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EATING HABITS OF CHILDREN WITH AUTISM

Autism is a developmental disorder characterized by severe deficits in social interaction and communication, as well as by stereotyped and repetitive behaviors. Children with autism frequently have significant eating difficulties with highly restricted range of food choices. Eating habits and patterns are often unusual and have an impact on family life. The purpose of this article was to review pertinent information regarding this complex developmental disorder and describe a recent study based on a parent survey of feeding patterns in children with autism to give a new perspective for both parents and professionals.

Autism is a relatively common developmental disorder diagnosed clinically on the basis of pervasive and qualitative impairments in communication, social interaction, and range of interests and activities. Current prevalence is estimated at 1:1,000, with autism identified four times more commonly in males than females (National Institute of Health, 1995). While the specific etiology for autism is unknown, its neurobiologic nature is well-established (Gillberg & Coleman, 1992). Features that support a neurobiologic basis include increased frequency of seizures in individuals with autism; mental retardation in 50 to 70% of individuals; evidence of genetic predisposition with recurrence risk of 3 to 7%; and associated sensorimotor deficits (e.g., hypotonia, toe-walking, motor stereotypes, and sensory integration difficulties) (Bailey, Phillips, & Rutter, 1996). In approximately 10% of cases, autism has been associated with other medical or genetic conditions including fragile X syndrome, tuberous sclerosis, metabolic disorders, fetal rubella syndrome, hemophilus influenza meningitis, and structural brain abnormalities (Rutter, Bailey, Bolton, & LeCouteur, 1994). Research into the etiology of autism is currently focused on the areas of genetics, immunology, neuroanatomy, and neurochemistry.

Many children with autism are first diagnosed between the ages of 2 and 4 years using clinical criteria found in the Diagnostic and Statistical Manual, Fourth Edition (DSM-IV) of the American Psychiatric Association (American Psychiatric Association, 1994). Speech and language delay is often the presenting problem; children with autism generally have difficulty with both verbal and nonverbal communication (Rapin, 1991). Some children never develop speech; others develop speech but exhibit marked impairments in their ability to initiate and sustain conversation. They also may engage in stereotyped or repetitive language. While communication problems are often a chief concern, the underlying core deficit in autism is believed to be in

social behavior. This is often most evident in the child's failure to develop typical peer interactions and relationships. Aloofness, self-occupying behavior, and inability to participate in group activities are usually apparent in day-care or preschool settings. Restricted, repetitive, and stereotyped behaviors frequently represent what is most easily observed to be abnormal in autism. Children demonstrate limited functional play and may interact with toys in an atypical fashion (e.g., lining them up or arranging toys by shape or color). Children may have unusual preoccupations with objects (e.g., traffic lights, vacuum cleaners) or extremely intense interests (e.g., meteorology, dinosaurs). Unusual sensory interests are common and may include smelling objects inappropriately or staring at lights or moving objects. Compulsive behaviors and stereotyped movements can be observed in many children.

Diagnosis is based on a detailed history and clinical observations with frequent use of semi-structured parent interviews and observational schema. Assessment for intervention requires an interdisciplinary approach often involving medicine, psychology, speech and language, occupational therapy, and education. Typical recommendations for the newly diagnosed child include enrollment in a structured preschool to provide appropriate social and developmental models with emphasis focused on joint attention, imitation, and reciprocal social interaction. Speech and language therapy and occupational therapy, provided in collaboration with teachers and family members, are often components of the program. Children with autism require individualized instruction with specific, carefully planned, and documented strategies and modifications. Family information, support, and input are crucial. While primary intervention is educational and behavioral in nature, medication may be indicated for some children.

Anecdotally, it has long been noted that many children with autism have feeding difficulties and unusual eating patterns. Many of these youngsters have an extremely limited food repertoire, which is likely related to sensory regulatory difficulties, desire for sameness, or other issues. Perhaps because of the interest in megavitamin therapy and other nutritional supplements as possible treatment strategies, several studies have attempted to assess nutritional status of children with autism (Patterson, Ekvall, & Mayes, 1993). Interestingly, these studies have indicated that nutritional intake for groups of autistic children as compared to controls appears generally adequate with minor exceptions (Shearer, Larson, Neuschwander, & Gedney, 1982). Indeed, one study indicated that parents of children with autism had a more positive attitude toward nutrition than did parents of controls (Raiten & Massaro, 1986). Less attention has been paid to how the social and behavioral aspects of children with autism contribute to the eating problems reported by parents. It was the purpose of this study to systematically review specific patterns and areas of concern regarding feeding and eating expressed by families of children with autism.

Method

Three hundred forty surveys were sent to families on the mailing list for the Autism Project at the University of Louisville's Child Evaluation Center. The Autism Project was designed to provide educational and behavioral intervention and support to families in Kentucky and southern Indiana whose children have been diagnosed with autism or other pervasive developmental disorders. Referrals are from a variety of sources including physicians, schools, and self-referral. Of the 340 surveys sent out, 100 were returned. The age distribution of the children whose parents returned surveys ranged from 22 months to 10 years: 48% were between the ages of 5 and 6 years; 22% were between the ages of 3 and 4 years; and 20% were 7 or 8 years of age. Ninety percent of the children had been diagnosed with autism, 7% with pervasive developmental disorder not otherwise specified, and the remaining 3% with related diagnoses. Of the respondents, the majority had been diagnosed at age 2 or 3 (26% at age 2; 35% at age 3). The questionnaire was developed by the first two authors from their experience working with families and children with autism and a review of the literature (see Table 1). Several parents were asked to respond to an initial questionnaire, and revisions were made based on responses. Results of the surveys were compiled and percentages reported for total responses unless indicated as the percentage answering the specific question. Statistical associations for variables were then calculated using chi square coefficients.

Results

Temperament. Several questions in the survey addressed issues of temperament in early infancy and the child's current disposition. In early infancy, 39% of the children were described as nondemanding and rarely fussy, 41% were described as demonstrating the usual amount of crying, and 19% were described as fussy

and crying much of the time. When using information from parents who answered both questions, an association of statistical significance was found between descriptions of infant temperament and two oral problems (eating nonedibles and problems taking medication). Nondemanding infants were more likely to have problems with eating nonedibles, while very fussy youngsters were less likely to eat nonedibles. Very fussy infants and those described as nondemanding were significantly more likely to have problems taking medications than were their typically fussy counterparts (see Table 2).

In describing the current degree of frustration of their child, 19% of parents reported that their child was easy-going, 68% described the child as moderately upset with reason, and 13% described the child as upset a great deal of the time. A statistically significant association was found between current disposition and two measures of nutrition and appetite. Easy-going children were more frequently described as having adequate nutrition compared to those who were very fussy or moderately upset with reason. Parents chose among three descriptions of appetite: poor for most foods, good for most foods, and good for foods that are liked. None of the children described as easy-going were reported to have a poor appetite, while none of the children who were upset a great deal were reported to have a consistently good appetite. One third of those described as upset a great deal of the time were reported to have poor appetites.

Responses to current activity level indicated that 15% of parents considered their children to be extremely active, 51% were considered very active, 29% were judged moderately active, 3% quiet, and 1% lethargic. A statistical association was not identified between activity level and other variables.

Early eating patterns. Forty-four percent of respondents reported that their child breast-fed for some period of time, with 10% still breast-feeding at I year. Eighty-eight percent were bottle fed for some period of time. Forty-four percent went to bed with a bottle and 35% took a bottle at naptime. The majority (81%) of the children were reportedly fed on demand. At 1 year of age, 52% of the children were drinking from a cup, 67% were eating from a spoon, and 67% were using a high chair. Two current eating problems were related to being breastfed at 1 year. Of the 10 children who were breastfed at a year, a majority had problems taking medications but none had insistence on rituals (see Table 3). A statistical association was identified between appetite and problems taking medication. Of those children fed on demand, over half had trouble taking medications as compared to 19% of those not fed on demand. Twenty-two percent of children fed on demand had a good appetite for most foods, while none of those not fed on demand demonstrated a good appetite for most foods (see Table 3).

Eighteen percent of parents reported that as an infant their child had some difficulty with sucking, and 24% reported that their child had problems with colic. Twenty percent had problems making the transition to spoon and cup. Twenty-three percent indicated that their child had some problems with chewing. An association of statistical significance was found between initial problems with sucking and two current problems (insistence on rituals and eating non-edibles). Over three quarters of those who had problems with sucking later demonstrated insistence on rituals; 72% of those who had problems with sucking were reported to eat nonedibles (see Table 3).

Regarding introduction of foods, 91% of the parents responded to the questions. Foods introduced at 3 to 6 months included cereal (88%), fruits (71%), juices (67%), yellow vegetables (60%), and green vegetables (59%). Foods typically introduced by 7 to 9 months include crackers and breads (69%), mixed foods (63%), and meats (64%). By 12 months, 98% were introduced to green vegetables, 97% to fruits, 91% to juices, 94% to yellow vegetables, 89% to crackers and bread, 82% to mixed foods, 79% to meats, 61% to lumpy foods, 56% to dairy products, and 44% to eggs.

Health concerns and nutritional adequacy. Twenty percent of parents believed health problems in their child affected eating patterns. Common health problems included ear infections (59%), gastroesophageal reflux (28%), current GI problems (17%), previous unspecified GI problems (21%), food allergies (10%), seizures (13%), and asthma (11%). Seventeen percent reported a history of hospitalization. A statistical association was identified between the presence of gastroesophageal reflux and difficulties taking medication. Children with gastroesophageal reflux and food allergies were significantly more likely to have problems taking medications. An association was also found with gastrointestinal problems and appetite. Twenty-three percent of the youngsters with GI problems had poor appetite for food, when compared to only 2% of their counterparts without GI problems. Only 6% of those with GI problems were described as having a good appetite for food as compared to 23% of those without GI problems (see Table 4).

While 67% of respondents described their child as a picky eater, 73% reported that their child had a good appetite for foods that were liked; 6% reported a poor appetite for most foods; and 19% reported a good appetite for most foods. Sixty-two percent reported that they believed their child had adequate nutritional intake, and 49% reported that their child ate a fairly well-balanced diet. Thirty-five percent reported that they gave their child food supplements. Children who were not picky eaters were more likely to be perceived as having adequate nutrition (97%), whereas those described as picky eaters were equally divided between adequate and inadequate nutrition.

Current eating patterns. Ninety-three percent of respondents reported a regular mealtime and 89% sat to eat meals. The average length of time for meals was 15 to 20 minutes (52%). Eighty percent of children were able to, feed themselves and 62.5% ate with other family members. Sixty-five percent had regular snacks and 89% had food accessible to the child. Factors that the parents felt influenced food selection were texture (69%), appearance (58%), taste (45%), smell (36%), and temperature (22%). Thirty-seven percent felt that there was a relationship between eating and behavior.

Problem eating/oral behaviors are listed in Figure 1. The most frequently reported problem behaviors were trying new foods (69%), taking medicine (62%), eating few foods (60%), mouthing objects (56%), and rituals surrounding eating (46%). A wide array of problem behaviors were reported.

Social aspects. Over a third (35.5%) of survey respondents felt that situations and people influenced the eating patterns of their children. Forty-one percent reported that their child ate differently in different settings. Families reported eating in a variety of social settings including fast-food restaurants (88%), drive-through restaurants (87%), sit-down restaurants (81%), relatives' homes (81%), friends' homes (68%), and picnics (64%). A minority of respondents reported that they participated in pitch-in meals (39%) or meals at fancy restaurants (25%).

Discussion

This study documents the presence and variety of eating patterns and problems seen in children with autism. Although the study is limited by lack of developmentally normal controls, review of the data reveals some interesting observations compared to typical development. With regard to early eating patterns, the rate of breast feeding appears somewhat high although rates vary considerably based on the population studied (Lawrence, 1985). The reported incidence of colic (24%) also seems somewhat inflated, given the fact that several pediatric texts quote a usual rate of 10% (Avery & First, 1994; Taubman, 1997). However, other texts note rates of up to 30% (Bromberg, 1997; Rudolph, Hoffman & Rudolph, 1996). The pattern of food introduction generally follows that typically recommended by pediatricians and nutritionists, although meats were presented somewhat earlier than expected.

The information regarding feeding from birth to a year provides interesting insights in that infant temperament and early feeding patterns seemed to be associated with current eating problems. Nondemanding infants appeared to have more problems with eating nonedibles and taking medication. Initial sucking difficulties were also associated with later problems with eating nonedibles. It could be hypothesized that these problems might be related to insufficient oral stimulation as infants. Children who were not fed on demand as infants were less likely to have a good appetite for most foods. Interestingly, those who were breastfed at a year were less likely to insist on rituals. The association of prolonged breastfeeding with decreased compulsivity in children is not readily explained.

With regard to health and nutritional concerns, the incidence of reported medical conditions does not appear excessive. While it is estimated that gastroesophageal reflux is problematic for perhaps 20% of children, it is noted in various pediatric texts that reflux is almost invariably present in infants less than a year of age (Avery & First, 1994; Belknap & McEvoy, 1994; Rudolph et al., 1996). The incidence of asthma appears in line with that estimated for the general population (5% to 15%) (Pearlman, Greos, & Vitanza, 1997). Highly varying epidemiologic figures are available concerning food allergies (Behrman & Vaughn, 1987; Katz, 1997).

It is interesting that while two thirds of parents reported picky eating habits, nearly half reported that their child had a fairly well-balanced diet and an even higher percentage reported adequate nutritional intake.

However, the prevalence of picky eating is confirmed by the number of parents who report that their child has a good appetite only when eating foods that are liked. It is not surprising that texture was believed to have the greatest influence on food selection, given issues of oral tactile sensitivity in many children with autism. Appearance, taste, and smell were other deciding factors. It seems reasonable that children who were not picky eaters were viewed as having better nutrition and better appetites. They were also more likely to have easy-going temperaments. Nearly all parents described a regular mealtime, perhaps reflecting an effort to maintain structure and consistency in eating patterns.

In considering the social aspects of eating, over a third of the respondents felt that situations and people influenced the eating patterns of their children. The majority of families had some meals outside of the home, with the most frequently patronized settings being fast food and drive-through restaurants. This pattern would appear typical for most American families with children. However, problems arise for the families of children with autism when the child lacks the skills or presents with behaviors that make inclusion in certain social settings awkward.

When eating/oral problems are studied, the difficulties for families of children with autism become more obvious. The problems reported most often were unwillingness to try new foods, mouthing objects, and rituals surrounding eating. Other strongly documented problem behaviors were licking objects, smelling and throwing food, and eating nonedibles. One may hypothesize a variety of reasons for the problems described. For instance, food refusal may be based on issues related to sensory difficulties and insistence on sameness. The child may also lack the language to express refusal or negotiate verbally. Problems with transition may impact on aspects of mealtime; too much stimuli or a prolonged period of sitting may cause a child to reject food. These are problems that worry parents and cause social disruption. Feeding an infant and child is often viewed as a primary responsibility of parents. When a child responds with difficult behaviors or refusals, the parent must decide on a course of action. Assisting parents with concerns about eating is important in helping the family avoid tension and difficult behaviors. While child development experts generally advocate that parents accept their young child's selected eating patterns without forcing the issue, this may not always be the route to take with children with autism. Systematic introduction of new foods, facilitation of one-partner social interactions during meals, establishing a routine, and minimizing stimuli may be more appropriate approaches for children with autism. Most children with autism, given patience and intervention, are eventually able to establish socially appropriate behaviors around eating.

The current study is limited in its conclusions by lack of developmentally normal controls with whom to compare results. It is also possible that the families who returned the survey were those with specific concerns about eating habits in their children and constitute a skewed population. No attempt was made to delineate racial, ethnic, or socioeconomic differences, nor were issues of family structure and dynamics addressed. Further studies are needed to document the specific nature of eating differences in children with autism as compared to typical children. However, this study serves to provide preliminary data regarding the eating habits and problems of children with autism. It raises issues regarding the influence of infant temperament and early feeding patterns on later eating patterns of children with autism. Additional research would aid in the development of strategies to facilitate appropriate eating habits and promote social aspects of mealtimes in this population.

Table 1. Sample Questions from Parent Survey on Eating Habits of Children with Autism

```
Describe your child's current activity level:
(circle one and comment, if desired):

Extremely Active
Very Active
Moderately
Active
Quiet
Lethargic

Describe your child in infancy: (circle one and comment, if
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desired):

Usual amount of crying like most babies
Cried and fussed; seldom slept long
Nondemanding/rarely cried unless hungry

Was your child drinking from a bottle at a year old?

Yes
No
(Comment, if desire)

How is your child's appetite currently? (circle one end comment, if desired):

Poor for nearly all foods
Good for those foods he/she likes
Good for most foods

Does your child eat a fairly balanced diet?

Yes
No
(Comment if desired)

Is your child a picky eater?

Yes
No
(Comment if desired)

If yes, what do you think are the factors influencing your child's selectivity most? (check those that apply)

Taste
Texture
Temperature
Smell
Looks
Other

Do you think your child has adequate nutrition? Please describe.

Yes
No

Do you think there is a relationship between your child's eating and his/her behavior? Please describe.

Yes
No

Are there health problems that affect your child's eating?

Yes
No
If yes, please complete the following:

Problem	Now	Past
Ear infections		
Having to take medication		
Asthma		
Seizures		
Hospitalizations		
Other-please describe		

Does your child have food allergies?

Yes
No
Please describe

Does your child have or has your child had any of the following habits/problems? Please check those that apply.

Habit/Problem	A problem now	Used to be a problem
Insisting on rituals		
Trouble chewing food		
Holding food in mouth or cheeks		
Spitting food		
Dumping/throwing food		
Eating nonedibles		
Mouthing objects		
Smelling food		
Taking medicine		
Eating foods only in certain places		
Unwilling to try new foods		
Requiring foods to be prepared in certain ways		
List others		

Table 2. Relationship Between Infant Temperament/Current Degree of Frustration and Current Eating Behaviors

Legend for Chart:

A - Current Issues
B- Nondemanding (n = 36)
C - Usual Amount of Fussiness of time (n = 40)
D - Very Fussy, Crying Much (n = 18)
E - Chi^2
F - Test of Significance

A	B	C E	D F
Eating nonedibles	18 (51%)	14 (34%) 11.80	1 (5%) .003[**]
Taking medications a problem	23 (64%)	13 (33%) 7.86	10 (56%) .020[*]

Legend for Chart:

B - Easygoing (n = 19)

C - Moderately Upset with Reason (n = 65)
D - Upset Great Deal of Time (n = 13)
E - Chi^2
F - Test of Significance

A	B	C E	D F
Adequate nutrition	17 (90%)	38 (59%) 6.79	7 (54%) .034[*]
Poor appetite	0 (0%)	2 (3%) 19.70	4 (34%) .001[***]

[*] p < .05
[**] p < .01
[***] p < .001

Table 3. Relationship Between Early Eating Patterns and Current Eating Behaviors

Legend for Chart:

A - Current Behavior
B - Breast Fed at 1 Year (n = 10)
C - Not Breast Fed at 1 Year (n = 83)
D - Chi^2
E - Test of Significance

A	B	C	D	E
Taking meds a problem	8 (80%)	37 (45%)	4.48	.034[*]
Insistence on routines	0 (0%)	43 (51%)	9.43	.002[**]

Legend for Chart:

B - Fed on Demand (n = 76)
C - Not Fed on Demand (n = 15)
D - Chi^2
E - Test of Significance

A	B	C	D	E
Taking reeds a problem	41 (54%)	3 (19%)	3.73	.050[*]
Good appetite for most food	18 (23%)	0 (0%)	9.02	.010[**]

Legend for Chart:

B - Problems Sucking (n = 18)
C - No Problems Sucking (n = 71)
D - Chi^2
E - Test of Significance

A	B	C	D	E

Insistence on routines	14 (78%)	28 (39%)	8.75	.003[**]
Eats nonedibles	13 (72%)	18 (25%)	14.22	.000[***]

[*] $p < .05$
[**] $p < .01$
[***] $p < .001$

Table 4. Relationship Between Health Concerns and Current Eating Behaviors

Legend for Chart:

A - Current Behavior
B - Food Allergies (n = 10)
C - No Food Allergies (n = 74)
D - Chi^2
E - Test of Significance

A	B	C	D	E
Trouble taking medications	9 (90%)	32 (43%)	7.70	.047[*]

Legend for Chart:

B - Current GI Problem (n = 17)
C - No GI Problem (n = 80)
D - Chi^2
E - Test of Significant

A	B	C	D	E
Good appetite for most food	1 (6%)	18 (23%)	3.07	.002[**]
Poor appetite for most food	4 (24%)	2 (3%)	3.07	.002[**]

[*] $p < .05$
[**] $p < .01$

Figure 1. Problem Eating Behaviors

Legend for Chart:

B - PERCENT

A	B
trying new foods	69
taking medicine	62
eating few foods	60
mouthing objects	56
rituals surrounding	46
insisting on routine	44

playing in food	43
licking objects	39
smelling food	39
throwing food	36
gagging	35
eating non-edibles	33
eating one brand	33
preparing one way	32
spitting food	25
holding food mouth	23

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