys during a two-month period. 289 people completed the questionnaires, and their responses were entered in a Google form, of which 263 were chosen after the inaccuracies were removed. An informed permission form was acquired from each participant in the survey after a brief introduction to the study's objective and intent. The inclusion criteria for present study include those who completed MDS and those who are studying MDS in the branch of orthodontics and dentofacial orthopedics. Orthodontist who were not willing to participate in the study and unable to give informed consent were excluded.

The data collected were entered into Microsoft Office Excel and analysed by using the Statistical Package for Social Sciences SPSS (V 22.0) (SPSS Inc, Chicago, Illinois, USA). The frequency distribution was computed.

RESULTS

Among the 263 study participants, 58 (22.1%) have their own private clinic, 87 (33.1%) are consultant orthodontists, 13 (4.9%) work in government hospitals, 5 (1.9%) work in private colleges, 9 (3.4%) are orthodontic post graduate students, and 91 (34.6%) are a combination of private clinic, consultation, academician, and post graduate students. (See Graph 1)
The current survey revealed that 263 (100%) respondents had awareness about the PRP in orthodontic treatment. The most of the respondents 208(79.1%) agreed the usage of PRP in orthodontic practice, followed by 50(19.0%) unsure about the usage in orthodontic practice. The majority of orthodontist 205 (77.9%) agreed that well understood about the mechanism and aware that treatment time will reduce due to the usage in orthodontic practice. Other 2(0.8%) denied to accept it and 56(21.3%) were unsure about it. Out of 263 orthodontist,170(64.6%) accepted that rate of orthodontic tooth movement was increased due to usage of PRP. The result further revealed that 71 (27.0%)PRP had impact on increased bone density,53(20.2%) suggested reducing alveolar ridge resorption,7(2.7%) were reported PRP has impact on reduced resorption, 7(2.7%) reported reduction in post-surgical pain in patients treated with periodontally accelerated osteogenic orthodontics, remaining 125(47.5%) reported all of the above (Table-1). About 176(66.9%) agreed that adverse effect of PRP such as mucosal swelling, irritation, itching sensation and mild to moderate pain, whereas remaining 53(20.2%) orthodontist opposed this statement. Likewise, 34(12.9%) were in dilemma. A total of 213 (81 %) orthodontist were accepted that systemic effect of PRP, whereas 50 (19%) reluctant to accept it. The majority of orthodontist 218 (77.9%) aware of the dosage ofPRP.

<table>
<thead>
<tr>
<th>Usage of PRP</th>
<th>Frequency n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP had impact on increased bone density</td>
<td>71</td>
<td>27.0</td>
</tr>
<tr>
<td>Reducing alveolar ridge resorption</td>
<td>53</td>
<td>20.2</td>
</tr>
<tr>
<td>Impact on reduced resorption</td>
<td>7</td>
<td>2.7</td>
</tr>
<tr>
<td>Reduction in post-surgical pain in patients treated with periodontally accelerated osteogenic orthodontics</td>
<td>7</td>
<td>2.7</td>
</tr>
<tr>
<td>Combination of any of the above</td>
<td>125</td>
<td>47.5</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 1-Usage of PRP in orthodontics
DISCUSSION
The aim of the current survey was conducted to assess the knowledge, perception and attitude regarding the role of PRP among the orthodontist in India. The biological response to an externally applied force interrupting the dentofacial complex's physiological homeostasis causes orthodontic tooth movement. Several approaches have been used to increase the rate of orthodontic tooth movement. Despite the fact that each strategy has been stated to be superior to the others in numerous research, the data for each technique is still conflicting. Many of these methods are based on the regional acceleratory phenomenon (frost 1983), which is based on the idea that when a bone is surgically wounded, an inflammation cascade is generated, resulting in increased osteoclastogenesis and hence faster tooth movement.

Platelet-rich plasma (PRP) is a little amount of plasma with a high percentage of autologous human platelets. Platelet concentration and the seven key growth factors are also included, which are actively secreted by platelets to promote wound healing. Platelets are one of the factors that aid in the healing of both soft and hard tissue wounds. Platelet-derived growth factor, transforming growth factor, endothelial growth factor, and other growth factors are found in platelets. These growth factors are important for wound healing control and promotion, as well as cellular activities like mitogenesis, chemotaxis, differentiation, and metabolism. The majority of orthodontist agreed that well understood about the mechanism and aware that treatment time will reduce due to the usage in orthodontic practice. Other denied to accept it and were unsure about it. Rashid et al. found that intraligamental injection of PRP increased the rate of orthodontic tooth movement in the PRP group after the first week when compared to the control group. The PRP group had twice the rate of orthodontic tooth movement as the control group, notably in the third week. According to Aysegul et al, orthodontic tooth movement is aided by localised osteoclastic activity when moderate and high platelet concentrations are injected. At 3, 7, 14, and 21 days, the experimental group's alveolar bone density was lower than the control group's. At the end of the 21-day period, the hPRP-E group had 1.7 times faster orthodontic tooth movement than the control group and 1.4 times faster orthodontic tooth movement than the mPRP-E group.

Around 71 (27.0%) orthodontist suggested that PRP had impact on increased bone density, 53(20.2%) suggested reducing alveolar ridge resorption, 7(2.7%) were reported PRP has impact on reduced resorption, 7(2.7%) reported reduction in post-surgical pain in patients treated with periodontally accelerated osteogenic orthodontics, remaining 125(47.5%) reported all of the above. On supporting this, Chandangupta et al showed that bone grafts with added PRP had increased bone density when compared to grafts without PRP at end of 6-month postoperative. The mean bone density was 1.04 times more in the PRP group than non PRP group at 3-month and 1.2 times more at 6 months. PRP seems to improve bone formation in alveolar clefts when admixed with autologous cancellous bone harvested from the iliac crest. Giuseppe Giudice et al PRP improves the quality of osteoblastic activity and it accelerates bone healing and it initiates early orthodontic treatment.

About 176(66.9%) agreed that adverse effect of PRP such as mucosal swelling, irritation, itching sensation and mild to moderate pain. The majority of orthodontist 218 (77.9%) aware of the dosage of PRP. Gulec et al. observed that the PRP effect is dose dependent with the effect of the high concentration of PRP lasts for longer, and it enhances the rate of tooth movement, as much as up to 1.7 times. Choi et al concluded that the rate of bone cell proliferation reduced with increasing the concentration (>5%) of PRP.

CONCLUSION
The present study concluded that vast majority of Orthodontist aware about the usage of PRP. The ablation of bone to initiate orthodontic tooth movement is a major issue addressed with surgical techniques. As a result, PRP may be a better option for accelerating tooth mobility. Using injectable PRP at various stages of orthodontic therapy can improve the quality of the treatment outcome by altering bone quality and increasing the rate of tooth movement.
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