

Assessment And Behavior Therapy For Feeding Problems In Neurologically Impaired Children

By

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- **Brain Damage Motor Handicap (BDMH), previously called cerebral palsy (C.P.) may be defined as a stationary non-progressive disorder of posture and movement often associated with epilepsy and communication disorder, and problems with hearing, vision and intellect resulting from a defect or lesion of the developing brain (*Hagber et al., 1993*).**
- **Many individuals with BDMH manifest oral-ingestive problems, in addition to other developmental problems. These problems may affect food-getting, masticatory efficiency, the formation of a swallow-safe bolus and the initiation of swallow (*Kenny et al., 1989*).**

Hagber, B., Hagberg, G., and Olow, I., (1993): The changing panorama of cerebral palsy in Sweden. Acta pediatric; 32:387-393.

Kenny D.J., Koheil R.M., Greenberg J., Reid D., Moran R., (1989): Development of a multidisciplinary feeding profile for children who are dependent feeders. Dysphagia 4: 16-28.

Aim of the work

The aim of this prospective study is to evaluate the feeding problems in a group of BDMH children in order to:

- identify the physiological breakdown in their feeding functions, and to
- help in formulation of proper management strategies.

Subjects and Methods:

(I) Subjects :

- This study was conducted in the Unit of Phoniatics, Mansoura University Hospitals on (50) children with BDMH (34 males and 16 females) with their ages ranged between 2 years 1month and 11years.
- The studied children had different types of BDMH [spastic (40), dyskinetic (4), ataxic (2), mixed (2), atonic (2)] and degrees of severity [mild (12), moderate (26), severe (12)].

Subjects and Methods: (cont.)

(II) Assessment of children:

All the children were evaluated through a specially designed diagnostic protocol that is applied in Phoniatic Unit, Mansoura University Hospitals (*Abou-Elsaad, 2002*). The protocol included the following:

- A- patient/parent's interview** (the child's feeding routine).
- B- Clinical examination** (vocal tract and neurological examinations).
- C- Communicative abilities of the child.**
- D- Formal testing** for cognitive and perceptual abilities of the child (Stanford Binet Test).

Abou-El Saad, T.,(2002): Swallowing problems in children. A lecture presented in 2nd Mansoura Symposium on phoniatic problems in children, March 2002.

Subjects and Methods: (cont.)

E- Oral-Motor and Feeding Assessment:

- 1. Pre-feeding assessment:** (parent-child interactions, head control and sitting balance...)
- 2. Oral-Motor Structure and Function Assessment:**
 - Precision, strength, range and symmetry of motion.
 - Oral sensory examination (hypersensitivity or hyposensitivity).
 - Primitive oral reflexes e.g. rooting, phasic bite, tongue protrusion reflexes.
- 3. Functional feeding assessment:**

The children were assessed during eating using The "Pediatric Feeding Assessment Checklist" (*Abou-Elsaad and Abdelatif, 2008*).

Abou-Elsaad, T. and Abdelatif, G. (2008): Assessment of functional feeding and swallowing biomechanics in normal children. Banha Medical Journal, Vol. 25, No 3, Sept. 2008, PP 273-293 .

Assessment And Behavioral Therapy Of Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

3. Functional feeding assessment: (cont.)

- The feeding domains assessed were:

- 1) **Spoon feeding: using pudding.**
- 2) **Cup and Straw drinking: using water.**
- 3) **Biting and Chewing: using biscuits.**
- 4) **Drooling: during feeding with solid foods (biscuits).**



Pediatric Feeding Evaluation Checklist			
Mansoura University Hospitals			
Medical Center of Phoniatrics and Communication Disorders			
Swallowing Disorders Clinic			
Child Name :		Gender: M / F	Age :
Address :		Date of evaluation : / /	Examiner :
Purpose of the study : initial / recheck		Telephone # :	Tape # :
Diagnosis :		Referring facility :	(inpatient / outpatient)
Spoon Feeding			
Normal behaviors	Adequate	Poor	Absent
▶ Upper lip moves downward, forward, and inward to assist in food removal.			
▶ Lower lip draws inward as the spoon is removed.			
Abnormal behaviors	Absent	Inconsistent	Present
▶ Phasic bite reflex.			
▶ Food loss.			
Cup Drinking			
Normal behaviors	Adequate	Poor	Absent
▶ Lip seal around the cup.			
▶ The jaw in a semi-open stable position.			
▶ A sequence of sips.			
Abnormal behaviors	Absent	Inconsistent	Present
▶ Cup is held between the teeth.			
▶ Tongue protrusion.			
▶ Liquid loss.			
Straw Drinking			
Normal behaviors	Adequate	Poor	Absent
▶ Lip seal around the straw.			
▶ A sequence of sips			
Abnormal behaviors	Absent	Inconsistent	Present
▶ Liquid loss.			
▶ Biting the straw by teeth.			

Biting			
Normal behaviors	Adequate	Poor	Absent
▶ Sustained, controlled bite.			
Abnormal behaviors	Absent	Inconsistent	Present
▶ Phasic bite.			
▶ Tonic bite.			
Chewing			
Normal behaviors	Adequate	Poor	Absent
▶ Diagonal or circular rotatory pattern of the jaw.			
▶ The lips are closed during swallowing.			
Abnormal behaviors	Absent	Inconsistent	Present
▶ Extension–retraction movement of the tongue.			
▶ Loss of food or saliva.			
Drooling			
Normal behaviors			
No drooling.			
Abnormal behaviors			
▶ Mild drooling (To lips only).			
▶ Moderate drooling (lip and chin).			
▶ Severe drooling (clothing soiled).			
Comment:	*Normal behaviors: 0 = absent 1 = poor 2 = adequate *Abnormal behaviors: 0 = Present 1 = inconsistent 2 = Absent *Drooling: 0 = Severe 1 = Moderate 2 = Mild 3 = No drooling		
Recommendations:			

Examples of abnormal feeding behaviors in BDMH children



Spoon feeding: poor upper and lower lips movements and food loss.



Cup drinking: poor lip seal, teeth holding and liquid loss.



Straw drinking: biting down the straw



Straw drinking: poor lip seal and liquid loss.

Examples of abnormal feeding behaviors in BDMH children (cont.)



Biting: absent sustained controlled bite .



Chewing: open lips, extension-retraction of tongue, food loss and drooling.

Assessment And Behavioral Therapy Of Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention:

The BDMH children were subjected to Behavioral Re-Adjustment Therapy (BRAT). The protocol of therapy was tailored for each child to correct the most evident breakdown of his/her feeding problems.

The individual training was conducted 30 minutes per session and was provided regularly on a biweekly basis for 3 months. A home program was counseled after every session to the patient's caregivers.

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

The BRAT technique included the following protocol of therapy:

(1) Modification of the manner of feeding:

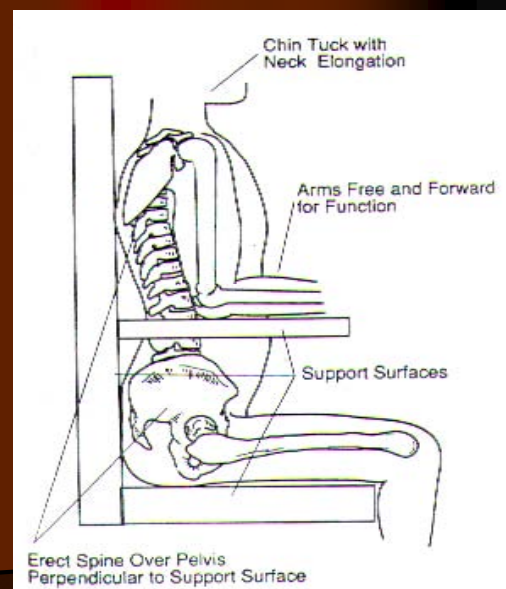
- Scheduling of mealtime.
- Pacing during mealtimes for regulating the time interval between bites and swallows.
- Environmental modification through reducing or increasing visual and auditory stimulation.

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

(2) Positioning and posture changes:

The optimal body position used was an upright 90-degree sitting position with hips, knees and ankles flexed at a 90-degree angle and feet flat on a surface. The chin was slightly flexed with arms and hands near midline of the body.



Assessment And Behavioral Therapy OF Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

3- Oral sensory-motor therapy techniques:

- In the hypertonic child (44 children, 88%), massaging of the cheeks and lips with the therapist's middle and index fingers were used to enhance relaxation of the facial musculature.



Assessment And Behavioral Therapy OF Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

3- Oral sensory-motor therapy techniques: (cont.)

- In the hypotonic child (6 children, 12%) tapping, vibration and quick stretch were used to improve the function and increase the tone.



Assessment And Behavioral Therapy Of Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

3- Oral sensory-motor therapy techniques: (cont.)

- Desensitization program was applied for the 18 children (36%) who showed hypersensitivity to touch at face and oral cavity.
- Intra-oral stimulation was used to decrease oral tactile hypersensitivity by the sequential application of pressure to specific oral areas e.g. massaging the upper and lower gums using an Infa-Dent finger® or NUK brush® in an anterior to posterior direction beginning in the midline.



Assessment And Behavioral Therapy Of Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

3- Oral sensory-motor therapy techniques: (cont.)

- In children who had low muscle tone, weak jaw muscles, or inconsistent control, the "snack cap" was used to improve the child's awareness of jaw movements and increase strength.
- Also the resistance the child felt while pulling thicker liquids through a longer straw increased the lip and cheek control.



Assessment And Behavioral Therapy Of Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

(4) Adaptive feeding utensils:

Varieties of specially adapted utensils were used according to the skills needed for food delivery and self-feeding.



(5) Modification of the food variables (volume, consistency).

Assessment And Behavioral Therapy Of Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

(III) Intervention: (cont.)

(6) Management of drooling:

The focus of training included: *(Morris and Klein, 1987 and Klein and Delaney, 1994).*

- optimizing head control and body posture,
- enhancing lip closure,
- facilitating active swallowing,
- improving tongue control,
- normalizing facial and oral sensation and
- increasing self-awareness of drooling.

Morris S, and Klein M (1987): Pre-feeding skills: A comprehensive resource for feeding development. Therapy Skill Builders, Tucson, AZ.

Klein MD and Delaney TA (1994): Feeding and nutrition for the child with special needs: Handouts for parents. Communication Skill Builders.

Assessment And Behavioral Therapy OF Feeding Problems In Neurologically Impaired Children

Subjects and Methods: (cont.)

The patients were re-assessed after treatment to evaluate the effectiveness of the behavioral therapy (pre-test versus end-test evaluations).

The feeding domains behaviors (normal and/or abnormal) were compared among the BDMH groups that have different degrees of severity.

Results

Results

Table (1): Comparison of spoon feeding behaviors (normal-abnormal) according to BDMH degree in pre-test versus end-test evaluations:

Behavior		Mild BDMH (n=12)		Moderate BDMH (n=26)		Severe BDMH (n=12)		
		Pre-test	End-test	Pre-test	End-test	Pre-test	End-test	
Normal	Upper lip movement	Ad	10(83.3%)	12(100%)	6(23.1%)	22(84.6%)**	-	-
		P	2(16.7%)	-	14(53.8%)	4(15.4%)	2(16.7%)	8(66.7%)
		Ab	-	-	6(23.1%)	-	10(83.3%)	4(33.3%)*
	Lower lip movement	Ad	10(83.3%)	12(100%)	6(23.1%)	22(84.6%)**	-	-
		P	2(16.7%)	-	14(53.8%)	4(15.4%)	2(16.7%)	8(66.7%)
		Ab	-	-	6(23.1%)	-	10(83.3%)	4(33.3%)*
Abnormal	Phasic bite refl.	Ab	12(100%)	12(100%)	22(84.6%)	24(92.3%)	6(50%)	6(50%)
		Inc	-	-	4(15.4%)	2(7.7%)	4(33.3%)	4(33.3%)
		Pr	-	-	-	-	2(16.7%)	2(16.7%)
	Food loss	Ab	10(83.3%)	12(100%)	6(23.1%)	14(53.8%)**	-	-
		Inc	2(16.7%)	-	12(46.2%)	10(38.5%)	-	6(50%)
		Pr	-	-	8(30.8%)	2(7.7%)	12(100%)	6(50%)*

Wilcoxon signed ranked test, * $P < 0.05$ (significant) and ** $P < 0.01$ (highly significant). Ad=adequate; P=poor; Ab=absent; inc=inconsistent; pr=present.

Results

Table (2): Comparison of cup drinking behaviors (normal-abnormal) according to BDMH degree in pre-test versus end-test evaluations:

Behavior		Mild BDMH (n=12)		Moderate BDMH (n=26)		Severe BDMH (n=12)		
		Pre-test	End-test	Pre-test	End-test	Pre-test	End-test	
Normal	Lip seal around cup	Ad	10(83.3%)	12(100%)	4(15.4%)	10(38.5%)**	-	-
		P	-	-	14(53.8%)	16(61.5%)	-	6(50%)
		Ab	2(16.7%)	-	8(30.8%)	-	12(100%)	6(50%)*
	The jaw position	Ad	12(100%)	12(100%)	20(76.9%)	20(76.9%)	-	-
		P	-	-	2(7.7%)	6(23.1%)	10(83.3%)	10(83.3%)
		Ab	-	-	4(15.4%)	-*	2(16.7%)	2(16.7%)
	Sips seq.	Ad	10(83.3%)	10(83.3%)	4(15.4%)	4(15.4%)	-	-
		P	-	2(16.7%)	12(46.2%)	20(76.9%)	-	4(33.3%)
		Ab	2(16.7%)	-	10(38.5%)	2(7.7%)**	12(100%)	8(66.7%)*
Abnormal	Cup holding	Ab	10(83.3%)	12(100%)	24(92.3%)	24(92.3%)	2(16.7%)	2(16.7%)
		Inc	2(16.7%)	-	2(7.7%)	2(7.7%)	10(83.3%)	10(83.3%)
		Pr	-	-	-	-	-	-
	Tongue protr	Ab	10(83.3%)	12(100%)	18(69.2%)	20(76.9%)*	-	-
		Inc	2(16.7%)	-	2(7.7%)	6(23.1%)	8(66.7%)	10(83.3%)
		Pr	-	-	6(23.3%)	-	4(33.3%)	2(16.7%)
	Liquid loss	Ab	6(50%)	8(66.7%)	4(15.4%)	4(15.4%)	-	-
		Inc	4(33.3%)	4(33.3%)	8(30.8%)	22(84.6%)	-	-
		Pr	2(16.7%)	-	14(53.8%)	-**	12(100%)	12(100%)

Wilcoxon signed ranked test, * $P < 0.05$ (significant) and ** $P < 0.01$ (highly significant).

Results

Table (3): Comparison of **straw drinking behaviors** (normal-abnormal) according to BDMH degree in pre-test versus end-test evaluations:

Behavior		Mild BDMH (n=12)		Moderate BDMH (n=26)		Severe BDMH (n=12)		
		Pre-test	End-test	Pre-test	End-test	Pre-test	End-test	
Normal	Lip seal.	Ad	10(83.3%)	10(83.3%)	4(15.4%)	8(30.8%)**	-	-
		P	-	2(16.7%)	12(46.2%)	14(53.8%)	-	2(16.7%)
		Ab	2(16.7%)	-	10(38.5%)	4(15.4%)	12(100%)	10(83.3%)
	Sips sequences	Ad	10(83.3%)	10(83.3%)	4(15.4%)	4(15.4%)	-	-
		P	-	2(16.7%)	8(30.8%)	14(53.8%)	-	-
		Ab	2(16.7%)	-	14(53.8%)	8(30.8%)*	12(100%)	12(100%)
Abnormal	Liquid loss	Ab	-	8(66.7%)**	-	-	-	-
		Inc	10(100%)	2(16.7%)	8(50%)	14(70%)	-	-
		Pr	-	2(16.7%)	8(50%)	6(37.5%)	2(100%)	2(100%)
	Biting the straw	Ab	10(83.3%)	12(100%)	14(53.8%)	14(53.8%)	2(16.7%)	2(16.7%)
		Inc	2(16.7%)	-	8(30.8%)	8(30.8%)	8(66.7%)	10(83.3%)
		Pr	-	-	4(15.4%)	4(15.4%)	2(16.7%)	-

Wilcoxon signed ranked test, *= $P < 0.05$ (significant) and **= $P < 0.01$ (highly significant).

Results

Table (4): Comparison of **chewing behaviors** (normal-abnormal) according to BDMH degree in pre-test versus end-test evaluations:

Behavior		Mild BDMH (n=12)		Moderate BDMH (n=26)		Severe BDMH (n=12)		
		Pre-test	End-test	Pre-test	End-test	Pre-test	End-test	
Normal	Diag. / circ. Rot. pattern	Ad	6(50%)	10(83.3%)*	-	-	-	-
		P	6(50%)	2(16.7%)	26(100%)	26(100%)	8(66.7%)	8(66.7%)
		Ab	-	-	-	-	4(33.3%)	4(33.3%)
	Lips closure	Ad	10(83.3%)	10(83.3%)	2(7.7%)	2(7.7%)	-	-
		P	-	-	12(46.2%)	22(84.6%)	4(33.3%)	6(50%)
		Ab	2(16.7%)	2(16.7%)	12(46.2%)	2(7.7%)**	8(66.7%)	6(50%)
Abnormal	Phasic bite reflex.	Ab	12(100%)	12(100%)	18(69.2%)	22(84.6%)**	-	6(50%)*
		Inc	-	-	2(7.7%)	4(15.4%)	-	6(50%)
		Pr	-	-	6(23.1%)	-	12(100%)	-
	Food loss	Ab	10(83.3%)	10(83.3%)	4(15.4%)	14(53.8%)**	-	-
		Inc	2(16.7%)	2(16.7%)	12(46.2%)	12(46.2%)	-	4(33.3%)
		Pr	-	-	10(38.3%)	-	12(100%)	8(66.7%)*

Wilcoxon signed ranked test, *= $P < 0.05$ (significant) and **= $P < 0.01$ (highly significant).

Results

Table (5): Comparison of **degrees of drooling** according to **BDMH degree** in pre-test versus end-test evaluations:

Degree of Drooling	Mild BDMH (n=12)		Moderate BDMH (n=26)		Severe BDMH (n=12)	
	Pre-test	End-test	Pre-test	End-test	Pre-test	End-test
No	4(33.3%)	8(66.7%)*	-	4(15.4%)*	-	-
Mild	8(66.7%)	4(33.3%)*	12(46.2%)	8(30.8%)	-	-
Moderate	-	-	10(38.5%)	14(53.8%)	6(50%)	8(66.7%)
Severe	-	-	4(15.4%)	-	6(50%)	4(33.3%)

Wilcoxon signed ranked test *=P < 0.05 (significant)

Results

Table (6): Comparison of **degrees of drooling** in BDMH children according to **degree of I.Q.** in pre-test versus end-test evaluations:

Degree of Drooling	Below average and mild MR (n=20)		Moderate MR (n=14)		Severe MR (n=16)	
	Pre-test	End-test	Pre-test	End-test	Pre-test	End-test
No	4(20%)	10(50%)*	-	2(14.2%)	-	-
Mild	12(60%)	6(30%)*	8(57.1%)	6(42.9%)	-	-
Moderate	-	4(20%)	6(42.9%)	6(42.9%)	10(62.5%)	12(75%)
Severe	4(20%)	-	-	-	6(37.5%)	4(25%)

Wilcoxon signed ranked test *=P < 0.05 (significant)

Summary of the results

Summary of the results

- BDMH children demonstrated statistically significant improvements in feeding domains behaviors in end-test when compared to pre-test except with biting which demonstrated statistically non-significant difference.
- Although the significant improvement of spoon feeding behaviors of moderate and severe BDMH children, there was no child of the severe BDMH children reached to adequate degree of the behaviors.

Summary of the results (cont.)

- The mildly and moderately impaired BDMH children demonstrated the most significant improvements. This indicates that the degree of severity has a significant role in the success of the BRAT techniques in BDMH children.
- The below average mentality, mild and moderate mentally retarded BDMH children demonstrated the most significant improvement. This also indicates that the cognitive abilities of the BDMH children has a significant role in the success of behavior feeding therapy.

Conclusions

Conclusions

- BDMH children have various feeding function impairments.
- The beneficial outcome of BRAT techniques that led to general improvement of feeding domains behaviors especially with the mildly and moderately neurologically impaired children.
- Active participation of the caregivers contributed to the maintenance of the newly acquired skills.

