Original Article

Feeding Associations With Speech And Language Using Tdsc And Lest Charts

Dr Sanjana Challagalla[1] , Dr Shradha Salunkhe[2] , Dr Vineeta Pande[3] , Dr. sharad Agarkhedkar[4]

[1]Resident department of pediatrics Dr. D. Y. Patil Medical college hospital and research Centre, DPU Vidyapeeth, Pimpri, Pune, Maharashtra, India.
[2]Professor in pediatrics Department of Pediatrics, Dr. D. Y. Patil Medical college hospital and research Centre, DPU Vidyapeeth, Pimpri, Pune, Maharashtra, India. corresponding
[3]M.D. Pediatrics, Professor, Department of Pediatrics, Dr. D. Y. Patil Medical college hospital and research Centre, DPU Vidyapeeth, Pimpri, Pune, Maharashtra, India.
[4]M.D. Pediatrics, hod, Professor, Department of Pediatrics, Dr. D. Y. Patil Medical college hospital and research Centre, DPU Vidyapeeth, Pimpri, Pune, Maharashtra, India.
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INTRODUCTION:

Feeding habits of children and its association with language development depends on the age at texture transitions, feeding phase (breastfeeding, weaning to solids or full solids), characteristics of the meal (duration, environment, and shared meals with adults),feeding practices, use of feeding equipment and bottle, digital or pacifier suction. The World Health Organization (WHO) recommends exclusive breastfeeding during the first six months of life and from this age, onwards, other foods and liquids are gradually introduced into the child's diet, and this transition should be carefully followed up by a professional.(1)Early weaning or unexercised sucking may culminate in the establishment of deleterious oral habits such as pacifier use, digital suction and oral breathing. These frequently demonstrate a relation to occlusal disarrangement, besides being able to justify changes in swallowing, breathing and speech functions.(2)

The consistency and texture are characteristics that will favour anatomical-functional changes of the infant which are associated with neurological maturation and will allow the correct execution of neurovegetative functions among them, the speech.(3)The use of the solid consistency during chewing stimulates the increase in the force that the orofacial muscles exert on the teeth.(4) This will not only change the quality of mastication, but also the development of maxillary bones, dental arches and other hard structures (such as dental elements), minimizing the possibility of occlusion changes.Oral health, also stimulated by masticatory action, has repercussions on speech production. Despite this, it can be affirmed that early dental losses may imply alterations in the articulatory pattern, as it allows the interposition of the tongue in the edentulous region, as a means of stabilizing the mandible. When loss occurs in the posterior region, there is no significant impairment in speech quality, whereas absence of anterior teeth favours omission and replacement of phonemes.(5)

Muscle activity per cycle is also relatively low for soft foods, which implies a lower total muscular activity required for the formation of food bolus.(6) Thus, the predominant consumption of pasty or soft consistency as the basis in a diet, results in a decrease in the workload or load of the muscle tissue, which may lead to a narrowing of the maxillary arch, especially in the areas of masticatory muscle insertion.Not only the muscles that move the mandible have an increased activity in the presence of foods with a more rigid consistency, but also the tongue, because when it participates in the swallowing of hard foods, there is an increase in amplitude and variation in lingual activity, particularly in the Posterior region.(7)The soft tissues and the mandible, which are required to perform the efficient masticatory function during administration of most solid consistency food, are basically the same structures that will modify the sound originated from the larynx by variations of the oral cavity spaces, produced by the speech. Failures in the biomechanics of this mechanism can affect the production of specific

phonemes.(8) Therefore, inadequate stimulation resulting from the use of predominantly soft foods may lead to the hypo functionality of the tongue, which will lead to a compromise in the production of sounds such as /r/, /s/, /z/, /t/, /d/, /n/, /l/, as well as lowering of the tonicity of the orbicularis muscles of the lips, which would justify the incorrect articulation of phonemes such as /p/, /b/ and /m/.

Therefore infant feeding favours the adequate growth and development of the child, contributing to maturation of several functions, including speech.

Bibliographical research by Neiva(9) related to Paediatric areas, Dentistry and Speech-Language Pathology, through Medline, found that natural breastfeeding favours the correct development of the stomatognathic system concerning mobility, strength and posture aspects of the structures that compose it, Therefore it should benefit the correct articulation of the phonemes, since such structures are directly involved in the process of speech sounds production, which was not perceptible in the casuistry of this research. It should be emphasized that the present research used only audio recording of children's speech and not video footage, which could provide more precise analysis regarding the possible compensations performed for phoneme production, through the compromise of some phono-articulatory organ.

The same study also reported that, on the contrary, early weaning, because it does not satisfy the instinctive sucking desire of children, may favour the establishment of habits such as bottle feeding, digital sucking and pacifiers, which compromise the healthy development of the stomatognathic system and may be, for example, the aetiology of malocclusion, which negatively impacts the structures involved in the speech production process. In this research, the habits of nutritive and non-nutritive sucking did not present a significant association with speech alterations.

In a cross-sectional study by Moimaz(10) conducted in southern Brazil with a random sample of 100 mothers with children up to 12 months of age, it was identified that 55% of the subjects did not breastfeed for the period determined by the WHO, at least one of the aforementioned habits.

The use of the bottle favours the work of a reduced group of orofacial muscles, favoring the activity of the buccinator muscles and the orbicularis of the mouth, compromising the correct development of the craniofacial complex and, thus, being associated with alterations in the articulation of speech sounds. (9) In the study by Victor Costa et al it did not demonstrate a significant association with the outcome evaluated.

The use of pacifiers and digital suction, considered non-nutritive sucking habits, can also be consequences of early weaning and also contribute to the appearance of alterations in phono-articulatory organs. In this context, a cross-sectional study (11) nested in a birth cohort in Pelotas, southern Brazil, with 359 children, found that these behaviours demonstrate a relationship with occlusal derangement. In the study by Victor Costa here was no statistically significant association between these aspects and speech disorders.

However, understanding speech as a function that depends on the correct growth and development of the stomatognathic system, requiring harmonious relationship between the phono-articulatory organs, to make the specific modifications of the sound originating from the larynx, one can admit that the factors that collaborate for the adequate maturation of the orofacial structures, indirectly, favor correct phonemic production.

In a study by Barbosa et al in 2009 (12) a total of 128 three- to five-year olds were assessed. 46% girls and 54% boys. Children were breastfed for an average of 25.2 (SD 9.6) months and used a bottle 24.4 (SD 15.2) months. Fifty-three children (41.7%) had or currently used a pacifier for an average of 11.4 (SD 17.3) months; 23 children (18.3%) were reported to have sucked their fingers. Delayed use of a bottle until after 9 months appeared to be protective for subsequent speech disorders. There was less than a one-third lower relative odds of subsequent speech disorders for children with a delayed use of a bottle compared to children without a delayed use of a bottle (OR: 0.32, 95% CI: 0.10-0.98). A three-fold increase in relative odds of speech disorder was found for finger-sucking behaviour (OR: 2.99, 95% CI: 1.10-8.00) and for use of a pacifier for 3 or more years (OR: 3.42, 95%

CI: 1.08-10.81).The results suggest extended use of sucking outside of breastfeeding may have detrimental effects on speech development in young children.

MATERIALS AND METHODS

AIMS AND OBJECTIVE:
To study the feeding associations with speech and language using Tdsc and Lest charts
Between 6months to 6 years of age.

This a prospective cross sectional study that was conducted in the Department of Paediatrics in a tertiary health care hospital. The study was conducted from May 2021 to October 2022 on patients between 0-6 years age group. 425 children were enrolled in the study.

Method of Data Collection and Tools:

All children were evaluated for speech and language delay using screening tool- Language Evaluation Scale Trivandrum (LEST). In this study a one item delay was considered as delay in LEST. This is a screening tool with thirty-three test items (0 to 3 years) and 31-items (3 to 6 years) validated against Receptive-expressive emergent language scale (REELS). All children were also screened for ADHD using DSM 5 for hyperactivity and inattention.

Data Analysis:
The collected data was entered into a Microsoft Excel Sheet. Statistical analysis was done using Med Calc. For statistical significance, $p<0.05$ was taken as significant. All tests were carried out at 5% significance level.

RESULTS:

TABLE 1: ASSOCIATION OF SLD WITH FEEDING PRACTICES:

FEEDING	DELAY (n/percentage)	NORMAL (n/percentage)	TOTAL (n/percentage)
BREAST FEEDING(BF)	48(16.3%)	246(83.7%)	294 (69.2%)
BF+BOF	30(26.8%)	82(73.2%)	112 (26.4%)
BOTTLEFEEDING(BOF)	10(52.6%)	9(47.4%)	19 (4.5%)
	88(20.7%)	337(79.3%)	425

Chi-squared test

Chi-squared	17.751
DF	2
Significance level	P = 0.0001

Table 1 shows there was a delay seen in 48 children (16.3%) who were exclusively breast fed, 10 children (52.6%) who were exclusively bottle fed and 30 children (26.8%) who were both breast and bottle fed. The p value is significant 0.0001. SLD is seen more in bottle fed children.

TABLE 2: FINGER SUCKING/PACIFIER HABITS AND SLD:

FINGER SUCKING /PACIFIER	DELAY (n/percentage)	NORMAL (n/percentage)	TOTAL (n/percentage)
PRESENT	24(30.0%)	56(70.0%)	80 (18.8%)
ABSENT	64(18.6%)	281(81.4%)	345 (81.2%)
	88(20.7%)	337(79.3%)	425

Chi-squared test

Chi-squared	5.173
DF	1
Significance level	P = 0.0229
Contingency coefficient	0.110

Table 2 shows there was a delay seen in 24 children (30%) who had history of finger or pacifier suction and 64 children (18.6%) with no history of finger/pacifier suction. SLD is seen more in children who are having a history of digital or pacifier suction.

TABLE 3: ASSOCIATION OF SLD WITH NUTRITIONAL STATUS:

NUTRITION	DELAY (n/percentage)	NORMAL (n/percentage)	TOTAL (n/percentage)
SAM	3(60.0%)	2(40.0%)	5 (1.2%)
MAM	24(25.8%)	69(74.2%)	93 (21.9%)
NORMAL	61(18.7%)	266(81.3%)	327 (76.9%)
	88(20.7%)	337(79.3%)	425

Fisher's exact test

P = 0.03131

Table 3 shows there was a delay seen in 3 children (60%) who had SAM, 24 children (25.8%) who had MAM and 61 children (18.7%) with normal nutrition. The percentage of delay was seen more in children with malnutrition.

Discussion:

The practice of exclusive breast feeding till six months of age helps the mother and baby to spend more time together. This helps to develop a strong emotional bond and improvement in the neurodevelopmental domain of the baby. This leads to a strong foundation for the development of language acquisition skills in the early years of life as well as in cognitive improvement. There was a delay seen in 48 children (16.3%) who were exclusively breast fed, 10 children (52.6%) who were exclusively bottle fed and 30 children (26.8%) who were both breast

and bottle fed. A major finding having a great social implication was that the language delay was less common in the children who were fortunate to have exclusive breast feeding. This finding was found to be statistically very significant. In the study by Belgin et al children who were exclusively breastfed had a delay in 6.4% when compared to 22.9% in children who were not fed exclusively. The study done by Olof HJ et al also supported this finding (288).In the study by Iqbal et al (289) it indicates that increasing the duration of breastfeeding (>12 months) during infancy was significantly associated with improvement in the cognitive and language development of children even after adjusting for a range of child and socio-economic and socio-environmental factors (aOR=2.42, aOR=2.44 respectively). Rytter et al. described lower breastfeeding rates in children with kwashiorkor, which might be related to decrease in maternal care and stimulation.

The use of pacifiers and finger suction, considered non-nutritive sucking habits, can also be consequences of early weaning and also contribute to the appearance of alterations in phono-articulatory organs. There was a delay seen in 24 children (30%) who had history of finger or pacifier suction and 64 children (18.6%) with no history of finger/pacifier suction. A cross-sectional study (154) nested in a birth cohort in Pelotas, southern Brazil, with 359 children, found that these behaviours demonstrate a relationship with occlusal derangement. In the study by Victor Costa here was no statistically significant association between these aspects and speech disorders.

Malnutrition is an important risk factor in child development. There was a delay seen in 3 children (60%) who had SAM, 24 children (25.8%) who had MAM and 61 children (18.7%) with normal nutrition. The percentage of delay was seen more in children with malnutrition. In a study by Akhter et al (290)although speech delay is the common symptom of ASD children, in this study nutritional status of children with ASD children were normal but only children with speech delay were at risk of being moderately impaired nutritional status. In the study by Chattopadhyay et al (291)effect of nutrition on the developing brain has been thoroughly studied and established. Undernutrition, particularly during fetal and 1st two years of postnatal life, is a major risk factor for poor neuro-development, leading to motor, cognitive and speech delay, as well as behavioral problems and learning disabilities. The study by Van den Heuvel M et al (292) showed children with kwashiorkor had a significantly worse language delay compared to children with marasmus at discharge. One explanation for this could be a difference in neurological involvement between kwashiorkor and marasmus. Secondly, the difference in language delay could be explained by a difference in the social environment between children with kwashiorkor and marasmus.

SUMMARY:

425 children were enrolled.

1. There was a delay seen in 48 children (16.3%) who were exclusively breast fed, 10 children (52.6%) who were exclusively bottle fed and 30 children (26.8%) who were both breast and bottle fed. The p value is significant 0.0001. SLD is seen more in bottle fed children.
2. There was a delay seen in 24 children (30%) who had history of finger or pacifier suction and 64 children (18.6%) with no history of finger/pacifier suction. SLD is seen more in children who are having a history of digital or pacifier suction.
3. There was a delay seen in 3 children (60%) who had SAM, 24 children (25.8%) who had MAM and 61 children (18.7%) with normal nutrition. The percentage of delay was seen more in children with malnutrition.

Conclusion:

The importance of correct nutrition, with variation of texture and consistency, must transpose the nutritional sphere and be understood as a facilitator of the development of the child in a global way, thus avoiding the installation of future disorders. From this, it can be inferred that food and speech patterns constitute a point of intersection in children's health. It is important to note the importance of feeding interference and oral habits in

the appearance of malocclusion and its relation with speech disorders, making it possible to understand the interaction of factors that are indirectly related to the outcome studies.

SLD was more in children who were exclusively bottle fed and who had history of digital and pacifier suction. It was seen more in children who had malnutrition.

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