



ASSESSMENT OF THE ORAL FUNCTION USING MRFT AND ITS CORRELATION WITH EATING BEHAVIOUR IN CHILDREN OF GANDHINAGAR CITY

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ABSTRACT Eating behaviour in children is an important determinant of child's general and oral health. It is one of the factors for promoting general growth and development of child and prevention and development of systemic diseases such as cardiovascular diseases, cancers, chronic respiratory diseases and diabetes and in development or progression of dental caries. Parental food habits and feeding strategies are the major environmental factors that models child's eating habits. Eating behaviour can be assessed using questionnaire consisting of feeding practices, food preferences, etc. and clinically by newly introduced mouth rinsing function. Hence, purpose of this study was to assess the eating behaviour and its correlation with mouth rinsing function test in children of Gandhinagar city. A total 220 participants between the age of 4-7 years were selected from primary school in Gandhinagar city for MRFT test and oral examination. Data on eating behaviour was collected from parents through questionnaires that consisted of feeding practice, preference of food and eating pattern. After collecting parental response, the score of MRFT test was correlated and the result was obtained. Significant correlation was found between MRFT score and feeding practice, eating pattern and adequacy of diet in children. The children with deleterious oral habits tended to have low MRFT score. Therefore, MRFT can be used as a simple measure by parents and also in community settings to assess the age appropriate oral function development in children that can be affected by eating behaviour.

KEYWORDS : Mouth Rinsing Function Test, Eating Behaviour, Oral Function, Feeding Practice.

INTRODUCTION:

Healthy Children are future of the bright nation. According to World Health Organization (WHO), Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.¹

Eating behaviour in children plays a vital role in development or prevention of health-related problems. It is a complex process affected by social, cultural, biological, ecological, and personal factors. Eating behaviour are established via different experiences with food within childhood period. Parental food habits, feeding practices, oral function, socioeconomic status are some of the factors that influences eating behaviour and can additionally affect the life of an individual.^{2,3}

A good oral health reflects the good general health and it also affects quality of life so, one should pay attention towards child's oral function/dysfunction to improve overall wellbeing. Oral functions include breathing, chewing, swallowing, mouth and tongue posture, speech, emotional communication, facial expression and appearance. In presence of oral habits e.g. sucking habits, biting habit, mouth breathing, abnormal swallowing pattern etc, oral function will be impaired.⁴ There are some problems of eating behaviour that can be related to oral function, like not chewing properly, fast chewing or swallow without chewing.⁵ Assessment of oral motor function can help identify the troublesome eating behaviour and hence it is essential for medical personnel and parents/caregivers to monitor eating pattern and intervene timely if deemed necessary.

Oral function is one of the most important factors for the maintenance of general condition in dependent elderly.⁶ According to Ikebe K et al [2011],] Marcelo P et al [2010],] Bakke M et al [1992], oral function evaluations in adults and the elderly were based on the occlusal force, diadochokinesis [Costa RD et al,2015], and colour changeable gum tests [Okada K et al,2010].⁷⁻¹¹

Schedule for Oral-Motor Assessment (SOMA), video fluoroscopic swallowing study (VFSS) [Moon Ju Ko et al,2011]¹² Oral Motor Assessment Scale, Functional Feeding Assessment–modified, Gisel

Video Assessment [C. Barton et al,2018]¹³, Adapted Orofacial Myofunctional Assessment Protocol [CASTRO et al,2012]¹⁴ are some of the assessment tools to evaluate oral motor functions in children.

Mouth rinsing function test (MRFT) was recently invented scale in Showa University, Japan. It is a simple, safe and low cost method to evaluate the oral function by grading mouth rinsing function in to five steps.⁵ (Table-1). Hence, this study was designed to evaluate the correlation between mouth rinsing function test and eating behavior in 4-7 years of children.

Table 1: Steps And Score Of MRFT

Score	Evaluation
1	Water cannot be held in mouth
2	Water can be held in mouth, but it is swallowed or spilled outside the mouth
3	Water can be rinsed around symmetrically
4	Water can be rinsed around asymmetrically but slowly
5	Water can be rinsed around asymmetrically well

MATERIAL AND METHOD:

The participants between the age of 4-7 years were selected from four primary schools in different zones in the Gandhinagar city for MRFT test and oral examination. Approval for this study was obtained from institute and respective authorities of selected schools.

The school staff distributed 300 closed ended questionnaires along with consent form about this study to the respective parents and collected the completed forms. Parents/guardians were invited to talk in person with the researchers if they had any doubt/question. Parents were also given one reference manual (approved by FDA) in which detailed information was mentioned regarding healthy and nutritious food, how much food does a child need according to age, healthy eating habits etc. Parents of 220 children gave the consent and returned the completed questionnaire. Rest of 80 children were absent at the time of the oral examination and MRFT test and their questionnaire forms were also not available. Therefore, only 220 participants were included; 84 boys and 136 girls. None of them had any illness or a

known medical history that could affect the tests.

Demographic details included in the questionnaire were the participants' age and sex. The eating behaviour was evaluated through the parental response of questionnaire form that assessed feeding practices, eating pattern, choice and adequacy of food, oral habits, mouth rinsing, etc. (Fig.1)

Student's Name: _____
 Age/Sex: _____

- What was the duration of breast/ bottle feeding of your child?
 A) 0-6months
 B) 6-12months
 C) >1year
- Does your child take nutritious food? (fruits, vegetables etc)
 Yes/No
- Does your child take meals at proper time?
 Yes/No
- Does your child take meals in adequate quantity?
 Yes/No
- Does your child chew properly?
 Yes/No
- Does your child eat slowly or fast?
 Slow/Fast
- Does your child like packed/ fast food?
 Yes/No
- Does your child have any deleterious oral habits?
 A) Thumb sucking
 B) Tongue thrusting
 C) Mouth breathing
 D) Lip sucking/lib biting
- Does your child get engaged in any other activity during eating?
 A) Mobile phone
 B) Television
 C) Playing
 D) other
- Can your child gargle or swish the water in mouth properly?
 Yes/No
- Do you know about the benefits of mouth rinsing?
 Yes/No

Fig.1- Parental Questionnaire Form For Recording Eating Behavior

The children were divided into three age groups; group-1: 4-5 years, group-2: 5-6 years and group-3: 6-7 years. A single investigator performed oral examination on each child in the sitting position in a school chair with the neck in anteflexion and with the help of diagnostic mouth mirror and explorer using natural light. After that MRFT test was performed. For that, each child was instructed to do the following actions, which were demonstrated for the child to imitate (Figure -2):



Take drinking water (approximately 10ml) into the mouth



Close the mouth keeping water in it.



Move both the cheeks symmetrically



Move the cheeks alternatively

Fig.2- Performance Of Mouth Rinsing Function Test.

The child was observed and evaluated from taking in the water to spitting it out and MRFT score was recorded.

Statistical Analysis:

The data were analysed using the SPSS statistics version 20.0. Chi-square test with $P < 0.05$ as significant value was applied to find out the significance of various responses. Correlations were assessed between questionnaire on eating behaviour and MRFT score using Spearman's rank correlation coefficients.

RESULTS:

The distribution of sample according to age and gender is shown in Table 2

Table 2: Distribution Of Sample

Years	Male %	Female%
4-5	23 (27.38)	49 (36.01)

5-6	28 (33.34)	45 (33.09)
6-7	29 (34.52)	46 (33.82)
Total=220	84 (100)	136 (100)

Parental responses of questionnaire form are mentioned in Table- 3. 58% of parents breast/ bottle fed their children for 6-12 months. Most of the children were taking nutritious food (73.6%) but not in adequate quantity (65.9%). Also, 41.4% parents responded that their children were not taking meal at the proper time. 65.9% parents stated that their children liked to have pack/fast food more. 13 out of 220 children had habit of mouth breathing and 6 had a habit of thumb sucking. While eating 20% of children got engaged in television watching. The majority of children were not chewing properly (77.7%). Inability to gargle or swish the water in mouth by their children was reported by 20.9 % parents and most of the parents were unaware of the benefits of mouth rinsing.

Mouth Rinsing Function Test And Eating Behaviour

Age wise distribution and MRFT score is given in Table -4. An average MRFT score of children between the age of 4-5 years was 3, 5-6 years was 4 and 6-7 years was 5. 8.3% children between 4-5 years of age have scored 2, 17.8% children (5-6years) have scored 3 and 1.3% children (6-7 years) have scored 4 ($p < 0.05$) (Table 4).

The eating behaviour and MRFT were correlated with Spearman correlation test (Table-5) which suggested that feeding practices, adequate quantities of food and chewing habits were positively correlated with mouth rinsing function test and were statistically significant. However, oral habits exhibited poor correlation ($p < 0.05$).

Table 3: Eating Behaviour As Reported By Parents.

1. What was the duration of breast/ bottle feeding of your child?	Number of children	Percentage (%)
Upto 6 months	92	41.8
6months-1 yr	128	58.2
>1yr	0	0
Total	220	100
2. Does your child take nutritious food? (fruits, vegetables etc)		
Yes	162	73.6
No	58	26.4
Total	220	100
3. Does your child take meals at proper time?		
Yes	129	58.6
No	91	41.4
Total	220	100
4. Does your child take meals in adequate quantity?		
Yes	75	34.1
No	145	65.9
Total	220	100
5. Does your child chew properly?		
Yes	49	23.3
No	171	77.7
Total	220	100
6. Does your child eat slowly or fast?		
Slow	91	41.4
Fast	129	58.6
Total	220	100
7. Does your child like packed/ fast food?		
Yes	75	34.1
No	145	65.9
Total	220	100
8. Does your child have any deleterious oral habits?		
No any habit	201	91.4
Thumb sucking	6	2.7
Tongue thrusting	0	0
Mouth breathing	13	5.9
Lip sucking/lib biting	0	0
Total	220	100
9. Does your child get engaged in any other activity during eating?		
No any activity	156	70.9
Mobile phone	16	7.3
Television	44	20
Playing	0	0
Other	4	1.8
Total	220	100

10. Can your child gargle or swish the water in mouth properly?		
No	46	20.9
Yes	174	79.1
Total	220	100
11. Do you know about the benefits of mouth rinsing?		
No	46	20.9
Yes	174	79.1
Total	220	100

Table- 4: Age Wise Distribution Of MRFT Score.

Score	Groups			Total	P Value
	4-5 years	5-6 years	6-7 years		
1	0 (0)	0 (0)	0 (0)	0 (0)	≤ 0.05 S
2	6 (8.3)	0 (0)	0 (0)	6 (2.7)	
3	66 (91.7)	13 (17.8)	12 (16)	91 (41.4)	
4	0 (0)	60 (82.2)	1 (1.3)	61 (27.7)	
5	0 (0)	0 (0)	62 (82.7)	62 (28.2)	
Total	72	73	75	220	

Table 5: Spearman Correlation Between Eating Behaviour And MRFT

Question	Correlation Value	P Value
1	0.134	0.047 S
2	0.025	0.715 NS
3	0.89	0.187 NS
4	0.132	0.042 S
5	0.148	0.028 S
6	0.167	0.013 S
7	-0.035	0.886 NS
8	-0.138	0.041 S
9	0.059	0.641 NS
10	0.009	0.894 NS
11	0.009	0.881 NS

(S- significant, NS- non significant)

DISCUSSION:

Nutrition is an essential part of a healthy life. Children need a wide range of nutritious food with high intake of minerals and vitamins to improve their quality of life. So, dietary habits should adapt at a young age and continue during later life. Good eating behaviour should be established in childhood as poor dietary habits can affect the overall growth of a child and it can increase risk of obesity also.¹⁵

Oral motor function in children is defined as the co-ordinated movement of the oral musculature including cheek, lips, tongue, jaw. The oral-motor aspect of eating involves oral muscles function, the strength of muscles, co-ordination of the range of motion and is fully developed as well as established by 3-4 years of age. The same coordination is required in mouth rinsing also. Thus, here in this study, Mouth Rinsing Function Test was performed to evaluate the oral function in children. Mouth rinsing not only helps to improve oral hygiene but it also improves the muscle co-ordination in children with defective oral motor function.¹⁶

Different methods are available to evaluate oral function in children like, using gummy jellies [Takada K, et al 1994, Tamura H, et al 1998] or occlusal force [Du X et al 2009].¹⁷⁻¹⁹ But these methods are cost effective and all parents are not ready for using food as children may be allergic to certain food. In their comparison mouth rinsing function test is simple, safe, low cost and can be easily applied in community settings without any need of specialized equipment or materials. Therefore, this test was used to evaluate the correlation between mouth rinsing function test and eating behavior in children.

Infant feeding practice has a strong association with later childhood eating behaviours. The American Association of Paediatric Dentistry recommends that breastfeeding is the ideal method of feeding practices and infant should breastfeed for 6 months of life after that iron rich solid food should be introduced.²⁰ Okubo et al [2016] suggested that more than 6 months of breastfeeding practice may prevent low intake of fruit and vegetables in early childhood²¹ Infant's flavour and food choice will develop during first 1000 days of life so following things should be done throughout these days: eating healthy diet during pregnancy, introduction of a variety of healthy foods during weaning, and exposing the child frequently to healthy food.²² It was found in our study that 6-12 months of breast/bottle feeding positively influenced eating behavior and MRFT score.

Parents play an important role in children's eating behavior in different ways: parents are actively making food choices for the family, serve as models for dietary choices, patterns, and use feeding practices to reinforce the development of eating patterns and behaviors that they deem appropriate. Parental food habits and feeding strategies are the most important factor to decide child's eating behaviour and food choices.²³ Majority of parents in this study stated that their children were having nutritious food though the adequacy of their diet was not satisfactory.

Oral habits are the main functional factors that influence the development of malocclusion e.g. sucking habits, biting habits, mouth breathing, alteration of swallowing etc. According to National Institute of Dental and Craniofacial research U.S. [2000], children with oral and orofacial disorder have the potential to compromise functioning, wellbeing and oral health quality of life.²⁴ Leme et al [2013], stated that children with habit group presented more oral dysfunction and had higher impact on quality of life. They concluded that presence of oral dysfunction is associated with worse oral health quality of life in subject with oral habits.²⁵ Our study is in accordance with this as the children without any deleterious oral habit had good MRFT score.

Obesogenic environment has negative influence on eating behaviour. Parents who are overweight or who are worried about their children of being obese should be more aware about high calorie food and should encourage their children to consume low fat food.²⁶

It was found in our study that large numbers of children were fond of pack and fast food. Nowadays, the media highly influences children's eating behaviours. There is a correlation between advertising for food product and children's diet and eating pattern; this will lead to high intake of snacks and less intake of fruits and vegetables. About 20% of children in our study also had a habit of watching television and most of the children did not chew properly. Thus, parents and caretakers should carefully monitor their children and they should limit their indulgence in any such activity and advertisement that can adversely affect their eating habit and behaviour.²⁷

In present study, the children who chewed properly tended to have high MRFT score. Defective oral function leads to slow or inefficient chewing, food left in the mouth, food falling from the mouth, gagging, coughing or choking, low intake of food etc. There are many motor exercises that can strengthen and improve the co-ordination of oral muscles. One of the exercises is puff the cheeks by holding the air and lips are sealed or rinsing the mouth. The movement of mouth rinsing requires the oral musculature to function properly (specially movement of the cheeks) and oral dexterity to move the mouth symmetrically as well as asymmetrically.²⁸⁻³⁰ Many of the parents in our study were not aware about mouth rinsing benefits and hence they should be made conversant that the efficiency and ability of their children to swish the water in mouth, gargle or mouth rinsing by age of 6-7 years can be used as a measures to assess adequate oral function.

Mastication is a complex function which involves masticatory muscles and requires asymmetrical jaw movement.³¹⁻³⁴ It was observed while performing MRFT test, low MRFT score children were not able to do asymmetrical rinsing movement and this may affect their masticatory movement. This might explain why children who had a problem with eating according to the questionnaire response had low MRFT scores. So, it can be advocated that MRFT is correlated to eating behaviour and children should be motivated in their early life to adapt appropriate oral function.⁵

The presented study did not account for factors like height, weight, oral pain, developmental milestones, etc. which could affect the development of oral function. Hence a more comprehensive study with larger sample size should be carried out to determine the factors affecting oral function.

CONCLUSION:

MRFT is effective and easily acceptable by the community. Eating behavior was related to MRFT score hence, children not meeting age appropriate MRFT score should be in detailed assessed for adequate oral function and if deemed necessary, timely efforts should be made to improve their oral and general health.

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