Chewing the Way to Better Dental Health: A Structured Literature Review on the Impacts of Hard Food on Malocclusion

Al-Hassan Abbas, Bilaal Kabir, Farouk Kachouh, Sayed Hafizi
Interdisciplinary School of Health Sciences, University of Ottawa

Introduction

Malocclusion is defined as the misalignment of teeth in the dental arches. (1) There are many consequences associated with malocclusions. Treatment for malocclusion is quite expensive in Canada and typically costs between $3000 and $8000.(2) There is speculation that soft food may be partially responsible, and they are characterized as having soft textures, being easily digestible, and well tolerated. (3) Soft foods are highly abundant in modern and industrialized diets. This structured literature review will answer the following question: Among humans, does a hard food diet reduce the incidence of malocclusions compared to a soft food diet?

Methodology: structured literature review

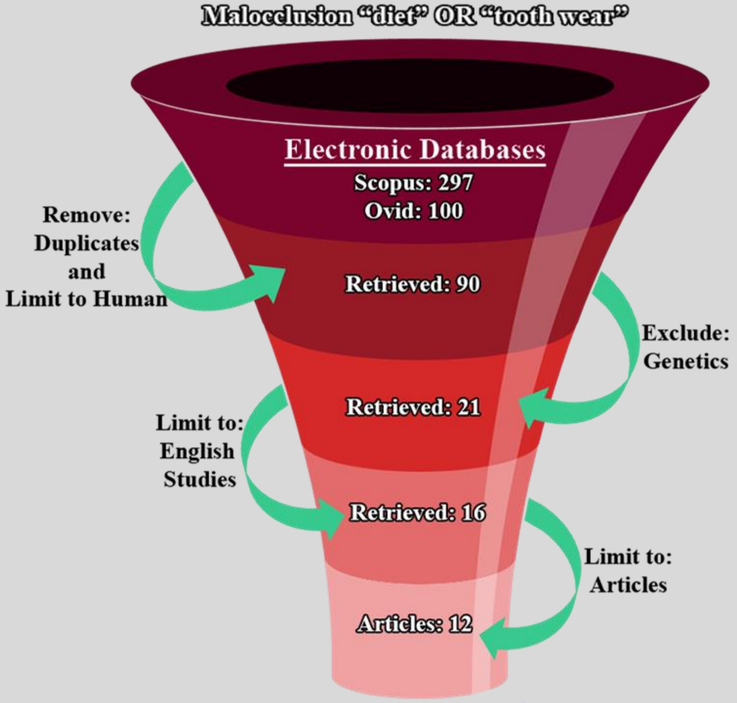

Figure 1. Flow-chart diagram of information through the different phases of the structured literature review

Results

Title	Findings
Changing Occlusal Variation in Pima Amerinds (4)	•Cross-sectional study done on 341 Pima Amerinds (a reservation Amerindian group from which one of us American Academy of Dermatology collected about ten thousand dental casts from 1948-1970). •Buccal segment relation (BSR) type and extent are both significantly more variable in younger Pima. •Data suggested that oral function changes as a result of dietary change are likely a factor in malocclusion. •48 older PIMA had BSR anomaly compared to 96 younger male PIMA.
Tooth Wear and the "Design" of the Human Dentition: A Perspective From Evolutionary Medicine (5)	•Study done on prehistoric populations found the cause of tooth wear to be friction of exogenous material over tooth surfaces as well as increased mastication when less refined and tougher foods were consumed. •Tooth wear has decreased as changes from hunting-gathering to agriculture were observed •Insufficient tooth wear leads to more malocclusions. •The findings of this study suggest that reduction in tooth wear has prevented contemporary people from attaining attritional occlusion
Dental Arch Dimensions and Tooth Wear in Two Samples of Children in the 1950's and 1990's (6)	•Study done on boys and girls ages 7 to 8 (50's group and 90's group). •Two researchers evaluated dental casts of subjects to assess for malocclusions. •1950's group data was obtained through medical records (retrospectively). •Method error determined by comparing Kappa tests with Yates correction. •Ratings from 50's and 90's groups compared (Mann-Whitney U-Test). •Greater occlusion in 50's group, greater malocclusion in 90's group.
Secular Trends in Malocclusion in Austrian Men (7)	•Study compared permanent dentition in the skulls of 94 19th century and 157 present-day dental casts of recruits stationed at military base. •The distribution of the scores indicate a higher prevalence of moderate to severe malocclusion in the present-day recruits. •The means and standard deviations were calculated as well as Mann Whitney U-test for intergroup differences. •Systematic error was also tested with a paired t-test and no systematic errors were found
Occurrence of malocclusion in attritive environment: a study of a skull sample from southwest Finland (8)	•Teeth from 207 15th and 16th century Finnish speaking adult individuals were visually examined and compared to present-day Finns •Examination included rotation of teeth, crowding and spacing of teeth, impaction of the canines, overjet and overbite, sagittal jaw relationship, cross bite, scissors bite and open bite. •77.2% and 21.8% of present-day Finns have angle class 1 and 2 occlusion, whereas in the skull samples 97.7% and 1.2% had an angle class 1 and 2 occlusion. Thus the extent of malocclusion is greater in present day Finns.

Discussion

Malocclusion is a condition that has plagued the human race for generations. The literature indicates that there has been an increase in the incidence and severity of malocclusions in the present day population. Many have attributed such a rise in malocclusions to the intake of soft foods which now contributes a majority of our diets.

Key Findings

All the studies reviewed in our results agreed that malocclusions are a result of decreased tooth wear due to softer diets. The papers also suggest that more research is still required to evaluate possible confounders.

Relevance to Field

The results are not surprising because the mechanism in which soft foods lead to malocclusions is a plausible mechanism. Certain eating habits and diets can lead to abnormal bone/jaw formation which could lead to crowding and malocclusions. (9)

Study Limitations

The studies retrieved had many limitations and biases including selection bias and misclassification bias. We had several limitations of our study. Due to exclusion criteria, we lost potential valuable studies. These exclusion criteria include: non-english studies, animal studies, and databases. Another limitation is not having access to results of randomized controlled trials since those were only done on animals and we excluded animal studies.

Future Implications

After this structured literature review, it can be concluded that we still require more research surrounding food consistency and its effect on malocclusion. An implication for the future is to include more western populations in the studies to have data on many locations in the world to ensure that the results are not biased based on genetic or geographic factors. First we need to make sure there is a causal relation before implementing new policies, which means we also need to assess for confounders. Also, public health can only benefit once we know that hard foods do not lead to other complications.

Conclusion

All of the relevant studies indicate that a hard food diet is negatively correlated with malocclusion. While soft foods do lead to a increase in the incidence of malocclusion, there are also other factors predisposing individuals to the development of malocclusion, such as one's genetics, that cannot be dismissed. In order to truly understand the strength of the relation between the two variables, more research needs to be conducted.

References

1. Malocclusion. (n.d.). Retrieved November 30, 2017, from https://www.merriam-webster.com/dictionary/malocclusion
2. Sandilands T. What is the Average Cost of Braces | Colgate® Oral Care [Internet]. [cited 2017 Nov 30]. Available from: http://www.colgate.com/en/us/oc/oral-health/cosmetic-dentistry/adult-orthodontics/article/what-is-the-average-cost-of-braces-in-2014-0714
3. Mosby I. Mosby's dictionary of medicine, nursing & health professions. [Internet]. Elsevier/Mosby; 2013 [cited 2017 Nov 30]. Available from: https://books.google.ca/books?id=P4GlCgAAQBAJ&pg=PA1660&lpg=PA1660&dq=they+are+characterized+as+having+soft+textures,+being+easily+digestible,+and+well+tolerated.&source=bl&ots=-FgiIMqAfV&sig=hHJFwENUTDUqyI0ypzRvk2KTFRc&hl=en&sa=X&ved=0ahUKEwjDtuOj_OfXAhWFw4MKHZWEBbAQ6AEILDAB#v=onepage&q=they are characterized as having soft textures%2C being easily digestible%2C and well tolerated.&f=false
4. Corruccini RS, Potter RHY, Dahlberg AA. Changing occlusal variation in Pima Amerinds. Am J Phys Anthropol [Internet]. Wiley Subscription Services, Inc., A Wiley Company; 1983 Nov 1 [cited 2017 Nov 25];62(3):317–24. Available from: http://doi.wiley.com/10.1002/ajpa.1330620311
5. Kaifu Y, Kasai K, Townsend GC, Richards LC. Tooth wear and the "design" of the human dentition: A perspective from evolutionary medicine. Am J Phys Anthropol [Internet]. 2003 [cited 2017 Nov 25];122(S37):47–61. Available from: http://www.ncbi.nlm.nih.gov/pubmed/14666533
6. Camporesi M, Marinelli A, Baroni G, Defraia E. Dental arch dimensions and tooth wear in two samples of children in the 1950s and 1990s. BD) [Internet]. 2009 Dec 19 [cited 2017 Nov 25];207(12):E24–E24. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19876044
7. Weiland FJ, Jonke E, Bantleon HP. Secular trends in malocclusion in Austrian men. Eur J Orthod [Internet]. 1997 Aug [cited 2017 Nov 25];19(4):355–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/9308255
8. VARRELA J. Occurrence of malocclusion in attritive environment: a study of a skull sample from southwest Finland. Eur J Oral Sci [Internet]. Blackwell Publishing Ltd; 1990 Jun 1 [cited 2017 Nov 30];98(3):242–7. Available from: http://doi.wiley.com/10.1111/j.1600-0722.1990.tb00968.x
9. Blackwelder, Aaron Christian. Association between dietary factors and malocclusion. Iowa Research Online [internet]. 2013 [Cited 2017 Dec 1]. Available from http://ir.uiowa.edu/etd/2440.