Simvastatin and its impact on healing of craniofacial bone and cartilage: A systematic review

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INTRODUCTION

SIMVASTATIN

Promotes bone formation	Anti bone resorption	Anti-inflammatory
• Enhances Alkaline phosphatase activity and mineralization • Stimulates VEGF expression	• Reverses the effects of TNF-Alpha	• Decreases interleukin 6&8

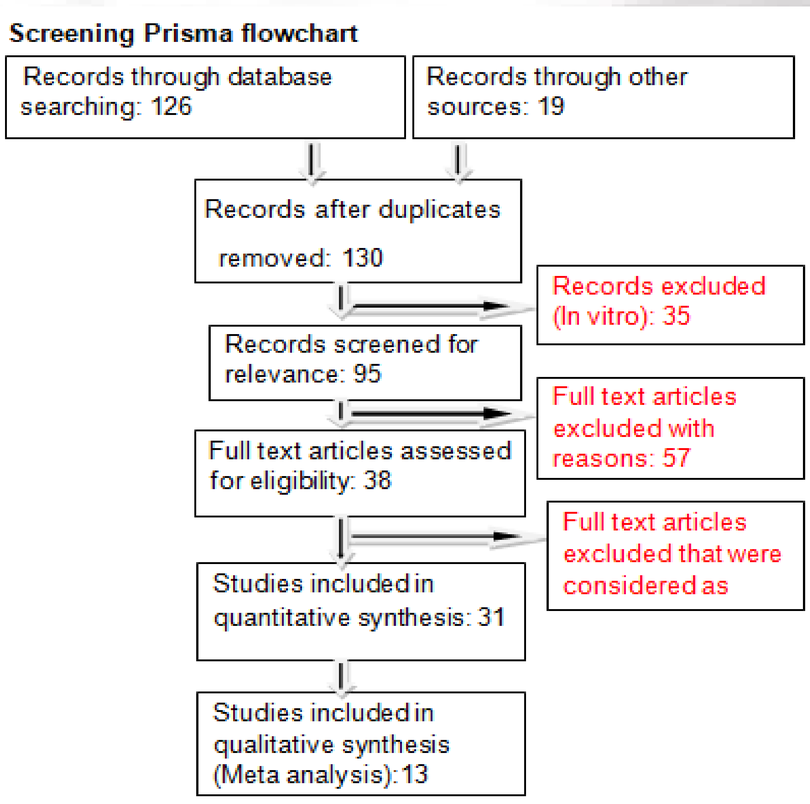
Application of statins in the craniofacial disease treatment has been widely investigated in both animal experiments and human clinical trials. Simvastatin is one of the most common osteopromotive drugs used by an overall 38.6 million Americans for treating hypercholesterolemia. Many systematic reviews have discussed its potential as an adjunct to non surgical and surgical periodontal therapy.

AIMS

In the present systematic review we aimed to assess the effects of simvastatin on bone healing in oral surgery by clearly demarcating its impact on both clinical, histological and radiographic variables in animal experiments as well as human trial. Our questions were:

- Does Simvastatin increase alveolar ridge width, Bone height/Clinical attachment levels and bone mineral density?
- Are the Outcomes different in animal experiments and human clinical trials?

METHODS



1.Literature search, study selection, data extraction, and results synthesis conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) statement.
2. Electronic and hand search of issues from 2000 up to the last issue available on 31st Jan 2017 was done.
3.The search was limited to oral surgery procedures in animal and human studies.
4. Risk of bias was assessed based on Cochrane collaborations' tool for assessment of bias.
6. For each study, Mean/SD values of BMD,CAL,BW was determined.
7.Statistical analysis was done using random effects model in NCSS software which determines the difference value and confidence interval. “Mean” represent the combined results.

RESULTS

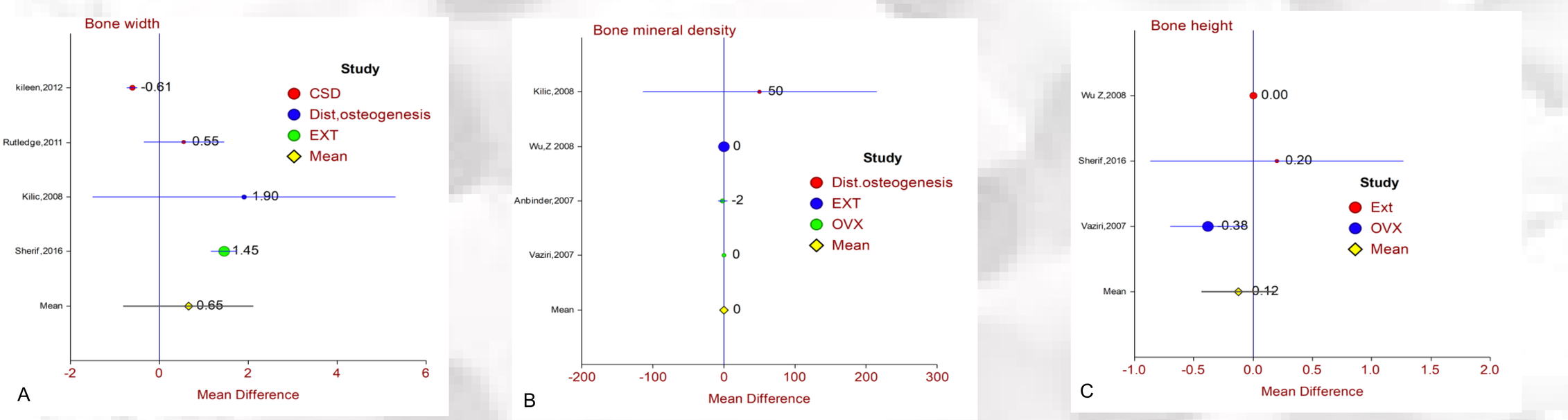


Fig 1: (Animal studies): Forest plots represent meta analysis of selected studies. Overall mean of 0.66 mm in Bone width (A), 0.07 mm in BMD (B) and 0.12 mm in bone height (C) was found. All studies favour statins treated group.
CSD: Critical size defects, Dist. Osteogenesis: Distraction osteogenesis, EXT: Extraction sockets, OVX: Ovariectomy

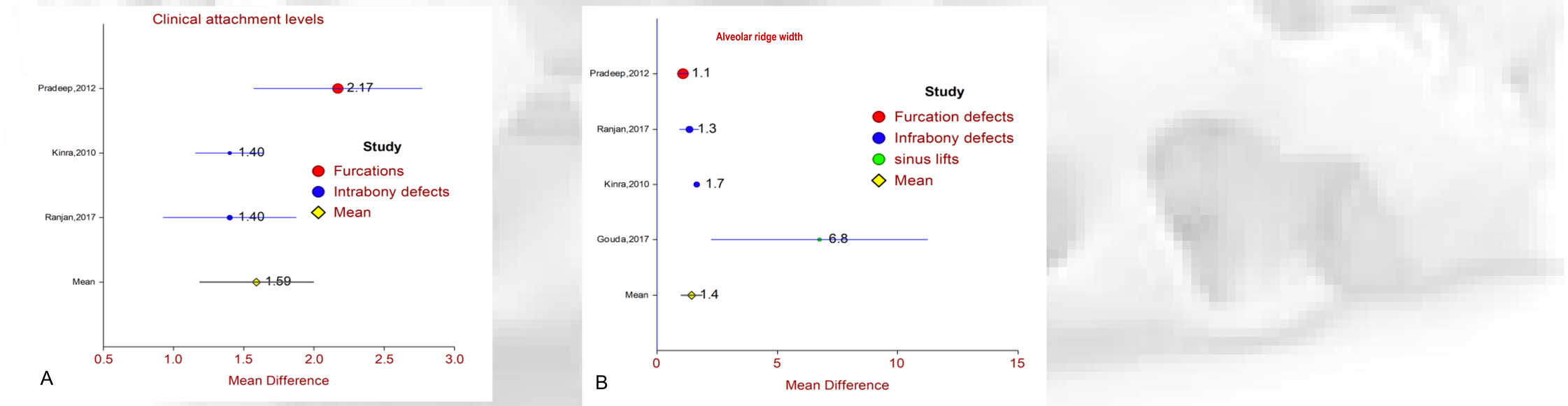


Fig 2 (Human studies): Forest plots represents meta analysis of selected studies. Overall mean of 1.59mm in Clinical attachment levels (A) and 1.4 mm in Defect bone fill (B) was noted. All studies favour statins treated group.

DISCUSSION

1. 23 animal studies and 8 human (5 randomized,3 prospective) studies were included. Each study included minimum of 8 sites assessed clinically, histologically and/or radiographically.
2. The outcomes were unrelated to the administration route.
3. Range of defect fill and increase in bone height/CAL was greater in human studies compared to animal trials.
4. The dose of SIM in studies ranged from 0.1- 2.2mg. However, results did not show huge variation in either groups of studies.

CONCLUSION

1.The results of this study show that Simvastatin (both local and systemic) has significant impact on Bone fill/ width , Bone height/CAL and Bone mineral density.
2.Simvastatin has the potential to be used as an osteopromotive bone graft in mono/ combined therapy for all types of intraoral defects.
3.Limitation: Small no. of studies for synthesis, Various study designs with different inclusion and exclusion criteria.