



Behavioral feeding assessment in autistic children

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Abstract:

The goal of this study is to describe the feeding behavior in children with autism spectrum disorders. Feeding problems may have a significant impact on the child's growth, development, and opportunities for social and community participation. The MCH-Feeding Scale is an easy method that can be used for evaluation behavioral feeding problems. There is clear difference in the behavior feeding among ASD children and TD children. The MCH-Feeding Scale is an easy method that can be used for evaluation behavioral feeding problems.

Keywords: ASD; Autism ; feeding

1. Introduction

Autism is group of heterogeneous neurodevelopmental conditions, characterised by early-onset problems in social communication and surprisingly repetitive actions and interests[1]. ASD kids display higher meals selectivity, which restricts intake of some foods, consuming a limited food types and the consumption of a single food frequently & this can lead to dietary deficiencies [2]. Learning to eat is a very complicated process that is stimulated by many biophysiological and environmental factors. Pediatric food

refusal is characterised by avoidance or limit of food consumption that effects in inadequate nutrition via oral intake. This is frequently followed by great weight reduction and a failure to gain weight, dependence on enteral feedings or food supplements, or interference with social functioning [3].

Kids with feeding disorders often have multiple co-occurring medical and developmental conditions. Feeding disorders are often related to the history of different developmental disabilities, bodily disabilities. These disorders can take the shape of overall

or partial food refusal or refusal based on the sensory features or characteristics of the food including color, smell, appearance, texture, kind or brand, that's often known as food selectivity [4].

Feeding disorders might have a widespread effect on the child's growth, development, and opportunities for social and network participation [5]. Assessment and management are best performed by a group of specialists. The group has to include a gastroenterologist, nutritionist, behavioral psychologist and phoniatician. Most of feeding disorders may be resolved or significantly progressed via medical, and behavioral therapy [6].

The idea of the whole team method is advocated by experts which include a psychiatrist, psychologist, paediatrician, nurse, dietician and phoniatician. The 'whole team' method found in expert services, related to proper management and a coherent treatment philosophy, it seems to be more important for final results than the specific skills of any individual working in a different setting [7].

2. Patients and Methods:

This was a case control study was carried out at the Phoniatics clinic; Beni-Suef university. The parents or care givers of autistic children and typically developing children were investigated for inclusion and exclusion criteria. If found fitting as

candidates for the research, they were asked to consent to participate in a questionnaire that is not time consuming from October till December 2019 involving Egyptian parents or care givers of 35 children diagnosed as autism compared with 70 typically developing children.

2.1 Inclusion criteria:

Individuals were eligible for inclusion in this study if they met the following criteria:

- (1) Diagnosis of autism, informed by team of specialists best estimate according to (DSM5)
- (2) Chronological age from 2 years to 4 years.

2.2 Exclusion criteria:

- (1) Neuromotor disorders interfering with study assessments.
- (2) Known genetic or chromosomal abnormality.
- (3) Great visual or hearing impairment.

B. All the subjects were submitted to the following evaluation:

1) Elementary diagnostic procedures:

A) Patient and parent interview with through medical history:

- Complaint and analysis of symptoms
- Personal history

B) Feeding history

Clinical diagnostic Aids:

A- *PSYCOMETRIC EVALUATION:* (1) Vineland Adaptive Behavior Scale [8]. (2) Childhood Autism Rating Scale (CARS)[9].

B- *Language Evaluation:* The Modified Preschool Language-four (Modified PLS-4) [10].

C-*The Montreal Children's Hospital Feeding [11].*

Analysis of data was performed using SPSS v. 25 (Statistical Package for Social science) for Windows.

Description of variables was presented as follows:

Description of quantitative variables was in the form of mean, standard deviation (SD).

Description of qualitative variables was in the form of numbers (No.) and percent's (%).

Data was explored for normality using kolomogrove test.

Chi-square test was used to compare cases and controls regarding the categorical variables.

T-test was used to compare between cases and controls regarding the normally distributed

scale variable and Mann-whitney test for the non-normally distributed data.

The significance of the results was assessed in the form of P-value that was differentiated into:

Non-significant when P-value > 0.05

Significant when P-value ≤ 0.05

Highly significant when P-value ≤ 0.001

3. Results:

Statistical distribution of the patients who participated in this study:

This study was done on parents and care givers of 35 children with males representing 25.7% and female representing 74.3% diagnosed as autism compared with 70 typically developing children with males representing 55.7% and females representing 44.3%, The mean age of children with ASD is 3.3±0.64, that of typically developing children is 3.2±0.76.

Table (1): Comparison of special types of food preference (selectivity) (fruit/vegetable/ starch) among children with autism spectrum disorder (ASD) and typically developing (TD) children .

Food Type	Children with ASD Count (%) (n = 35)	TD children Count (%) (n = 70)	P-value
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Fruits (Orange, apple, banana, melon, mango.....)	no	4 (12.1%)	0(0.0 %)	0.034*
	some	15 (45.5%)	23 (71.9%)	
	all	14 (42.4%)	9 (28.1%)	
Vegetables (carrot, cucumber, brocli,)	no	2 (6.1%)	2 (6.3%)	0.995
	some	20 (60.6%)	19 (59.4%)	
	all	11 (33.3%)	11 (33.4%)	
Meat (red meat, chicken, fish, meat balls, chicken balls,)	no	8 (24.2 %)	1 (3.1 %)	0.038*
	some	19 (57.6 %)	21 (65.6 %)	
	All	6 (18.2 %)	10 (31.3%)	
Milk products (milk, yogurt, cheese,	No	3 (9.1%)	1 (3.1%)	0.488
	some	18 (54.5%)	16 (50.0%)	
	All	12 (36.4%)	15 (46.9%)	
Juice (orange, lemon, apple, mango,	No	0 (0.0%)	0 (0.0%)	0.316
	some	15 (46.9%)	19 (59.4%)	
	all	17 (53.1%)	13 (40.6%)	
Starch (potato ,macaroni , rice , ...)	no	0 (0.0%)	0 (0.0%)	0.244
	some	11 (35.5%)	16 (50.0%)	
	all	20(64.5%)	50.0%)	

(Some) means not more than 2 types, (more) means more than 2 types

Table (1) showed that:

-Autistic children prefer more meats (P-value=0.038) & fruits (P-value=0.034) than the TD children.

-There was no significant difference between cases and controls regarding eating vegetables, Milk products, Juice and starch.

Table(2): comparison between 14 items of The Montreal Children's Hospital Feeding Scale in autistic children & typically developing children.

Item	Children with ASD (n = 35)	TD children (n = 70)	P value
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item 1	4.7143±1.84026	5.4412±1.71371	0.049*
item 2	3.7714±1.78368	2.7647±1.92484	0.011*
item 3	4.6000±1.51851	5.2941±1.97793	0.072
item 4	5.1143±2.29797	4.5882±2.76565	0.336
Item 5	1.7143±1.29641	1.5294±.95371	0.413
Item 6	3.8857±1.84345	2.4118±1.42719	<0.001**
Item 7	1.7429±85209	1.5000±.78227	0.151
Item 8	5.6857±1.45059	5.9118±1.55242	0.476
Item 9	3.3143±1.79495	2.6765±2.01073	0.117
Item 10	4.7143±1.84026	3.8235±2.38741	0.056
Item 11	1.9429±1.18676	1.6176±.97780	0.141
Item 12	5.6000±1.11672	5.8824±1.70626	0.378
Item 13	1.0286±0.16903	3.01±0.17021	<0.001**
Item 14	6.9143±0.37349	1.6±0.011	<0.001**
Total score	67.4±3.6	62.7±4.9	<0.001**

Table (2) showed that there was a significant increase of the total score of the ASD children than the TD children (P-value<0.001). Data presented as mean ± SD. *Items 1,2,6,13,14 and the total score differed significantly by group at P<0.01

4. Discussion:

This study represents an evaluation of the feeding problems in children with ASD and comparing them with normal. The selected groups were two groups of (2-4) years old for early intervention if feeding difficulties were found. The sample of autistic children was 26 males and 9 females, it was random sample. We expected that males would be more than females as we know that ASD is a neurodevelopmental disorder with a male-to-female prevalence of 4:1 as [12] mentioned. The genetic mechanisms underlying this gender difference continue to be not clear as

[13] explained. The “extreme male mind theory” is a outstanding theory to give an explanation for that this gender bias, which shows that fetal testosterone exposure, might underlie gender difference in autistics traits [14]. We used psychometric traits of a newly developed; it's miles a brief bilingual 14-item parent report tool (The Montreal Children's Hospital Feeding Scale [MCH-Feeding Scale]) that was designed to discover feeding troubles in kids from six months to 6 years of age. The MCH-Feeding Scale may be utilized by pediatricians and different health care specialists for detection of feeding troubles

[11]. We selected this scale due to the fact that it is quickly administered in an outpatient clinic, in about five min, with suitable reliability. Regarding MCH-Feeding Scale effects confirmed that ASD kids caregivers discovered problem with mealtimes in their kids more than TD kids, that was expected as autistic kids want more care and want more help in consuming manner and nearly in their activities [15].

Autistic kids caregivers had been concerned approximately their kids eating more than TD kids caregivers as in table (2) that was expected because the caregivers of the ASD kids realize that well, many people with autism have food aversions and sensitivities due to neophobia they suffer from [16]. [17] & [18] mentioned that stress is a common experience for dad and mom caring for a kid with autism, parents who advocated more feeding troubles mentioned better degrees of pressure than people who suggested fewer feeding troubles [4]. ASD kids had been acting up, creating a massive fuss for the duration of mealtimes more than TD kids as in table (2) as hyperactivity frequently arise in people with ASD [19]. The caregivers of autistic kids assumed that their kids feeding affect their relationship with their kids & affect their family relationships negatively [11].

We also used semi structured interview that we adapt it into Arabic language, the interview carries questions that aren't present (The Montreal Children's Hospital Feeding Scale [MCH-Feeding Scale]) to cover most of feeding troubles in ASD & evaluating them with TD kids having the identical age group. The results described a nutritional sample in kids with ASD characterized by a decrease intake of meat. The results aren't handiest displaying decrease consumption of proteins, minerals as in kids with ASD as mentioned by [21] & [22] however also showed a considerable increase of eating fruits and meats in the TD kids than the ASD kids as showed in table (1). We notified decrease intake of fishes as caregivers referred in kids with ASD who usually eat lower quantities of fish than TD kids [21].

The low fish intake is associated with the low consumption of omega-three fatty acids. Both ASD and TD kids prefer juice (orange, lemon, apple, mango, etc.) and starch (potato, macaroni, rice, etc.) in nearly a similar rate. It seems that autistic kids like sugary flavor of juice as most of kids & considerably more likely to just accept only low-texture meals (puréed & liquid) [20]. Results showed that the most forms of milk products have been preferred by ASD kids, they prefer yogurt (as it is low – structure food).

5. Conclusion and Recommendations

There is clear difference in the behavior feeding among ASD children and TD children. The MCH-Feeding Scale is an easy method that can be used for evaluation behavioral feeding problems. Our findings suggest the need to early investigate feeding behaviors and to develop practical feeding approaches for ASD children to maintain

nutritional adequacy. Future studies with larger sample size should focus on alternative assessment methods as objective measures of food selectivity with valid dietary patterns measures. Evaluation of autistic feeding problems should be as soon as the diagnosis is established for early helping the parents and caregivers.

6- Appendix:



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The MCH-Feeding Scale

(For children: 6 months - 6 years)

Numbers in boxes represent feeding difficulties

- | | | | | | | | | | | |
|-----|---|---|--|--|----------------------------|----------------------------|----------------------------|----------------------------|--|---------------------|
| 1. | How do you find mealtimes with your child? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <i>Very difficult</i> | <i>Easy</i> | | |
| 2. | How worried are you about your child's eating? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 | | | | | <i>Not worried</i> | <i>Very worried</i> | |
| 3. | How much appetite (hunger) does your child have? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <i>Never hungry</i> | <i>Good appetite</i> | | |
| 4. | When does your child start refusing to eat during mealtimes? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <i>At the beginning</i> | <i>At the end</i> | |
| 5. | How long do mealtimes take for your child (in minutes)? | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <i>1-10</i> <i>11-20</i> <i>21-30</i> <i>31-40</i> <i>41-50</i> <i>51-60</i> <i>>60 min</i> | |
| 6. | How does your child behave during mealtimes? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 | | | | | <i>Behaves well</i> | <i>Acts up, makes a big fuss</i> | |
| 7. | Does your child gag or spit or vomit with certain types of food? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 | <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 | | | | | <i>Never</i> | <i>Most of the time</i> | |
| 8. | Does your child hold food in his/her mouth without swallowing it? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <i>Most of the time</i> | <i>Never</i> | | |
| 9. | Do you have to follow your child around or use distractions (toys, TV) so that your child will eat? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 | | | | <i>Never</i> | <i>Most of the time</i> | |
| 10. | Do you have to force your child to eat or drink? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | <i>Most of the time</i> | <i>Never</i> | | |
| 11. | How are your child's chewing (or sucking) abilities? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 | <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 | | | | | <i>Good</i> | <i>Very poor</i> | |
| 12. | How do you find your child's growth? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | | | | <i>Growing poorly</i> | <i>Growing well</i> |
| 13. | How does your child's feeding influence your relationship with him/her? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 | | | | <i>Very negatively</i> | <i>Not at all</i> |
| 14. | How does your child's feeding influence your family relationships? | <input type="checkbox"/> 1 <input type="checkbox"/> 2 | <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 | | | | | <i>Not at all</i> | <i>Very negatively</i> | |



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The MCH-Feeding Scale Scoring Sheet

Child's name: _____

Birth date: _____

Date of screening: _____

Age: _____

To get the total raw score:

1. Enter the scores of the 7 items with asterisk in first column.
2. Reverse the scores for the items with asterisk in the 1st column (1→7, 2→6, 3→5, 4→4, 5→3, 6→2, 7→1) and enter the reversed scores in the 2nd column.
3. Enter the scores of the 7 items without asterisk in the 2nd column.
4. Add the scores of the 14 items in the 2nd column to get total raw score.

Items	1*	_____	_____
	2	_____	_____
	3*	_____	_____
	4*	_____	_____
	5	_____	_____
	6	_____	_____
	7	_____	_____
	8*	_____	_____
	9	_____	_____
	10*	_____	_____
	11	_____	_____
	12*	_____	_____
	13*	_____	_____
	14	_____	_____
Total raw score:		_____	_____

T score equivalents for MCH-FS total raw scores

Raw score	T-score	Raw score	T-score	T-score Ranges	Interpretation
14	35	56	68		
15	36	57	69	61 to 65	Mild Difficulties
16	37	58	70		
17	38	59	71	66 to 70	Moderate Difficulties
18	39	60	72		
19	39	61	72	Above 70	Severe Difficulties
20	40	62	73		
21	41	63	74		
22	42	64	75		
23	43	65	76		
24	43	66	76		
25	44	67	77		
26	45	68	78		
27	46	69	79		
28	46	70	80		
29	47	71	80		
30	48	72	81		
31	49	73	82		
32	50	74	83		
33	50	75	83		
34	51	76	84		
35	52	77	85		
36	53	78	86		
37	54	79	87		
38	54	80	87		
39	55	81	88		
40	56	82	89		
41	57	83	90		
42	57	84	91		
43	58	85	91		
44	59	86	92		
45	60	87	93		
46	61	88	94		
47	61	89	94		
48	62	90	95		
49	63	91	96		
50	64	92	97		
51	65	93	98		
52	65	94	98		
53	66	95	99		
54	67	96	100		
55	68	97	101		
		98	102		

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