The Cause of Malocclusions

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March 24, 2017

My clinical experience & scope of practice

- Structural & Sensory-Motor based speech disorders
  - Craniofacial Disorders & Cleft Palate
  - Dysarthria – childhood & adult
  - Dyspraxia – childhood & adult
  - Poor coordination & low tone
  - Poor sensory feedback
  - Fluency/Stuttering
- Feeding, Oral stage swallowing & Oromyofunctional therapy
- Social-Cognitive therapy for Autism & Aspergers
- Developmental Speech & Language
- Family Communication Support

Malocclusions: Are You Made or Born That Way

- Early Oral Function & dysfunction assuming a normal pregnancy, birth, and craniofacial structure & function
- Fetal Growth Retardation: Underdeveloped structure in utero
- Craniofacial genetics & syndromes (another day)

Early Oral Function & Dysfunction

- Impact of Breastfeeding
- Impact of Soft Tissue Restriction
- Impact of Airway Obstruction
- Impact of Mouth Breathing
- Impact of Oral Habits
- Impact of Swallowing
- Impact of Chewing
- Impact of Oral Dysfunction

Impact of Breastfeeding

Impact of Breastfeeding on Occlusion & Facial Development

- Breastfeeding and bottle feeding use different facial muscles with different amounts of pressure
- Breastfeeding draws the nipple deep into the mouth and shapes the palate
- Breast feeding requires the jaw to work and develops better masseter muscles
- Breast milk leads to better dental health
- Bottle nipples do not spread or shape the palate
- Bottle feeding is more passive and doesn't require as much jaw compression

Impact of Breastfeeding on Occlusion

Pediatrics. 2015 Jul;136(1):e60-7. doi: 10.1542/peds.2014-3276. Epub 2015 Jun 15.

Exclusive Breastfeeding and Risk of Dental Malocclusion.

Peres KG[1], Cascaes AM[2], Peres MA[3], Demarco FF[4], Santos IS[4], Matijasevich A[5], Barros AJ[4].

Author information

Abstract

OBJECTIVES: The distinct effect of exclusive and predominant breastfeeding on primary dentition malocclusions is still unclear. We hypothesized that exclusive breastfeeding presents a higher protective effect against malocclusions than predominant breastfeeding and that the use of a pacifier modifies the association between breastfeeding and primary dentition malocclusions.

METHODS: An oral health study nested in a birth cohort study was conducted at age 5 years (N = 1303). The type of breastfeeding was recorded at birth and at 3, 12, and 24 months of age. Open bite (OB), crossbite, overjet (OJ), and moderate/severe malocclusion (MSM) were assessed. Poisson regression analyses were conducted by controlling for sociodemographic and anthropometric characteristics, sucking habits along the life course, dental caries, and dental treatment.

RESULTS: Predominant breastfeeding was associated with a lower prevalence of OB, OJ, and MSM, but pacifier use modified these associations. The same findings were noted between exclusive breastfeeding and OJ and between exclusive breastfeeding and crossbite. A lower prevalence of OB was found among children exposed to exclusive breastfeeding from 3 to 5.9 months (33%) and up to 6 months (44%) of age. Those who were exclusively breastfed from 3 to 5.9 months and up to 6 months of age exhibited 41% and 72% lower prevalence of MSM, respectively, than those who were never breastfed.

CONCLUSIONS: A common risk approach, promoting exclusive breastfeeding up to 6 months of age to prevent childhood diseases and disorders, should be an effective population strategy to prevent malocclusion.

Impact of Breastfeeding on Occlusion

Acta Paediatr. 2015 Dec;104(467):54-61. doi: 10.1111/apa.13103.

Effect of breastfeeding on malocclusions: a systematic review and meta-analysis.

Peres KG[1], Cascaes AM[2], Nascimento GG[1,2], Victora CG[3].

Author information

Abstract

AIM: The objective of this systematic review was to investigate whether breastfeeding decreases the risk of malocclusions.

METHODS: Six databases were systematically searched to the end of October 2014. Observational and interventional studies were included. Breastfeeding was evaluated in three categories: (i) ever versus never; (ii) exclusive versus absence of exclusive; and (iii) longer periods versus shorter periods. All types of malocclusion were considered as the outcome. Pooled adjusted odds ratio and its 95% confidence interval (95%CI) were obtained from meta-analyses. Heterogeneity was assessed with both the Q-test and the I-square. Funnel plots and Egger's test were employed to assess publication bias.

RESULTS: Forty-eight studies were included in the systematic review, and 41 were included in the overall meta-analysis (n = 27 023 participants). Subjects who were ever breastfed were less likely to develop malocclusions than those never breastfed (OR 0.34; 95% CI 0.24; 0.48), those who were exclusively breastfed presented lower risk to present malocclusion than those with absence of exclusive breastfeeding (OR 0.54; 95% CI 0.38; 0.77), and subjects longer breastfed were less likely to have malocclusions than those shorter breastfed (OR 0.40; 95% CI 0.29; 0.54).

CONCLUSION: Breastfeeding decreases the risk of malocclusions.

Impact of Breastfeeding on Occlusion

BMC Oral Health. 2015 Mar 10;15:30. doi: 10.1186/s12903-015-0010-1.

Association of breastfeeding and three-dimensional dental arch relationships in primary dentition.

Sum FH[1], Zhang L[2,3], Ling HT[4], Yeung CP[5], Li KY[6], Wong HM[7], Yang Y[8].

Author information

Abstract

BACKGROUND: The benefits of breastfeeding on oral health are still inconclusive, especially the association on occlusion. This study aimed to investigate the association of breastfeeding and the development of primary dentition.

METHODS: A cross-sectional study was conducted with 851 Asian children aged 2-5 years old in Hong Kong. Questionnaires were completed by the parents to collect information on breastfeeding and the non-nutritive sucking habits. The children's dental arch relationships were examined in the sagittal, vertical, and transverse dimensions by an experienced examiner.

RESULTS: Children who experienced pure breastfeeding for more than 6 months had a lower chance of developing a class II incisal relationship ($P < 0.05$) or an increased overjet ($P < 0.05$), and had wider intercanine ($P < 0.05$) and intermolar widths ($P < 0.05$). Vertically, no association on the extent of overbite or openbite was found ($P > 0.05$).

CONCLUSIONS: Pure breastfeeding for more than 6 months is positively associated with primary dental arch development in the anterior sagittal dental segment and on the horizontal arch width in primary dentition. Therefore, pure breastfeeding for more than 6 months is recommended, as it is associated with lower chance of the development of abnormal dental relationships. The results will be valuable for education and promotion of maternal breastfeeding.

Impact of Breastfeeding on Occlusion

Funct Orthod. 2001 Fall;18(3):24-7.

Breastfeeding is early functional jaw orthopedics (an introduction).

Page DC[1].

Author information

Abstract

Breastfeeding places beneficial orthopedic forces on the jaws, similar to the forces of Functional Jaw Orthopedics--the newest form of orthodontics. To date most breastfeeding benefits have been attributed to the content of mother's milk. The true orthopedic benefits of breastfeeding, suckling, deserve more definitive attention and research. Breastfeeding is early preventive Functional Jaw Orthopedics because breastfeeding forces impact the jaws during a very rapid period of infant jaw growth. Breast suckling aids proper development of the jaws which form the gateway to the human airway. Bottle, pacifier and digit sucking deform jaws and airways. Forward forces of suckling clearly oppose the backward forces of sucking. Dentists who understand the positive impact of forward orthopedic forces on the jaws should support and advocate exclusive breastfeeding for about 6 months.

Impact of Breastfeeding on Posterior Crossbite

Am J Orthod Dentofacial Orthop. 2010 Jan;137(1):54-8. doi: 10.1016/j.ajodo.2007.12.033.

Relationship between breastfeeding duration and prevalence of posterior crossbite in the deciduous dentition.

Kobayashi HM[1], Scavone H Jr, Ferreira RI, Garib DG.

Author information

Abstract

INTRODUCTION: This cross-sectional retrospective epidemiologic study assessed the relationship between exclusive breastfeeding duration and the prevalence of posterior crossbite in the deciduous dentition.

METHODS: Clinical examinations were performed in 1377 Brazilian children (690 boys, 687 girls), 3 to 6 years old, from 11 public schools in São Paulo, Brazil. Based on questionnaires answered by the parents, the children were classified into 4 groups according to the duration of exclusive breastfeeding: G1, never (119 subjects); G2, less than 6 months (720 subjects); G3, 6 to 12 months (312 subjects); and G4, more than 12 months (226 subjects). The statistical analyses included the chi-square test ($P < 0.05$) and the odds ratio.

RESULTS: The posterior crossbite was observed in 31.1%, 22.4%, 8.3%, and 2.2% of the children, in groups G1, G2, G3, and G4, respectively. The results showed a statistically significant relationship between exclusive breastfeeding duration and the prevalence of posterior crossbite.

CONCLUSIONS: Children who were breastfed for more than 12 months had a 20-fold lower risk for the development of posterior crossbite compared with children who were never breastfed and a 5-fold lower risk compared with those breastfed between 6 and 12 months.

Impact of Soft Tissue Restriction

Impact of Soft Tissue Restriction

- Upper lip ties
  - Can make breastfeeding difficult, lips can't flange
  - Can insert between central incisors creating a diastema & rotation
  - Can cause cavities on the upper central incisors
- Tongue ties
  - Restrict normal lingual movement
  - Contribute to cavities
  - Prohibit the tongue from elevating and the ***blade*** from suctioning to the palate at rest & during the swallow
- Buccal ties
  - Pull on gums at canines
  - Contribute to pocketing of food

Impact of Soft Tissue Restriction

Prog Orthod. 2013 Nov 7;14:44. doi: 10.1186/2196-1042-14-44.

Skeletal and dental characteristics in subjects with ankyloglossia.

Srinivasan B[1], Chitharanjan AB.

Author information

Abstract

BACKGROUND: The role of ankyloglossia in etiology of malocclusion is not much discussed over the years. The aim of the present study was to assess the skeletal and dental characteristics in subjects with ankyloglossia.

METHODS: Fifty-seven subjects diagnosed with ankyloglossia (group 1) were compared with 60 subjects (group 2) without ankyloglossia, who had class I skeletal base. Ankyloglossia was diagnosed and graded (mild, moderate, severe and very severe) using Kortlow's method. SNA, SNB, ANB, Go-Gn-SN angle, FMA, maxillary and mandibular intercanine widths and intermolar widths, tooth size-arch length discrepancy in maxillary and mandibular arches and overbite were measured. Independent t test was used to compare the mean parameters between the two groups. Analysis of variance and Tukey honestly significant difference were used to compare mean parameters among various grades of ankyloglossia.

RESULTS: Majority of group 1 subjects belonged to class I skeletal base followed by class II and class III skeletal bases. Moderate ankyloglossia was most common in group 1. The mean maxillary and mandibular intercanine widths and maxillary intermolar width were statistically significant in independent t test ($P<0.01$) and reduced in group 1. In ANOVA followed by Tukey HS, the Go-Gn-SN angle and overbite were statistically significant among different grades of ankyloglossia ($P<0.05$).

CONCLUSIONS: Subjects with ankyloglossia had reduced maxillary and mandibular intercanine widths and reduced maxillary intermolar width. The mandibular plane angle and overbite were altered with severity of ankyloglossia.

Impact of Soft Tissue Restriction

ERJ Open Res. 2016 Jul 29;2(3). pii: 00043-2016. eCollection 2016.

A frequent phenotype for paediatric sleep apnoea: short lingual frenulum.

Guilleminault C[1], Huseni S[1], Lo L[1].

Author information

Abstract

A short lingual frenulum has been associated with difficulties in sucking, swallowing and speech. The oral dysfunction induced by a short lingual frenulum can lead to oral-facial dysmorphosis, which decreases the size of upper airway support. Such progressive change increases the risk of upper airway collapsibility during sleep. Clinical investigation of the oral cavity was conducted as a part of a clinical evaluation of children suspected of having sleep disordered breathing (SDB) based on complaints, symptoms and signs. Systematic polysomnographic evaluation followed the clinical examination. A retrospective analysis of 150 successively seen children suspected of having SDB was performed, in addition to a comparison of the findings between children with and without short lingual frenula. Among the children, two groups of obstructive sleep apnoea syndrome (OSAS) were found: 1) absence of adenotonsils enlargement and short frenula (n=63); and 2) normal frenula and enlarged adenotonsils (n=87). Children in the first group had significantly more abnormal oral anatomy findings, and a positive family of short frenulum and SDB was documented in at least one direct family member in 60 cases. A short lingual frenulum left untreated at birth is associated with OSAS at later age, and a systematic screening for the syndrome should be conducted when this anatomical abnormality is recognised.

Impact of Soft Tissue Restriction

Arch Plast Surg. 2012 Jul;39(4):329-32. doi: 10.5999/aps.2012.39.4.329. Epub 2012 Jul 13.

A study on the genetic inheritance of ankyloglossia based on pedigree analysis.

Han SH[1], Kim MC, Choi YS, Lim JS, Han KT.

Author information

Abstract

BACKGROUND: Ankyloglossia or tongue-tie is a congenital anomaly characterized by an abnormally short lingual frenum. Its prevalence in the newborn population is approximately 4%. Its mode of inheritance has been studied in some articles, but no conclusion has been established. Also, no relevant report has been published in Korea. This study was conducted to elucidate the genetic inheritance of ankyloglossia via pedigree analysis.

METHODS: In this study, 149 patients with no other congenital anomaly who underwent frenuloplasty between March 2001 and March 2010 were studied. Pedigrees were made via pre- or post-operative history taking, and patients with uncertain histories were excluded. In the patient group that showed a hereditary nature, the male-to-female ratio, inheritance rate, and pattern of inheritance were investigated.

RESULTS: One hundred (67.11%) of the patients were male and 49 (32.89%) were female (male-female ratio=2.04:1). Ninety-one (61.07%) patients reported no other relative with ankyloglossia, and 58 (38.93%) patients had a relative with this disease. The inheritance rate was 20.69% in the 58 cases with a hereditary nature. In the group with no family history of ankyloglossia, the male-female ratio was 3.79:1, which significantly differed from that of the group with a family history of ankyloglossia. X-chromosome mediated inheritance and variation in the gene expression was revealed in the pedigree drawn for the groups with hereditary ankyloglossia.

CONCLUSIONS: Ankyloglossia has a significant hereditary nature. Our data suggest X-linked inheritance. This study with 149 patients, the first in Korea, showed X-linked inheritance in patients with a sole anomaly.

Impact of Airway Obstruction

Airway Obstruction

- Airway obstruction/pressure in the head
  - Sinus infections, enlarged nasal turbinates, deviated septum
  - Chronis middle ear infections
  - Enlarged tonsils & adenoids
  - Chronic upper airway infections
  - Allergies, asthma, pollutants
  - Tongue falling airway at night

Impact of Enlarged Soft Tissue on Mouth breathing

Int J Pediatr Otorhinolaryngol. 2009 Dec;73(12):1803-9. doi: 10.1016/j.ijporl.2009.10.001. Epub 2009 Oct 30.

Patency of nasopharynx and a cephalometric image in the children with orthodontic problems.

Wysocki J[1], Krasny M, Skarzyński PH.

Author information

Abstract

OBJECTIVES: To study a possible impact of adenoidectomy on malocclusion on the base of cephalometry.

METHODS: Retrospective analysis of 148 patients qualified into the orthodontic treatment (77 girls and 71 boys) at the age of 9-11 years (an average age: 10 years and 3 months). Material was divided into three groups, equalized regarding sex and age. The first one consisted of the patients after adenoidectomy, at the moment of orthodontic assessment without any organic pathology within a nasal cavity or nasopharynx. To the second group were included children who for different reasons were not a subject of adenoidectomy despite clinical diagnosis of adenoid hypertrophy. In the third group were patients whose only problem was malocclusion. X-ray pictures taken on a cephalostate were scanned and given to cephalometric assessment. In statistics Bartlett's test, Tukey's test and Pearson's correlation coefficients were used.

RESULTS: The significant differences with respect to many skull parameters appeared among the groups. The inappropriate respiratory habits find their reflection mainly within anterior and lower anterior facial height, angle of mandibular plane, nasopharyngeal flow and dental parameters. An evident beneficial influence of adenoidectomy is observed within a period of 36-41 months after an operation. Nasopharyngeal flow is the most sensitive parameter indicating the respiratory conditions, and is strongly connected with the key cephalometric parameters.

CONCLUSIONS: In cases of malocclusion of skeletal character, coexisting with adenoid hypertrophy, adenoidectomy should be carried out as early as possible.

Impact of Enlarged Soft Tissue on the Mandible

Eur J Orthod. 1990 Aug;12(3):233-43.

Cranio-facial morphology in children with and without enlarged tonsils.

Behlfelt K[1], Linder-Aronson S, McWilliam J, Neander P, Laage-Hellman J.

Author information

Abstract

The purpose of the present study was to compare the cranio-facial morphology in children with and without enlarged tonsils. The material consisted of 73 children with enlarged tonsils, and a control group of children with normal tonsils, matched for age, sex, and number. The mean age for the groups was 10.1 and 10.0 years, respectively. Evaluation of anamnestic history, clinical examination, and lateral skull radiographs were undertaken. Compared to the control children, the children with enlarged tonsils had more retrognathic and posteriorly inclined mandibles, larger anterior total and lower facial heights, and larger mandibular plane angles. Regression analyses revealed that functional, postural, and morphological factors, such as open mouth posture, low posture of the tongue, large depth of oropharynx at the site of the tonsils as well as mouth-breathing at night, were associated with skeletal features expressing an increased open vertical configuration and mandibular retrognathism.

Impact of Middle Ear Infections on Hard Palate Development

Pediatr Dent. 2008 Jan-Feb;30(1):9-14.

The relationship between acute otitis media and the anatomic form of the hard palate.

Kim SJ[1], Donovan DM, Blanchard SB, Kowolik JE, Eckert GJ.

Author information

Abstract

PURPOSE: Acute otitis media (AOM) is a serious health concern for millions of children. This study was conducted to determine the relationship between AOM and the shape of the hard palate.

METHODS: Intraoral examinations were performed on 175 pediatric dental patients ages 4-6. The palatal height was classified as high, medium or low. The accompanying parent completed a survey regarding their child's age, gender, overall health, history of AOM and presence of known risk factors for AOM.

RESULTS: Eighty five percent of the total sample had a positive history for AOM, with 76% experiencing AOM prior to age 1. High palatal vault was a significant finding in children that experienced AOM before age 1 (odds ratio 3.49). Logistic regression analysis revealed that children with high palatal vaults underwent tube placement more often than the rest of the study population (odds ratio 2.49).

CONCLUSIONS: Our study revealed a relationship between the presence of high palatal vaults and early, recurrent acute otitis media in young children. Recognition of high palatal vault in children suffering from AOM, in the presence of other known risk factors, may guide health care professionals to identify an otitis media prone patient and aid in prevention of recurrence.

Impact of Mouth Breathing

Impact of Mouth Breathing

- Nasal breathing activates the atlanto-occipital joint, the atlanto-axial joint, the sphenobasilar joint and the sutures of the facial and head bones. Mouth breathing encourages a lower jaw posture and change in directional growth.
- The sinuses begin to develop about age 4. Nasal breathing activates their growth with the movement of air. Mouth breathing contributes to rhinitis and polyps.
- Mouth breathing tends to be shallow and inefficient. Nasal breathing is more diaphramatic.
- Mouth breathing at night is a precursor to snoring, upper airway resistance syndrome, and obstructive sleep apnea.

Impact of Mouth Breathing on Posterior Crossbite

Int J Pediatr Otorhinolaryngol. 2009 May;73(5):767-73. doi: 10.1016/j.ijporl.2009.02.006. Epub 2009 Mar 12.

Prevalence of malocclusion among mouth breathing children: do expectations meet reality?

Souki BQ[1], Pimenta GB, Souki MQ, Franco LP, Becker HM, Pinto JA.

Author information

Abstract

OBJECTIVE: The aim of this study was to report epidemiological data on the prevalence of malocclusion among a group of children, consecutively admitted at a referral mouth breathing otorhinolaryngological (ENT) center. We assessed the association between the severity of the obstruction by adenoids/tonsils hyperplasia or the presence of allergic rhinitis and the prevalence of class II malocclusion, anterior open bite and posterior crossbite.

METHODS: Cross-sectional, descriptive study, carried out at an Outpatient Clinic for Mouth-Breathers. Dental inter-arch relationship and nasal obstructive variables were diagnosed and the appropriate cross-tabulations were done.

RESULTS: Four hundred and one patients were included. Mean age was 6 years and 6 months (S.D.: 2 years and 7 months), ranging from 2 to 12 years. All subjects were evaluated by otorhinolaryngologists to confirm mouth breathing. Adenoid/tonsil obstruction was detected in 71.8% of this sample, regardless of the presence of rhinitis. Allergic rhinitis alone was found in 18.7% of the children. Non-obstructive mouth breathing was diagnosed in 9.5% of this sample. Posterior crossbite was detected in almost 30% of the children during primary and mixed dentitions and 48% in permanent dentition. During mixed and permanent dentitions, anterior open bite and class II malocclusion were highly prevalent. More than 50% of the mouth breathing children carried a normal inter-arch relationship in the sagital, transversal and vertical planes. Univariate analysis showed no significant association between the type of the obstruction (adenoids/tonsils obstructive hyperplasia or the presence of allergic rhinitis) and malocclusions (class II, anterior open bite and posterior crossbite).

CONCLUSIONS: The prevalence of posterior crossbite is higher in mouth breathing children than in the general population. During mixed and permanent dentitions, anterior open bite and class II malocclusion were more likely to be present in mouth breathers. Although more children showed these malocclusions, most mouth breathing children evaluated in this study did not match the expected "mouth breathing dental stereotype". In this population of mouth breathing children, the obstructive size of adenoids or tonsils and the presence of rhinitis were not risk factors to the development of class II malocclusion, anterior open bite or posterior crossbite.

Impact of Mouth Breathing on Hard Palate Development

Int J Pediatr Otorhinolaryngol. 2014 Jan;78(1):91-5. doi: 10.1016/j.ijporl.2013.09.028. Epub 2013 Nov 14.

Evaluation of maxillary arch dimensions and palatal morphology in mouth-breathing children by using digital dental casts.

Lione R[1], Buongiorno M[1], Franchi L[2], Cozza P[1].

Author information

Abstract

OBJECTIVE: The aim of the present study was to analyze the variations of maxillary arch size and of palatal morphology in subjects with prolonged mouth-breathing due to allergic rhinitis when compared with a control group with normal breathing pattern by using a three-dimensional analysis on digital casts.

METHODS: 26 Caucasian children (19 females and 7 males) with a mean age of 8.5 years (SD 1.6 years) were selected according to the following criteria: mouth-breathing pattern due to allergic rhinitis, early mixed dentition, skeletal Class I relationship and prepubertal stage of cervical vertebral maturation. The study group was compared with a control group of 17 nasal breathing subjects (9 females; 8 males, mean age 8.5 years SD 1.7 years). For each subject an initial dental cast was taken and the upper arch was scanned by using a tridimensional scanner. On each digital model linear measurements were performed to analyze maxillary arch dimensions and palatal morphology. Significant between-group differences were tested with the Student t-test ($p<0.05$).

RESULTS: the transverse dimension of the upper arch was significantly smaller in subjects of the study group thus confirming the influence of oral breathing on skeletal development with a significant constriction of the whole palate. The study group showed a higher and sharper palatal vault at the level of second deciduous molars and of first permanent molars.

CONCLUSIONS: Children with mouth-breathing pattern showed a significant constriction of the maxillary arch and an increased palatal height when compared with subjects with normal breathing pattern.

Impact of Mouth Breathing on Hard Palate Development

J Dent (Shiraz). 2016 Mar;17(1):26-31.

The Effects of Septal Deviation, Concha Bullosa, and Their Combination on the Depth of Posterior Palatal Arch in Cone-Beam Computed Tomography.

Dalili Kajan Z[1], Khademi J[2], Nemati S[1], Niksolat E[3].

Author information

Abstract

STATEMENT OF THE PROBLEM: Nasal breathing is the major pattern of air intake. Changes in breathing pattern alter the posture of the head, jaws and tongue that could change pressure on the jaw and teeth and affect their growth.

PURPOSE: This study aimed to investigate the relationship between septal deviations (SD) per se and in combination with concha bullosa (CB) on maxilla; particularly the depth of palatal arch.

MATERIALS AND METHOD: This descriptive-comparative study was performed on 116 cone-beam computed tomography (CBCT) images. The images were categorized into four groups (n=29) as follows; group 1: SD+CB, group 2: only SD, group 3: neither SD nor CB, and group 4: only CB. In coronal images, deviated septal length (DSL), angle of deviated septal curve (DSCA), palatal arch depth (PAD), palatal interalveolar length (PIL), PAD/PIL ratio, septal vertical length (SVL), maxillopalatal arch angle (MPAA), interjugum distance (IJD), and jugum angle (JA) were measured. The data were statistically analyzed with Tukey's HSD and Chi-square tests.

RESULTS: There were statistically significant differences in DSL and DSCA (p= 0.0001) among the four groups. The study groups were not statistically different regarding the IJD, JA, MPAA, PAD/PIL, PAD, PIL, and SVL. However, in group 1, PAD/PIL were significantly correlated with DSCA and DSL (p= 0.037, and p= 0.043, respectively).

CONCLUSION: Based on the findings of this study, simultaneous occurrence of SD and CB influenced the depth and curve of the palatal bone. The PAD/PIL ratio was negatively correlated with the DSCA angle. This correlation was associated with a decrease in PAD, indicating that concurrent occurrence of SD and CB remarkably affected the palatal base of maxilla.

Impact of Mouth Breathing on the Mandible

Laryngoscope. 2010 Oct;120(10):2089-93. doi: 10.1002/lary.20991.

The effect of mouth breathing versus nasal breathing on dentofacial and craniofacial development in orthodontic patients.

Harari D[1], Redlich M, Miri S, Hamud T, Gross M.

Author information

Abstract

OBJECTIVES/HYPOTHESIS: To determine the effect of mouth breathing during childhood on craniofacial and dentofacial development compared to nasal breathing in malocclusion patients treated in the orthodontic clinic.

STUDY DESIGN: Retrospective study in a tertiary medical center.

METHODS: Clinical variables and cephalometric parameters of 116 pediatric patients who had undergone orthodontic treatment were reviewed. The study group included 55 pediatric patients who suffered from symptoms and signs of nasal obstruction, and the control group included 61 patients who were normal nasal breathers.

RESULTS: Mouth breathers demonstrated considerable backward and downward rotation of the mandible, increased overjet, increase in the mandible plane angle, a higher palatal plane, and narrowing of both upper and lower arches at the level of canines and first molars compared to the nasal breathers group. The prevalence of a posterior cross bite was significantly more frequent in the mouth breathers group (49%) than nose breathers (26%), (P = .006). Abnormal lip-to-tongue anterior oral seal was significantly more frequent in the mouth breathers group (56%) than in the nose breathers group (30%) (P = .05).

CONCLUSIONS: Naso-respiratory obstruction with mouth breathing during critical growth periods in children has a higher tendency for clockwise rotation of the growing mandible, with a disproportionate increase in anterior lower vertical face height and decreased posterior facial height.

Impact of Mouth breathing on the Mandible

Med Sci Monit. 2015 Jun 18;21:1765-73. doi: 10.12659/MSM.893395.

Relationships between Malocclusion, Body Posture, and Nasopharyngeal Pathology in Pre-Orthodontic Children.

Šidlauskienė M[1], Smailienė D[1], Lopatienė K[2], Čekanauskas E[3], Pribuišienė R[4], Šidlauskas M[1].

Author information

Abstract

BACKGROUND: Malocclusion, body posture, and breathing pattern may be correlated, but this issue is still controversial. The aim of the study was to examine the relationship between the type of malocclusion, body posture, and nasopharyngeal obstruction in children aged 7-14 years.

MATERIAL AND METHODS: The study group comprised 94 patients aged 7-14 years (mean±SD: 11.9±2.1 years); 44 (46.8%) males and 50 (53.2%) females. All patients passed an examination performed by the same orthodontist (study model and cephalometric radiograph analysis), orthopedic surgeon (body posture examined from the front, side, and back), and otorhinolaryngologist (anterior and posterior rhinoscopy and pharyngoscopy) in a blind manner.

RESULTS: Postural disorders were observed in 72 (76.6%) patients. Hypertrophy of the adenoids was diagnosed in 54 (57.4%) patients, hypertrophy of the tonsils in 85 (90.3%), nasal septum deviation in 51 (54.3%), and allergic rhinitis in 19 (20.2%) patients. There was a statistically significant correlation between presence of kyphotic posture and a reduction in the SNB angle, representing sagittal position of the mandible. Also, there was a statistically significant association between kyphotic posture and nasopharyngeal obstruction (54.1% of patients with nasopharyngeal obstruction were kyphotic, compared with 25% of patients with no nasopharyngeal obstruction; p=0.02). Kyphotic posture and reduced SNB angle were more common among males.

CONCLUSIONS: We concluded that: 1) there was a significant association between the sagittal position of the mandible (SNB angle) and a kyphotic posture; 2) kyphotic posture was significantly more common among patients with nasopharyngeal obstruction.

Impact of Mouth Breathing on the Mandible & Hyoid

Laryngoscope. 2007 Jun;117(6):1102-6.

How does open-mouth breathing influence upper airway anatomy?

Lee SH[1], Choi JH, Shin C, Lee HM, Kwon SY, Lee SH.

Author information

Abstract

OBJECTIVES/HYPOTHESIS: Open-mouth breathing during sleep may increase the severity of obstructive sleep apnea (OSA) and complicate nasal continuous positive airway pressure (CPAP) therapy in patients with OSA. The aim of this study was to assess the effect of open-mouth breathing on upper airway anatomy using lateral cephalometry and fiberoptic nasopharyngoscopy.

STUDY DESIGN: This was a cross-sectional study.

METHODS: Lateral cephalometry and fiberoptic nasopharyngoscopy were carried out on 28 subjects with a mean age of 36.7 years. We compared the effect of the mouth being open or closed on the results in lateral cephalometry (pharyngeal length, distance between the mandible and hyoid bone [MP-H], angles from the sella-nasion to mandibular points A and B [SNA, SNB, respectively], retropalatal, retroglossal, and hypopharyngeal distance) and fiberoptic nasopharyngoscopy (retropalatal and retroglossal cross-sectional area).

RESULTS: On lateral cephalometric measurements, retropalatal distance (P = .000), retroglossal distance (P = .000), and MP-H (P = .002) were lower with mouth open, and pharyngeal length (P = .000) was greater. However, there were no significant differences in SNA and hypopharyngeal distance. On fiberoptic nasopharyngoscopy, retropalatal (P = .005) and retroglossal (P = .000) cross-sectional areas were significantly reduced with the mouth open.

CONCLUSIONS: Open-mouth breathing is associated with reduction of the retropalatal and retroglossal areas, lengthening of the pharynx and shortening of the MP-H in the upper airway. We suggest that knowledge of these anatomic changes improves our understanding of the increase of OSA severity and the low adherence to nasal CPAP therapy in mouth breathers.

Impact of OSA on Hard Palate Development

Int J Pediatr Otorhinolaryngol. 2009 Sep;73(9):1234-41. doi: 10.1016/j.ijporl.2009.05.012. Epub 2009 Jun 11.

The development of sleep disordered breathing from 4 to 12 years and dental arch morphology.

Hultcrantz E[1], Löfstrand Tideström B.

Author information

Abstract

OBJECTIVE: To track the development of sleep disordered breathing (SDB) as well as dento-facial morphology in cohort of children by having them complete a questionnaire at ages 4, 6 and 12. Clinical examination, sleep studies (at ages 4 and 12) and orthodontic evaluation were carried out on all who were reported to snore regularly and children who did not snore at all.

RESULTS: Out of the original group of 615 children, 64% (393) answered the inquiry on all three occasions. Of those, 27 snored regularly and 231 did not snore at all at the age of 12. There were differences between those groups on all answers, especially prevalence of oral breathing: 78% versus 5% ($p<0.001$). The prevalence of OSA decreased from 3.1% at the age of 4 to 0.8% at age 12 and the severity decreased from a mean AHI 14.8 at 4 to a mean AHI of 1.95 at age 12. The minimum prevalence of snoring regularly was estimated to 4.2% at 12 years compared to 5.3% at 4, calculated for the original cohort of 644 children. The odds for a child who snored regularly at 4 or 6 years to be snoring regularly also at age 12 was 3.7 times greater than for a not snoring child in spite of surgery (OR 3.7, 95% CI 2.4-5.7). 63 children had undergone surgery due to snoring by age 12. 14 of them never snored and 17 snored regularly at the age 12. The dental arch was narrower in the children snoring regularly at 4, 6 and 12 years compared to not snoring children. Cross-bites were more common among snoring children than among non-snoring children, at 4 and 6 as well as at 12.

CONCLUSION: The prevalence of regular snoring is about the same from 4 to 12 years independent of surgery, but the prevalence of OSA decreased considerably. The children snoring regularly generally have a narrower maxilla compared to children not snoring. Surgery in young children is necessary but "cures" the snoring only temporary.

Impact of OSA on Hard Palate Development

Eur J Orthod. 2009 Apr;31(2):160-7. doi: 10.1093/ejo/cjn061. Epub 2008 Nov 20.

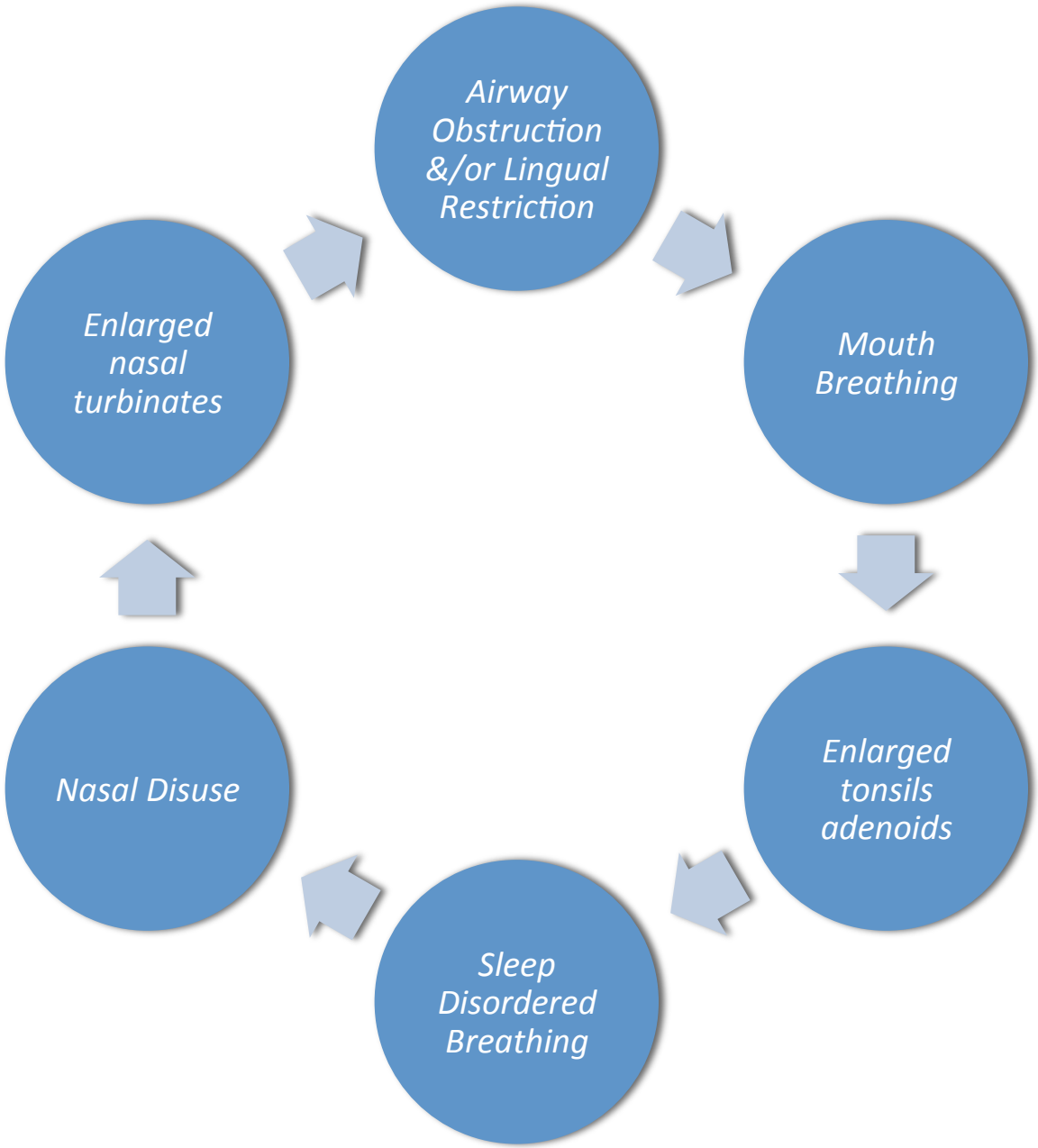
Dental arch morphology in children with sleep-disordered breathing.

Pirilä-Parkkinen K[1], Pirttiniemi P, Nieminen P, Tolonen U, Pelttari U, Löppönen H.

Author information

Abstract

The aim of the present study was to examine the effects of nocturnal breathing disorders such as obstructive sleep apnoea (OSA) and snoring on developing dental arches. The study group comprised 41 children (22 males, 19 females, mean age 7.2 years, standard deviation 1.93) with diagnosed OSA. Age- and gender-matched groups of 41 snoring and 41 non-obstructed control children were selected. Orthodontic examination was carried out and dental impressions were taken. Malocclusions were diagnosed clinically and 13 linear variables were measured from the dental casts. The differences between the dental arch measurements of the OSA, snoring, and control groups were studied using analysis of variance followed by Duncan's multiple comparison method. Children with diagnosed OSA had a significantly increased overjet, a reduced overbite, and narrower upper and shorter lower dental arches when compared with the controls. Snoring children had similar but not as significant differences as OSA children when compared with the controls. There were more children with an anterior open bite (AOB) in the OSA group (P=0.016) and with a Class II or asymmetric molar relationship in the groups of OSA (P=0.013) and snoring (P=0.004) subjects compared with the non-obstructed controls. There were more subjects with mandibular crowding (P=0.002) and with an AOB (P=0.019) with an increasing obstructive apnoea-hypopnoea index (AHI). These findings are in agreement with previous studies of the effects of increased upper airway resistance on dental arch morphology and can be explained by long-term changes in the position of the head, mandible, and tongue in order to maintain airway adequacy during sleep.



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Conditions that Impact Mouth Breathing

- Airway obstruction
- Chronic diseases
- Chronic middle ear infections
- Anxiety/Stress/Worry - even mild or situational
- Poor/ Inefficient/Over breathing
- Structural dysmorphology or disorder

Impact of Oral Habits

Impact of Oral Habits

- Non-nutritive sucking & chewing
- It's not enough to stop it if you don't know WHY it's there
- Keeping the tongue low for any reason changes the swallow, promoting a more forward rather than upward pressure and contributing to the continuation of the malocclusion.

Impact of Oral Habits on Open Bite & Overjet

Int J Paediatr Dent. 2017 Mar;27(2):108-119. doi: 10.1111/ipd.12227. Epub 2016 Feb 9.

Effects of conventional and orthodontic pacifiers on the dental occlusion of children aged 24-36 months old.

Lima AA[1], Alves CM[2,3], Ribeiro CC[3,4], Pereira AL[5,6], da Silva AA[3,7], Silva LF[8,9,10], Thomaz EB[3,11].

Author information

Abstract

AIM: To investigate the effects of conventional and orthodontic pacifiers on the prevalence of malocclusion (MO) considering frequency, duration, and intensity of the sucking habit.

DESIGN: Data were collected at three time-points: birth, T1; (12-24 months old), T2; (24-36 months old), T3 and were divided into three groups: control (GC; 110), without non-nutritive sucking habits; orthodontic pacifiers (GOrth; 55); conventional pacifiers (GConv; 55). A questionnaire was applied. Clinical examination was performed at T3. The groups were compared as to the prevalence and severity of anterior open bite (AOB), accentuated overjet, anterior crossbite, posterior crossbite (PCB).

RESULTS: The use of pacifiers was associated with occurrence of MO compared to GC ($P < 0.05$). Frequency, intensity, and duration of pacifier use was also associated with of MO. There was significant difference in the prevalence of MO between GConv and GOrth for AOB ($P = 0.027$). Only GConv exhibited higher odds of PCB compared to GC ($P = 0.040$). The prevalence of MO was significantly higher in pacifiers users ($P < 0.001$).

CONCLUSION: The prevalence of MO was higher among children who used pacifiers. According to a general trend, the use of conventional pacifiers was associated to severe anterior open bite and overjet.

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Impact of Oral Habits on Open Bite & Posterior Crossbite

Med Sci Monit. 2014 Oct 24;20:2036-42. doi: 10.12659/MSM.890885.

The prevalence of malocclusion and oral habits among 5-7-year-old children.

Kasparaviciene K[1], Sidlauskas A[2], Zasciurinskiene E[1], Vasiliauskas A[1], Juodzbalys G[3], Sidlauskas M[1], Marmaite U[1].

Author information

Abstract

BACKGROUND: Digit sucking, tongue thrust swallowing, and mouth breathing are potential risk factors for development of malocclusion. The purpose of this study was to verify the prevalence of different occlusal traits among 5-7-year-old children and assess their relationship with oral habits.

MATERIAL AND METHODS: The study included 503 pre-school children (260 boys and 243 girls) with a mean age of 5.95 years. Different occlusal traits were verified by intraoral examination. Oral habits were diagnosed using data gathered from clinical examination of occlusion and extra-oral assessment of the face, combined with a questionnaire for parents.

RESULTS: The study demonstrated that 71.4% of the children presented with 1 or more attributes of malocclusion and 16.9% had oral habits. The vertical and sagittal malrelation of incisors, as well as spacing, were the predominant features. This study showed that digit suckers have higher incidence of anterior open bite (P=0.013) and posterior crossbite (P=0.005). The infantile type of swallowing demonstrated strong association (P=0.001) with anterior open bite.

CONCLUSIONS: Non-nutritive sucking habits and tongue thrust swallowing are significant risk factors for the development of anterior open bite and posterior crossbite in pre-school children.

Impact of Oral Habits on Posterior Crossbite

Braz Oral Res. 2007 Apr-Jun;21(2):153-8.

Prevalence of posterior crossbite among pacifier users: a study in the deciduous dentition.

Scavone H Jr[1], Ferreira RI, Mendes TE, Ferreira FV.

Author information

Abstract

The aim of this study was to evaluate the prevalence of posterior crossbite among children whose pacifier-sucking habit persisted until different ages. Children aged 3 to 6 years were randomly selected from public preschools in São Paulo, SP, Brazil. Their mothers were asked to complete a questionnaire on non-nutritive sucking behaviors. The sample consisted of 366 children assigned to 2 groups: control (n = 96) and pacifier users (n = 270). Pacifier users were further assigned to 3 subgroups, according to the age of habit persistence: P1 - until 2 years of age; P2 - between 2 and 4 years of age; and P3 - between 4 and 6 years of age. One dentist assessed the children for occlusal relationships through clinical examination. Associations between the age interval of habit discontinuation and the prevalence of posterior crossbite were analyzed using the chi-square test ($p < 0.05$). The prevalence of posterior crossbite was significantly higher among pacifier users (20.4%), compared to control children (5.2%), $p < 0.01$. Unilateral posterior crossbite was more prevalent than bilateral crossbite among pacifier users (9.8% versus 3.6%). Functional posterior crossbites were diagnosed in 3.1% of the control children and 7% of the pacifier users. The frequencies of posterior crossbite were notably high for children in the 3 pacifier subgroups, P1, P2, and P3, corresponding to 17.2%, 16.9%, and 27.3%, respectively. The high prevalence of posterior crossbite may be associated with pacifier-sucking habits that persisted after 2 years of age.

Impact of Oral Habits & Soft Tissue Restriction on Posterior Crossbite

Am J Orthod Dentofacial Orthop. 2010 Jul;138(1):32-40. doi: 10.1016/j.ajodo.2008.09.029.

Posterior crossbite in the deciduous dentition period, its relation with sucking habits, irregular orofacial functions, and otolaryngological findings.

Melink S[1], Vagner MV, Hocevar-Boltezar I, Ovsenik M.

Author information

Abstract

INTRODUCTION: The aim of this study was to assess unilateral posterior crossbite, sucking habits, orofacial functions, and otolaryngological findings in the deciduous dentition. These findings would allow us to establish a preventive program for posterior crossbite, based on interceptive treatment at an early stage of dental development. We would determine the predictive value for posterior crossbite development in correlation with the duration of sucking habits.

METHODS: Data were collected on 30 children (13 boys, 17 girls) with unilateral posterior crossbite (mean age, 5.5 years; range, 3.6-7.2 years) and 30 children (17 boys, 13 girls) without crossbite (mean age, 5.9 years; range, 5.4-6.7 years), randomly selected from a local kindergarten. Information about each subject's nutritive and nonnutritive sucking behaviors was collected through parent interviews and questionnaires. An orthodontist and an otolaryngologist clinically examined all the children. Study models were obtained from all children, and dental arch parameters including arch widths in the canine and second deciduous molar regions were measured directly from the models. The data were then compared between the posterior crossbite and the noncrossbite groups.

RESULTS: The results indicated correlations between prolonged pacifier sucking habit ($P = 0.001$), short frenulum linguae ($P < 0.001$), smaller maxillary arch width ($P < 0.001$), greater mandibular arch width ($P < 0.002$), and unilateral posterior crossbite. A receiver operating characteristic curve was plotted for the pacifier sucking time. The borderline for the development of posterior crossbite suggested by the receiver operating characteristic curve was 18 months of pacifier sucking duration. The odds ratios between the crossbite and noncrossbite groups were 3.6 (CI = 0.97-13.4) for pacifier habit duration of 18 to 35 months and 21.9 (CI = 3.7-129.4) for pacifier suckers of more than 36 months. No significant correlation between enlarged adenoids and tonsils or impaired nasal breathing and the crossbite was found.

CONCLUSIONS: These results suggest that the duration of a pacifier habit and a short frenulum linguae are associated with posterior crossbite at the age of 4 or 5 years because of the low tongue posture in the mouth. Pediatricians and pedodontists should give precise recommendations for enhancing breast feeding and discontinuing pacifier habits at least until the child is 18 months of age. Further studies are also needed to determine more objectively the etiology of tongue posture, swallowing pattern, and the length of the frenulum linguae in children with posterior crossbite.

Impact of Oral Habits on the Swallow

Am J Orthod Dentofacial Orthop. 2009 Sep;136(3):375-81. doi: 10.1016/j.ajodo.2008.03.018.

Incorrect orofacial functions until 5 years of age and their association with posterior crossbite.

Ovsenik M[1].

Author information

Abstract

INTRODUCTION: In addition to heredity, sucking habits, impaired nasal breathing, and atypical swallowing patterns are considered important factors in the etiology of posterior crossbite. The purpose of this study was to assess irregular orofacial functions to determine their correlation with posterior crossbite.

METHODS: Two hundred forty-three children were examined at the ages 3, 4, and 5. Irregular orofacial functions and morphologic traits of malocclusion were clinically evaluated. The prevalence of posterior crossbite and the relationship with incorrect orofacial functions was determined. Data were analyzed by using the chi-square test and repeated measures analysis of variance (ANOVA).

RESULTS: Posterior crossbite at 5 years of age was found in 20% of the children. Half of the crossbite children had dummy sucking or were bottle-fed. Bottle feeding decreased during the observation years, but atypical swallowing, thumb sucking, and mouth breathing persisted. Mouth breathing and dummy sucking behavior were found to be statistically significantly different between the crossbite and noncrossbite groups of children. Atypical swallowing patterns increased in children with crossbite and decreased in those without crossbite. The difference was statistically significantly different (repeated measures ANOVA, P = 0.038).

CONCLUSIONS: Every clinical examination of children in the deciduous dentition with sucking habits should include assessment of orofacial functions, especially the swallowing pattern, which was found to be an important factor in the etiology for posterior crossbite development.

Impact of Breastfeeding on Oral Habits

Prog Orthod. 2015;16:43. doi: 10.1186/s40510-015-0113-x. Epub 2015 Dec 18.

Exploring the association between feeding habits, non-nutritive sucking habits, and malocclusions in the deciduous dentition.

Lopes-Freire GM[1], Cárdenas AB[2], Suarez de Deza JE[3], Ustrell-Torrent JM[4], Oliveira LB[5], Boj Quesada JR Jr[3].

Author information

Abstract

BACKGROUND: This study aimed to explore the association between feeding habits, non-nutritive sucking habits, and malocclusions in deciduous dentition.

METHODS: A cross-sectional observational survey was carried out in 275 children aged 3 to 6 years and included clinical evaluations of malocclusions and structured interviews. Statistical significance for the association between feeding habits and the development of malocclusion was determined using chi-square and Fisher's exact tests. In addition, odds ratio (OR) calculations were used for intergroup comparisons. Controlling for confounders was adjusted by excluding children with non-nutritive sucking habits.

RESULTS: The results indicated that there were no significant relationships between exclusive breastfeeding or bottlefeeding and the presence of any type of malocclusion ($p > 0.05$). There was also no significant association between breastfeeding or bottlefeeding duration and malocclusion ($p > 0.05$). In addition, it was observed that exclusive breastfeeding had a protective effect and diminished the risk of acquiring non-nutritive sucking habits ($p = 0.001$).

CONCLUSIONS: There was no association between feeding habits and malocclusions in the deciduous dentition in this sample of children. Exclusive breastfeeding reduced the risk of acquiring non-nutritive sucking habits.

Impact of Breastfeeding on Oral Habits

BMC Pediatr. 2015 Apr 21;15:46. doi: 10.1186/s12887-015-0364-1.

Effects of breast-feeding duration, bottle-feeding duration and non-nutritive sucking habits on the occlusal characteristics of primary dentition.

Chen X[1], Xia B[2], Ge L[3].

Author information

Abstract

BACKGROUND: Early transition from breastfeeding and non-nutritive sucking habits may be related to occlusofacial abnormalities as environmental factors. Previous studies have not taken into account the potential for interactions between feeding practice, non-nutritive sucking habits and occlusal traits. This study assessed the effects of breast-feeding duration, bottle-feeding duration and non-nutritive sucking habits on the occlusal characteristics of primary dentition in 3-6-year-old children in Peking city.

METHODS: This cross sectional study was conducted via an examination of the occlusal characteristics of 734 children combined with a questionnaire completed by their parents/guardians. The examination was performed by a single, previously calibrated examiner and the following variables were evaluated: presence or absence of deep overbite, open bite, anterior crossbite, posterior crossbite, deep overjet, terminal plane relationship of the second primary molar, primary canine relationship, crowding and spacing. Univariate analysis and multiple logistic regressions were applied to analyze the associations.

RESULTS: It was found that a short duration of breast-feeding (never or ≤ 6 months) was directly associated with posterior cross bite (OR = 3.13; 95% CI = 1.11-8.82; P = 0.031) and no maxillary space (OR = 1.63; 95% CI = 1.23-2.98; P = 0.038). In children breast-fed for ≤ 6 months, the probability of developing pacifier-sucking habits was 4 times that for those breast-fed for >6 months (OR = 4.21; 95% CI = 1.85-9.60; P = 0.0002). Children who were bottle-fed for over 18 months had a 1.45-fold higher risk of nonmesial step occlusion and a 1.43-fold higher risk of a class II canine relationship compared with those who were bottle-fed for up to 18 months. Non-nutritive sucking habits were also found to affect occlusion: A prolonged digit-sucking habit increased the probability of an anterior open bite, while a pacifier-sucking habit associated with excessive overjet and absence of lower arch developmental space.

CONCLUSION: Breastfeeding duration was shown to be associated with the prevalence of posterior crossbite, no maxillary space in the deciduous dentition and development of a pacifier-sucking habit. Children who had a digit-sucking habit were more likely to develop an open bite

Impact of Swallowing

Impact of Swallowing

- Older literature implicated the dynamic action of the swallow as having a negative impact on facial development, not supported in research or in the field.
- It's a learned reflex. Changing the structure will not automatically change the function. It must be relearned.
- A tongue thrust swallow is forward, rather than upward pressure to create an oral seal to initiate the swallow reflex. It's a compensatory movement when normal movement is inhibited.
- It will contribute to forward rest posture, anterior open bite, and orthodontic relapse.

Impact of Swallowing

Physiol Rep. 2013 Nov;1(6):e00167. doi: 10.1002/phy2.167. Epub 2013 Nov 29.

Role of tongue pressure production in oropharyngeal swallow biomechanics.

Hori K[1], Taniguchi H[1], Hayashi H[1], Magara J[1], Minagi Y[2], Li Q[3], Ono T[2], Inoue M[1].

Author information

Abstract

The tongue is important for orofacial movements, including swallowing. Although numerous studies have focused on tongue pressure against the palate, its physiological role has not been fully evaluated. The tongue pressure generation may have the temporal coordination with the swallowing relational organs. The aim of this study was to clarify the physiological mechanisms of tongue pressure and to investigate the temporal relationship among tongue pressure, supra-hyoid muscle activity, and videofluorographic (VF) images during swallowing. Fifteen healthy young subjects participated. Tongue pressure measured using a sensor sheet with five channels, electromyographic EMG, and VF was recorded synchronously during 4-ml barium swallowing. Swallowing behavior in VF images with and without the sensor sheet was compared. Furthermore, the temporal relationship between events measured from tongue pressure, EMG, and VF was evaluated. Swallowing behavior on VF images was not affected by placement of the sensor sheet. Tongue pressure at the posterio-lateral point of the hard palate tended to have biphasic peaks. Tongue pressure production with a monophasic pattern appeared during the same period as the second peak in the biphasic pattern. The onset of tongue pressure was later than the start of hyoid movement and onset of EMG, and offset was observed between the hyoid at the up-forward position and reposition. Onset of tongue pressure at the anterior area was correlated with the start of slight hyoid elevation. Offset of tongue pressure at the posterio-lateral points was strongly time locked with the hyoid at the up-forward position. The present results suggested the temporal coordination of tongue pressure generation with the swallowing-related organs. That is, the tongue pressure was produced for bolus propulsion, and was closely related to hyoid movement temporally during swallowing. These results may contribute to clarify the clinical state with the disorder of tongue kinetics.

The Impact of Swallowing

Aust Dent J. 2014 Jun;59 Suppl 1:155-61. doi: 10.1111/adj.12103. Epub 2013 Oct 23.

The role of oral soft tissues in swallowing function: what can tongue pressure tell us?

Kieser JA[1], Farland MG, Jack H, Farella M, Wang Y, Rohrle O.

Author information

Abstract

Tongue pressure data taken from healthy subjects during normal oral activities such as mastication, speech and swallowing are providing us with new ways of understanding the role of the tongue in craniofacial growth and function. It has long been recognized that the sequential contact between the tongue and the palate plays a crucial role in the oropharyngeal phase of swallowing. However, because the focus of most research on intraoral pressure has been on the generation of positive pressure by the tongue on the hard palate and teeth, generation and coordination of absolute intraoral pressures and regional pressure gradients has remained unexplored. Ongoing research in our laboratory has uncovered highly variable individual pressure patterns during swallowing, which can nonetheless be divided into four stages: preparatory, primary propulsive, intermediate and terminal. These stages may further be sub-classified according to pressure patterns generated at the individual level as tipper or dipper patterns in the preparatory stage, roller or slapper in the primary propulsive and monophasic or biphasic during the intermediate stage. Interestingly, while an increase in bolus viscosity can result in significant changes to pressure patterns in some individuals, it has little effect in others. Highly individual responses to increased viscosity are also observed with swallowing duration. The above, together with other findings, have important implications for our understanding of the aetiology of widely differing conditions such as protrusive and retrusive malocclusions, dysphagia and sleep apnoea, as well as the development of novel food products.

Impact of Chewing

Impact of Chewing on Oral Development

- Chewing helps:
  - Regulate bone growth & maintenance
  - Reduce stress
  - Improve attention
  - Increase cognition
  - Stabilize the TM joint
  - With the absorption of food
- Chewing provides early sensory motor awareness & skill development
  - Teaches oral proprioception
  - Moves the gag reflex to the back
  - Provides a foundation for normal oral movement needed for speech

Impact of Chewing on Oral Development

J Oral Rehabil. 2012 Aug;39(8):559-67. doi: 10.1111/j.1365-2842.2012.02306.x. Epub 2012 Apr 10.

Decreased chewing activity during mouth breathing.

Hsu HY[1], Yamaguchi K.

Author information

Abstract

This study examined the effect of mouth breathing on the strength and duration of vertical effect on the posterior teeth using related functional parameters during 3 min of gum chewing in 39 nasal breathers. A CO(2) sensor was placed over the mouth to detect expiratory airflow. When no airflow was detected from the mouth throughout the recording period, the subject was considered a nasal breather and enrolled in the study. Electromyographic (EMG) activity was recorded during 3 min of gum chewing. The protocol was repeated with the nostrils occluded. The strength of the vertical effect was obtained as integrated masseter muscle EMG activity, and the duration of vertical effect was also obtained as chewing stroke count, chewing cycle variation and EMG activity duration above baseline. Baseline activity was obtained from the isotonic EMG activity during jaw movement at 1.6 Hz without making tooth contact. The duration represented the percentage of the active period above baseline relative to the 3-min chewing period. Paired t-test and repeated analysis of variance were used to compare variables between nasal and mouth breathing. The integrated EMG activity and the duration of EMG activity above baseline, chewing stroke count and chewing cycle significantly decreased during mouth breathing compared with nasal breathing ($P<0.05$). Chewing cycle variance during mouth breathing was significantly greater than nasal breathing ($P<0.05$). Mouth breathing reduces the vertical effect on the posterior teeth, which can affect the vertical position of posterior teeth negatively, leading to malocclusion.

Impact of Chewing on Oral Development

Int Orthod. 2014 Mar;12(1):32-48. doi: 10.1016/j.ortho.2013.12.003. Epub 2014 Jan 21.

Evaluation of masseter muscle morphology in different types of malocclusions using cone beam computed tomography.

[Article in English, French]

Becht MP[1], Mah J[2], Martin C[3], Razmus T[4], Gunel E[5], Ngan P[6].

Author information

Abstract

OBJECTIVES: To evaluate the length and orientation of masseter in different types of malocclusions using Cone Beam Computed Tomography (CBCT).

METHODS: Samples of 180 patients seeking orthodontic treatment at the University of Nevada, Las Vegas School of Dentistry, were included in the study. Pre-treatment multi-slice CBCT scans of these patients were divided into three anteroposterior groups: Class I subjects with ANB angle 0° to 5°; Class II subjects with ANB angle >5°; and Class III subjects with ANB angle <0°. CBCT scans were also divided into three vertical groups: normodivergent subjects with mandibular plane angle 22° to 30°; hyperdivergent subjects with mandibular plane angle >30°, hypodivergent subjects with mandibular plane angle <22°. The masseter was identified and landmarks were placed on the anterior border, at the origin and insertion of the muscle in 3-D mode of the Dolphin Imaging 10.5 Premium software. The Frankfort Horizontal Plane was used as a reference plane and an angular measurement was obtained by intersection of a line produced by the masseter landmarks to calculate the orientation of the muscles. The length of the masseter was measured and data were analyzed using ANOVA and matched pairs test.

RESULTS: ANOVA found significant differences in muscle length among the three vertical groups for both the left and right muscles. Paired t test showed significantly shorter muscle length for the hypodivergent group (43.3 ± 4.0 mm) compared to the normodivergent group (45.6 ± 4.5 mm, $P < 0.05$) and shorter muscle length for the hyperdivergent group (42.3 ± 4.7 mm) compared to the hypodivergent group, $P < 0.05$. No significant differences were found in muscle length among the three anteroposterior groups. However, significant differences in muscle orientation angle were found among the three anteroposterior groups ($P < 0.05$). Class II subjects were found to have the most acute orientation angle (67.2 ± 6.6°) and Class III had the most obtuse orientation angle (81.6 ± 6.8°).

CONCLUSIONS: These results suggest that certain types of malocclusion may have different masseter lengths and orientations and these differences may have implications for the mechanical advantage in bite force. For example, Class III individuals may have greater bite force than Class II individuals because the muscle fibers are oriented more along the arch of closure.

Impact of Chewing on Oral Development

J Hum Evol. 2004 Jun;46(6):655-77.

Effects of food processing on masticatory strain and craniofacial growth in a retrognathic face.

Lieberman DE[1], Krovitz GE, Yates FW, Devlin M, St Claire M.

Author information

Abstract

Changes in the technology of food preparation over the last few thousand years (especially cooking, softening, and grinding) are hypothesized to have contributed to smaller facial size in humans because of less growth in response to strains generated by chewing softer, more processed food. While there is considerable comparative evidence to support this idea, most experimental tests of this hypothesis have been on non-human primates or other very prognathic mammals (rodents, swine) raised on hard versus very soft (nearly liquid) diets. Here, we examine facial growth and in vivo strains generated in response to raw/dried foods versus cooked foods in a retrognathic mammal, the rock hyrax (Procavia capensis). The results indicate that the hyrax cranium resembles the non-human primate cranium in having a steep gradient of strains from the occlusal to orbital regions, but differs from most non-anthropoids in being primarily twisted; the hyrax mandible is bent both vertically and laterally. In general, higher strains, as much as two-fold at some sites, are generated by masticating raw versus cooked food. Hyraxes raised on cooked food had significantly less growth (approximately 10%) in the ventral (inferior) and posterior portions of the face, where strains are highest, resembling many of the differences evident between humans raised on highly processed versus less processed diets. The results support the hypothesis that food processing techniques have led to decreased facial growth in the mandibular and maxillary arches in recent human populations.

The Impact In Utero

Impact of Fetal Growth Retardation on Facial Development

- More likely to be born with retrognathic jaw
- More likely to be born with tongue tie
- This will cause a high narrow hard palate
- This will cause maxilla/mandible misalignment from birth
- This contributes to open mouth resting posture & mouth breathing

Impact of Prematurity on the Mandible

Eur J Orthod. 1998 Aug;20(4):417-25.

Short stature of prenatal origin: craniofacial growth and dental maturation.

Van Erum R[1], Mulier M, Carels C, de Zegher F.

Author information

Abstract

Recently, children born small for gestational age (SGA) with a catch-up growth failure, have been selected for high dose growth hormone (GH) treatment. In order to gain greater insight concerning dentofacial growth and maturation of these patients, and to evaluate the possible effects of high does GH administration on facial structures, craniofacial growth and dental maturation were evaluated in short SGA persons. Seventy-seven cephalograms and orthopantomograms were available from 48 subjects, aged between 2 and 32 years. Craniofacial growth was assessed by calculating age- and gender-specific standard deviation scores (SDS) for eight linear and five angular measurements. Tooth formation was evaluated by means of a dental delay score (i.e. dental age minus chronological age). The SDS for craniofacial growth measurements for the lateral aspect showed a short anterior cranial base (-1.8 SDS), a small retropositioned mandible (< or = -1.7 SDS) and a small maxilla (-1.5 SDS); a high mandibular plane angle (+1.9 SDS) and a wide cranial base angle (+1 SDS). These findings result in a small retrognathic face with a relatively increased lower anterior face height (+1.7 SDS). In contrast to skeletal maturation, dental age was not delayed. The general growth retardation is, apparently, reflected to a differential extent within the craniofacial complex, while dental maturation appears to be a distinct process tightly linked to chronological age, and independent of general growth and bone age.

Impact of Prematurity on Posterior Crossbite

Angle Orthod. 2016 Sep;86(5):832-8. doi: 10.2319/102715-723.1. Epub 2016 Mar 21.

Early risk factors for posterior crossbite and anterior open bite in the primary dentition.

Germa A[1], Clément C[2], Weissenbach M[3], Heude B[4], Forhan A[5], Martin-Marchand L[6], Bonet M[7], Vital S[8], Kaminski M[9], Nabet C[10].

Author information

Abstract

OBJECTIVE: To investigate risk factors specific to posterior crossbite and anterior open bite at the age of 3 years.

MATERIALS AND METHODS: The study included 422 children of the French EDEN mother-child cohort. The main outcomes were the presence of posterior crossbite and anterior open bite assessed by dentists at 3 years. Social characteristics (collected during pregnancy), neonatal characteristics (collected at birth), duration of breast-feeding (collected prospectively), sucking habits at 3 years, and open lips (as a proxy for mouth breathing) were studied and two logistic regressions conducted.

RESULTS: Preterm birth appears to be a risk factor specific for posterior crossbite (OR: 3.13; 95% CI: 1.13-8.68), whereas small for gestational age seems to be associated with a lower risk of posterior crossbite (OR: 0.32; 95% CI: 0.12-0.87). Ongoing pacifier or thumb sucking at 3 years is a risk factor for both posterior crossbite and anterior open bite.

CONCLUSIONS: Children born preterm seem to be more at risk for posterior crossbite than those born at term. Different mechanisms may be involved in posterior crossbite and anterior open bite.

Impact of Oral Dysfunction

Oral Dysfunction Causes Malocclusions

Eur J Paediatr Dent. 2012 Dec;13(4):321-3.

Causal relationship between malocclusion and oral muscles dysfunction: a model of approach.

Saccomanno S[1], Antonini G, D'Alatri L, D'Angelantonio M, Fiorita A, Deli R.

Author information

Abstract

AIM: Bad habits result in altered functions which with time can cause anomalies of the orofacial morphology. To solve these problems, orthodontic treatment can be supported by myofunctional therapy in order to recover the normal functionality of the oral muscles. The aim of this study is to assess the need to treat patients with neuromuscular disorders, from both the occlusion and the muscles condition approach in order to obtain the balance needed for the stability of treatment.

MATERIALS AND METHODS: A sample of 23 patients with atypical swallowing was included in this study, some of them presented thumb sucking and oral breathing. After case history collection, in order to make a correct orthodontic and functional diagnosis, correction of anomalies was carried out since they could compromise the success of the therapy (maxillary contraction, oral breathing, and short lingual fraenum). Then a different therapeutic approach was applied on the basis of the specific dental features.

RESULTS: Both from the diagnostic and therapeutic point of view, important results were achieved especially through muscle analysis with dynamometer and surface electromyography.

CONCLUSION: Orthodontic therapy, in the presence of bad habits, is not enough to solve orthodontic issues, it must be combined with a myofunctional treatment. The success of the therapy is granted only when patients and their family comply with the treatment and all factors which can prevent success of the therapy are removed.

Oral Dysfunction Causes Malocclusions

Eur J Orthod. 2007 Oct;29(5):523-9.

Follow-up study of functional and morphological malocclusion trait changes from 3 to 12 years of age.

Ovsenik M[1], Farcnik FM, Korpar M, Verdenik I.

Author information

Abstract

The aim of this study was to evaluate morphological and functional malocclusion trait changes in 3- to 12-year-old children and to determine whether such functional traits at the 3, 4, and 5 years of age correlated with malocclusion severity score at 12 years of age. Two hundred and sixty-seven children (132 boys, 135 girls) were randomly selected for a follow-up study from a previous cohort of 560 subjects. Functional and morphological traits were clinically assessed. Five functional malocclusion traits: mouth breathing, atypical swallowing, thumb, pacifier sucking, and bottle feeding were assessed and evaluated. Intra-arch assessment involved measurements of incisor crowding, rotation of incisors, and axial inclination of the teeth. For inter-arch measurements, overbite, anterior open bite, overjet, reverse overjet, anterior crossbite, and buccal segment relationships were recorded. The weighted sum of recorded occlusal traits thus represented the total malocclusion severity score. The median morphological malocclusion severity score was almost the same at 3 and 12 years of age, while functional malocclusion decreased. Sucking habits (finger- or dummy-sucking, bottle feeding) until 5 years of age were statistically significantly correlated with an atypical swallowing pattern from 6 to 9 years (Spearman r = 0.178, P = 0.017), which in turn was statistically significantly correlated with the morphological malocclusion severity score (Spearman r = 0.185, P = 0.042) at 12 years of age. At an early age, the morphological severity score is related to the stage of dental development, while at a later period, malocclusion severity score is also the result of incorrect orofacial functions at an early stage of dental development.

Oral Dysfunction Causes Malocclusion

J Orofac Orthop. 2011 Mar;72(1):21-32. doi: 10.1007/s00056-010-0004-1. Epub 2011 Mar 11.

Relationship between occlusal findings and orofacial myofunctional status in primary and mixed dentition: part IV: interrelation between space conditions and orofacial dysfunctions.

[Article in English, German]

Seemann J[1], Kundt G, Stahl de Castrillon F.

Author information

Abstract

AIM: The aim of this study was to provide basic representative data on the prevalence of malocclusions involving space deficiency in both primary and early mixed dentition and to examine the relationship between these malocclusions and orofacial dysfunctions. The results should be viewed from an orthodontic prevention and early treatment perspective.

SUBJECTS AND METHODS: Orthodontic findings in the maxilla and mandible as well as the myofunctional status of 766 children in primary dentition and 2,209 children in mixed dentition were examined clinically in a cross-sectional study. The following parameters from each jaw were subjected to orthodontic analysis: crowding in the anterior and posterior regions of the maxilla and mandible in primary and mixed dentitions, deviations from normal maxillary arch forms in the primary dentition, deviations from normal anterior maxillary arch width in mixed dentition and maxillary apical base morphology in mixed dentition. Static and dynamic orofacial dysfunctions were documented with reference to specific parameters and clinical tests.

RESULTS: Crowding was observed in every tenth child in primary dentition (10.8%) and in every second child in mixed dentition (49.7%). Habitual open mouth posture, visceral swallowing, articulation disorders and oral habits were statistically significantly more frequent in children in primary dentition presenting a narrow maxillary arch. Reduced anterior maxillary arch width (compression) was statistically more frequent in children in early mixed dentitions with habitual open mouth posture. A narrow maxillary apical base correlated positively with all the orofacial dysfunctions analyzed.

CONCLUSIONS: Deviations from a regular arch form become apparent very early during dentition development and coexist with specific orofacial dysfunctions. They are thus important indicators for the early detection of functional abnormalities, causing deviations from normal dentition development. In children with orofacial dysfunctions the development of a narrow maxillary dental arch should be prevented by myofunctional therapy and by educating the parents. Interceptive orthodontic measures to treat a narrow maxillary arch in primary and early mixed dentition should also focus on eliminating functional disturbing factors, such as orofacial dysfunctions. Interdisciplinary cooperation with specialists in other fields of medicine, e.g. otorhinolaryngology and speech therapy, is essential to achieve this goal.

Oral Dysfunction Causes Malocclusion

Acta Otorhinolaryngol Ital. 2016 Oct;36(5):386-394. doi: 10.14639/0392-100X-770.

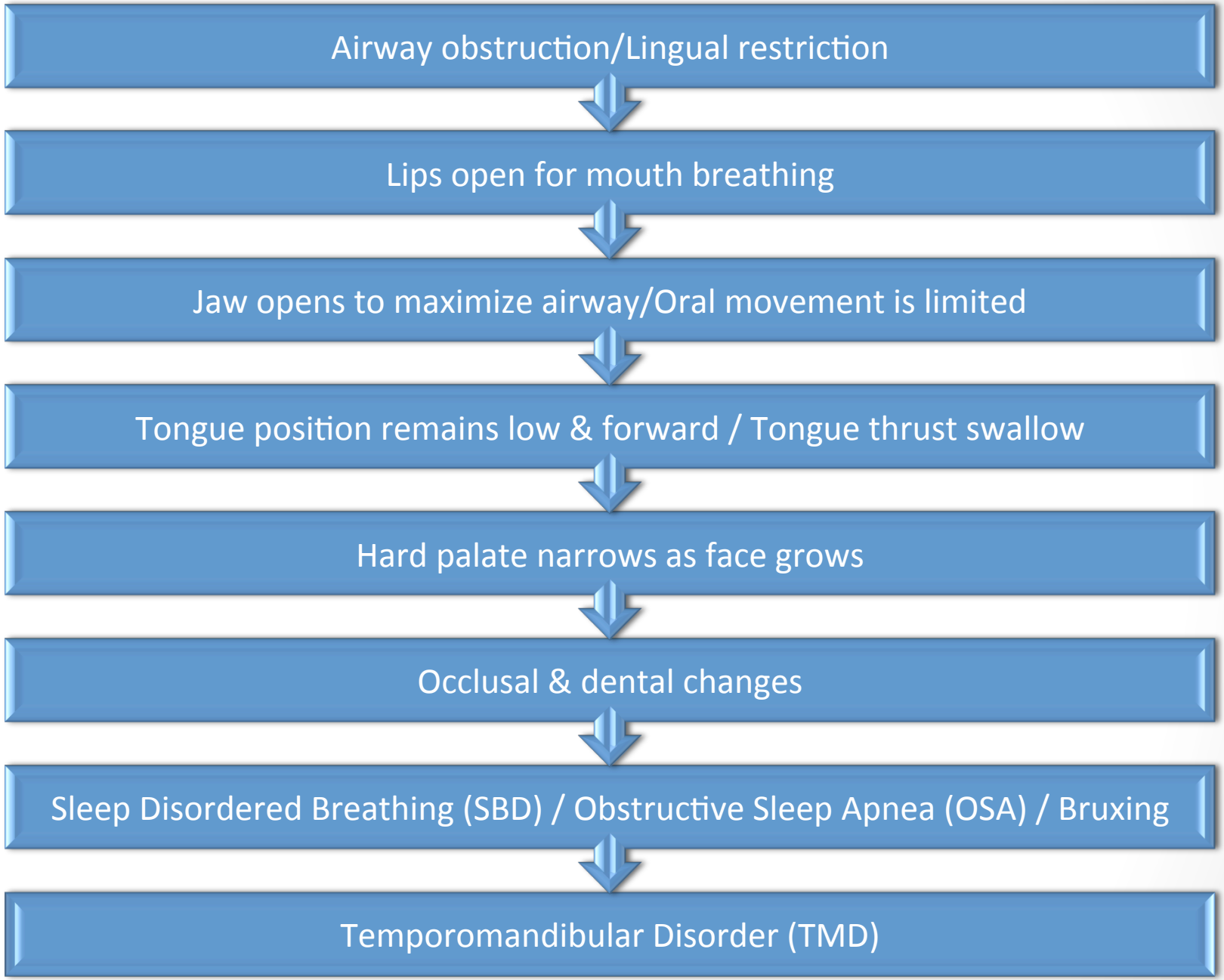
Association between oral habits, mouth breathing and malocclusion.

Grippaudo C[1], Paolantonio EG[1], Antonini G[1], Saulle R[2], La Torre G[2], Deli R[1].

Author information

Abstract in **English**, Italian

The ratio of bad habits, mouth breathing and malocclusion is an important issue in view of prevention and early treatment of disorders of the craniofacial growth. While bad habits can interfere with the position of the teeth and normal pattern of skeletal growth, on the other hand obstruction of the upper airway, resulting in mouth breathing, changes the pattern of craniofacial growth causing malocclusion. Our crosssectional study, carried out on 3017 children using the ROMA index, was developed to verify if there was a significant correlation between bad habits/mouth breathing and malocclusion. The results showed that an increase in the degree of the index increases the prevalence of bad habits and mouth breathing, meaning that these factors are associated with more severe malocclusions. Moreover, we found a significant association of bad habits with increased overjet and openbite, while no association was found with crossbite. Additionally, we found that mouth breathing is closely related to increased overjet, reduced overjet, anterior or posterior crossbite, openbite and displacement of contact points. Therefore, it is necessary to intervene early on these aetiological factors of malocclusion to prevent its development or worsening and, if already developed, correct it by early orthodontic treatment to promote eugnatic skeletal growth.


Airway obstruction/Lingual restriction
Lips open for mouth breathing
Jaw opens to maximize airway/Oral movement is limited
Tongue position remains low & forward / Tongue thrust swallow
Hard palate narrows as face grows
Occlusal & dental changes
Sleep Disordered Breathing (SBD) / Obstructive Sleep Apnea (OSA) / Bruxing
Temporomandibular Disorder (TMD)

Impact of Oral Dysfunction Across a Lifetime

- Airway-based malocclusions leading to sleep disordered breathing in childhood, bruxing begins
- Diagnosis of ADHD, aggression, poor problem solving
- Increased risk for academic and social failure
- Poor facial aesthetics
- Jaw rotated back into airway and palate invading sinuses, bruxing
- Poor chewing and swallowing
- Poor sleeping and ability to exercise
- Tendency toward obesity leading to obstructive sleep apnea
- Increased risk of heart attack, stroke, and early death

Impact of Maternal Oral Dysfunction

Impact of Maternal Oral Dysfunction on Fetal Development

Rev Med Interne. 2006 Apr;27(4):291-5. Epub 2006 Feb 28.

[Obstructive Sleep Apnea Syndrom during pregnancy: prevalence of main symptoms and relationship with Pregnancy Induced-Hypertension and Intra-Uterine Growth Retardation].

[Article in French]

Calaora-Tournadre D[1], Ragot S, Meurice JC, Pourrat O, D'Halluin G, Magnin G, Pierre F.

Author information

Abstract

OBJECTIVE: To investigate the frequency of main symptoms of Obstructive Sleep Apnea Syndrom (OSAS) and their relationship with Pregnancy Induced-Hypertension (PIH) as well as Intrauterine Growth Retardation (IGR) as suggested by recent studies.

METHODOLOGY: Four hundred (and) thirty-eight enquiry forms completed during post-partum period were analysed, after exclusion of multiple pregnancies. Collected data were demographic characteristics, obstetrical events, sleep disorders during last trimester, screening of snoring and vigilance troubles with an Epworth score.

RESULTS: Forty-five percentages of the patients reported to have habitual snoring during pregnancy. Among these, 85% were non-snorers before pregnancy. Daytime somnolence concerned 84,5% of the population with an Epworth score significatively increased (P<0,0001). The prevalence of PIH was found to be 4,5%, with two apparently independent risk factors: the body mass index (OR=1,1) and an association between snoring and increased vigilance trouble (OR=2,6). No statistical difference was found concerning IGR.

CONCLUSIONS: SAS symptoms are frequent during pregnancy and snoring appears to be linked with PIH. However, polysomnographic data are not yet sufficient to explain pathophysiological mechanisms and find relevant diagnostic markers during pregnancy.

Impact of Maternal Oral Dysfunction on Fetal Development

Clin Lab Med. 2016 Jun;36(2):435-46. doi: 10.1016/j.cll.2016.01.001. Epub 2016 Mar 4.

Sleep Disordered Breathing and Adverse Pregnancy Outcomes.

Cain MA[1], Louis JM[2].

Author information

Abstract

Sleep disordered breathing (SDB) occurs in 0.6% to 15% of reproductive-aged women. Because of an overlap in symptoms of SDB and normal pregnancy findings, the diagnosis of SDB in pregnancy is challenging. The repetitive arousals, sleep fragmentation, and hypoxias experienced by patients with SDB lead to an increase in oxidative stress and inflammation. In the nonpregnant population SDB is associated with an increased risk of diabetes mellitus, heart disease, and stroke. Increasing evidence identifies an association between SDB in pregnancy and gestational diabetes, preeclampsia, and fetal growth abnormalities.

Impact of Maternal Oral Dysfunction on Fetal Development

Eur J Obstet Gynecol Reprod Biol. 2016 Dec 14;210:166-172. doi: 10.1016/j.ejogrb.2016.12.013. [Epub ahead of print]

Association of obstructive sleep apnea with adverse pregnancy-related outcomes in military hospitals.

Spence DL[1], Allen RC[2], Lutgendorf MA[3], Gary VR[2], Richard JD[3], Gonzalez SC[4].

Author information

Abstract

BACKGROUND: Obstructive sleep apnea (OSA) is associated with significant morbidity and mortality in non-obstetrical and obstetrical patients.

OBJECTIVES: To estimate the prevalence of OSA and its relationship with pregnancy-related complications in a general obstetric population of Department of Defense beneficiaries receiving direct-care at military treatment facilities.

STUDY DESIGN: A retrospective cohort study of all women (N=305,001) who gave birth at a military treatment facility from 2008 to 2014. OSA cases were randomly selected and matched on age (3:1 ratio) to non OSA cases. Multivariable logistic regression was used to examine the risks of adverse pregnancy outcomes (cesarean delivery, gestational diabetes, gestational hypertension, preeclampsia, postoperative wound complications, hospital stay greater than five days, acute renal failure, pulmonary edema, preterm delivery, poor fetal growth, and stillbirth) between pregnant women with and without a diagnosis of OSA. Cases were identified using ICD-9 codes, while controlling for demographics, obesity, and medical comorbidities associated with OSA and the outcomes of interest.

RESULTS: We identified 266 cases of OSA (OSA rate=8.7 per 10,000; increased from 6.4 to 9.9 per 10,000 from 2009 to 2013). OSA was associated with a higher odds of cesarean delivery (AOR,1.60; 95% CI, 1.06-2.40), gestational hypertension, (AOR, 2.46; 95% CI, 1.30-4.68), preeclampsia (AOR, 2.42; 95% CI, 1.43-4.09), and preterm delivery (AOR, 1.90; 95% CI, 1.09-3.30).

CONCLUSIONS: Obstructive sleep apnea is associated with adverse maternal and fetal outcomes.

Impact of Maternal Oral Dysfunction on Fetal Development

BJOG. 2014 Dec;121(13):1685-93. doi: 10.1111/1471-0528.12885. Epub 2014 May 30.

Hypertension, snoring, and obstructive sleep apnoea during pregnancy: a cohort study.

O'Brien LM[1], Bullough AS, Chames MC, Shelgikar AV, Armitage R, Guilleminault C, Sullivan CE, Johnson TR, Chervin RD.

Author information

Abstract

OBJECTIVE: To assess the frequency of obstructive sleep apnoea among women with and without hypertensive disorders of pregnancy.

DESIGN: Cohort study.

SETTING: Obstetric clinics at an academic medical centre.

POPULATION: Pregnant women with hypertensive disorders (chronic hypertension, gestational hypertension, or pre-eclampsia) and women who were normotensive.

METHODS: Women completed a questionnaire about habitual snoring and underwent overnight ambulatory polysomnography.

MAIN OUTCOME MEASURES: The presence and severity of obstructive sleep apnoea.

RESULTS: Obstructive sleep apnoea was found among 21 of 51 women with hypertensive disorders (41%), but in only three of 16 women who were normotensive (19%, chi-square test, P=0.005). [Author correction added on 16 June 2014, after first online publication: Results mentioned in the abstract were amended.] Non-snoring women with hypertensive disorders typically had mild obstructive sleep apnoea, but >25% of snoring women with hypertensive disorders had moderate to severe obstructive sleep apnoea. Among women with hypertensive disorders, the mean apnoea/hypopnoea index was substantially higher in snorers than in non-snorers (19.9±34.1 versus 3.4±3.1, P=0.013), and the oxyhaemoglobin saturation nadir was significantly lower (86.4±6.6 versus 90.2±3.5, P=0.021). Among women with hypertensive disorders, after stratification by obesity, the pooled relative risk for obstructive sleep apnoea in snoring women with hypertension compared with non-snoring women with hypertension was 2.0 (95% CI 1.4-2.8).

CONCLUSIONS: Pregnant women with hypertension are at high risk for unrecognised obstructive sleep apnoea. Although longitudinal and intervention studies are urgently needed, given the known relationship between obstructive sleep apnoea and hypertension in the general population, it would seem pertinent that hypertensive pregnant women who snore should be tested for obstructive sleep apnoea, a condition believed to cause or promote hypertension.

The Impact of Function on Structure

- Impact of Breastfeeding
- Impact of Soft Tissue Restriction
- Impact of Airway Obstruction
- Impact of Mouth Breathing
- Impact of Oral Habits
- Impact of Swallowing
- Impact of Chewing
- Impact of Oral Dysfunction

- Impact of Maternal Oral Dysfunction

Prevention of Malocclusions

- Screen for daytime and night time breathing disorders
- Screen & refer for restricted oral frenula in patients of all ages
- Screen & refer for airway obstruction & conditions that necessitate mouth breathing
- Screen & refer feeding & oral function difficulties early in life
- Multidisciplinary team care is the most effective way to follow a patient over the lifetime

What causes a high narrow palate?

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