

Eating Behavior of Autistic Children

Maulina Handayani¹, Elisabeth Siti Herini², Satoshi Takada³

Association between autism and eating problem has been discussed in US and European countries recently, but there are only a few studies about that matter in Asian countries.

Objective: This study provides information about eating behavior in autistic children in comparison with Typically Developing (TD) children in two different countries, which are Japan and Indonesia.

Method: Participants of this study were 39 Japanese and 13 Indonesian parents with autistic children and 197 Japanese and 144 Indonesian parents of TD. Ages of subjects were between 3 to 6 years old. Eating behavior was evaluated by using Brief Autism Mealtime Inventory (BAMBI) completed by parents.

Result showed that commonly children in both countries had eating behavior problems and children with autistic showed more problems than TD children. It is estimated that autistic children have a delay in eating development that may influence their eating behaviors. It is also reported that cultural background can be considered as another influencing factor in the difference of eating behavior in each country.

Conclusion: Our study provided information that Autism children have problem in eating behavior. It needs to be noticed continually by clinicians and parents, although problem in eating behavior is not a core feature of autism; it can be an associate feature in autism.

Key words: Autism, Eating behavior, Children

¹ Department of Community Health Science, Faculty of Health Sciences, Kobe University, Kobe, Japan. Nursing Study Program, Faculty of Medicine and Health Sciences, State Islamic University Jakarta, Jakarta, Indonesia (maulina_h@yahoo.com)

² Faculty of Medicine, Gajah Mada University, Yogyakarta, Indonesia (email: herini_es@yahoo.com)

³ Department of Community Health Science, Faculty of Health Sciences, Kobe University, Kobe, Japan (email:satoshi@kobe-u.ac.jp)

Introduction

Eating is an important aspect in childhood because it is related to growth and development process. Besides, eating also reflects parent's attentions in rearing their children. Refuse food is described as avoiding food and 'won't eat' that can effect picky eater behavior while eat limited food behavior is expressed by eating small number of food and unwilling to try new food or neophobia. Many studies reported that children's eating behaviour was characterized by food preference and small numbers of food children eat. Studies in normal population's children in US, European and Asian countries showed that young children were common to have a picky eater or food neophobia (Wright et al, 2007; Charruth et al, 2000; Yen et al, 1994; Charruth et al, 2003).

Recently, a relation between autism and eating behavior has been discussed in many studies. Several researches noted that children with autism have showed aberrant patterns of food acceptance, are commonly selective in food type (only eating the food they like or picky eater) and eat a narrow range of food than children without autism (Williams et al, 2000; Schreck et al, 2004; Johnson and Handen, 2008). It was also reported that children with autism are more likely to exhibit disruptive behavior when they refuse presented food (Ahearen et al 2001).

According to the relationship between sensory symptoms and eating problems, a study found that children with autism were more impaired than Typically Developing (TD) children in tactile sensitivity. It also reported that autistic children were more abnormal than TD children in their respond to taste and smell. Furthermore, it mentioned that those abnormal sensory activities have significant relationship with overall adaptive behavior (Rogers et al, 2003). In addition, autistic children were also predicted to have sensory deficits such as deficit in olfactory signal (Rapin, 2000). This delay can influence the ability in eating way.

Furthermore, difficulties in social interaction and communication that are the characteristic of children with autism may lead them to have problems in learning behavior needed for daily activity such as eating behavior. Restricted, repetitive behavior, sameness, distress over trivial change and interest in following routines or ritual may contribute in the idiosyncratic eating behavior. In the relationship between autism and gastrointestinal abnormalities, a study found that gastrointestinal abnormalities such as reflux esophagitis correlate with the sudden irritability and aggressive behavior in autism, which might be the causes of some behavioral problems in mealtime (Horvarth et al, 1999).

The population of autism children in Japan has been increasing year by year. A study completed in a part of Yokohama with stable population of about 300,000 reported that there was a cumulative incidence to age 7 years of 48 cases of ASD per 10,000 children in 1989, and another one was 86 in 1990. In addition, the incidence rate grew to 97 and 161 cases per 10,000 children in 1993 and 1994 (Honda et al, 2005). Respectively, this data indicated the number of autism in Japan is increasing. Although the number of autism in Indonesia is still unclear, raising a child with autism gives special concern for parents in all aspect including in eating behavior.

The study related to eating behavior in Japanese and Indonesian experienced by children with autism has been very few. This study had two purposes include 1) to provide information related to eating behavior in normal children and its relationship with age and gender, 2) to examine how children with autism have different eating behavior in comparison with TD children.

Methods

Participants were Japanese and Indonesian parents with autistic children and Japanese and Indonesian parents of TD children. Japanese autistic children were recruited from outpatient clinic of Kobe University Hospital in Kobe city, while Indonesian autistic children were recruited from outpatient clinic of Dr. Sardjito Hospital and local handicapped school in Yogyakarta city. TD children were recruited from the community and local kindergarten in Kobe, Yogyakarta and Jakarta city.

Children were categorized into TD when they had no developmental delay reported by parents, primary physicians, or teachers. Autistic children were diagnosed by psychologists, psychiatrists, pediatricians, or child neurologists. The ages of subjects were between 3 to 6 years old. It was assumed that infant and toddler years are the period of transition when the food is changed from formula to solid food and children depend on their parent in feeding. While 3 to 6 years are period when children become more independent in feeding and additionally, it was predicted that most of eating problem occurred in this period of age.

Data Collection Procedure and Data Analysis

This study was approved by the Ethic committee of Kobe University, and local government of Jakarta and Yogyakarta city. Parents of those children were given an informed

consent letter for their agreement to participate in this study. Parents completed Brief Autism Mealtime Behavior Inventory (BAMBI) developed by Lukens (2008). BAMBI was designed to measure mealtime behavior problems observed in children with autism aged 3 to 11 years old. It was not direct measure but a reflection of parental report. It consisted of 18 questions with a multiple choice response, where '1' referred to never/ rarely, '2' for seldom, '3' for occasionally, '4' for often and '5' for almost every meal. BAMBI included 3 categories of eating behaviors, which were limited variety of food (8 questions), food refusal (5 questions) and feature of autism (5 questions). In BAMBI, parents were also required to evaluate each behavior as a problem or not (yes or no questions).

Related with this study, permission was given by the author of BAMBI for translating into Japanese and Indonesian languages. Japanese, Indonesian and English native were concern in the translation process. The internal consistency of reliability was assessed using Cronbach's coefficient alpha .74 for Japan version and .73 for Indonesia version. Demographic data consisting of children's age, height, weight, gender, and also information related to the eating time, medical problems, and disability problem were included. Additionally, information related parents were also obtained.

The differences in the scores of height, weight and age were evaluated by t-test. An analysis of Variance (ANOVA) was used to evaluate the relationship between eating behavior to age and gender. Non parametric analyses were conducted for BAMBI scores that violate the assumption of normality and homogeneity of variance. Fisher exact test was used to evaluate the "yes or no" questions of BAMBI.

Result

Thirty nine Japanese and 13 Indonesian parents with autistic children and 197 Japanese and 144 Indonesian parents of TD participated in this study. The ages of subjects were between 3 to 6 years old and all children had no allergy, serious diseases or any dietary problems. Most parents who participated in this study were mothers. All participants answered the 5 point Likert of BAMBI. For "yes or no" questions of BAMBI, 175 Japanese and 128 Indonesian parents of TD children and 31 Japanese and 13 Indonesian parents of autistic children had completed to answer it (see table 1, 2).

Table 1 Demographic Data of TD Children

| Subject Characteristics | Country | |
|----------------------------|---------------|-------------------|
| | Japan (N=197) | Indonesia (N=144) |
| Children Age, total (%) | | |
| 36-47 months | 45 (22.8) | 57(39.6) |
| 48-59 months | 56 (28.4) | 37(25.7) |
| 60-71 months | 72 (36.5) | 31(21.5) |
| 72-84 months | 24 (12.2) | 19(13.2) |
| Weight(Kg), <u>mean±SD</u> | | |
| 36-47 months | 14.5±1.5 | 13.5±2.9* |
| 48-59 months | 16.5±2.2 | 16.2±3.3 |
| 60-71 months | 18.2±2.3 | 18.9±3.2 |
| 72-84 months | 18.5±2.3 | 20.0±4.2 |
| Average | 16.9±2.6 | 16.2±4.1 |
| Height(Cm), <u>mean±SD</u> | | |
| 36-47 months | 96.8±5.2 | 94.5±6.2 |
| 48-59 months | 103.6±5.5 | 100.8±6.1* |
| 60-71 months | 109.5±4.6 | 108.0±7.2 |
| 72-84 months | 111.9±4.3 | 115±5.5* |
| Average | 105.2±7.3 | 101.8±9.7*** |

*p < .05

**p < .01

***p < .001: Japan vs Indonesia

Table 2 Demographic Data of Autism and TD Children

| Subject Characteristics | Country | | | |
|--|-------------|------------|-------------|------------|
| | Japan | | Indonesia | |
| | Autism (39) | TD (197) | Autism (13) | TD (144) |
| Children Age(month) Mean±SD | 64.5±10.0 | 57.9±11.2* | 59.5±15.2 | 52.5±13.7 |
| Weight(Kg), <u>Mean±SD</u> | 18.5±2.9 | 16.9±2.6* | 15.9±3.0 | 16.2±4.0 |
| Height(Cm), <u>Mean±SD</u> | 110.7±7.7 | 105.2±7.3* | 101.8±8.4 | 101.8±9.7 |
| Gender (%) | | | | |
| Male | 32(83.1) | 102(52) | 12(92.3) | 80(55.5) |
| Female | 7(17.9) | 91(48) | 1(7.7) | 64(44.5) |
| Mealtime frequency in a <u>day</u> (%) | | | | |
| 1 time | 0(0) | 0 (0) | 0(0) | 1 (0.7) |
| 2 times | 1(2.6) | 0 (0) | 3(23.1) | 23 (16) |
| 3 times | 34(87.2) | 192(97.5) | 7(53.8) | 110 (76.4) |
| > 3 times | 4(10.3) | 5(2.5) | 3(23.1) | 10 (8.3) |
| Parent: | | | | |
| Age (year) Total (%) | | | | |
| <19 | 1(2.6) | 1 (0.5) | 0(0) | 0 (0) |
| 20-29 | 2(5.1) | 14 (7.1) | 3(23.1) | 48 (33.3) |
| 30-39 | 27(69.2) | 141 (71.6) | 6(46.2) | 84 (58.3) |
| 40-49 | 9(23.1) | 39 (19.8) | 4(30.8) | 12 (8.3) |
| Parents status: | | | | |
| Mother | 34(87.2) | 195(99) | 10(76.9) | 141(98) |
| Father | 4(10.3) | 2 (1) | 3(23.1) | 3(2) |
| No answer | 1(2.6) | 0(0) | 0(0) | 0(0) |

*p < .05

p < .01 *p < .001 : Autism vs TD, analyzed by t-test.

Two-way ANOVA was conducted to analyze refuse food and eat limited food behavior and its relationship with age and gender. Subjects were divided into four groups according to their age; group 1: 36-47 months, group 2: 48-59 months, group 3: 60-71 months, group 4: 72-84 months (table 3).

Table 3 Eating behavior score in TD Children

| Age (month) | Japan (N=197) | | | Indonesia (N=144) | | |
|-------------|---------------|-----------------|----|-------------------|-----------------|----|
| | Refuse Food | Limited Variety | n | Refuse Food | Limited Variety | n |
| 36-47 | 5.7±1.2 | 15.5±4.4 | 45 | 9.3±3.6*** | 20.5±4.3 | 57 |
| 48-59 | 5.8±1.9 | 17.3±5.5 | 56 | 8.7±2.7 | 19.0±4.6 | 37 |
| 60-71 | 5.5±1.0 | 15.6±4.2 | 72 | 7.2±2.9 | 19.5±4.0 | 31 |
| 72-83 | 5.8±2.2 | 16.2±4.5 | 24 | 6.3±1.5*** | 19.6±4.6 | 19 |

Mean±SD, *** $p < .001$ Indonesia 36-47 mo vs 72-83 mo.

Results revealed that in Japanese children, gender and age did not show difference in the refuses and eat limited food-behavior scores. Thus, for Indonesian children, gender also did not significantly difference in both behaviors but in the relationship with age, results demonstrated that there was a significant difference of age in refuse food behaviour which was the more older the children, the mean score of refuse to food was decreasing.

Wilcoxon-test was conducted to evaluate the difference of BAMBI score between two groups in both countries. There was a significant difference in total BAMBI scores between Japanese autistic and TD children ($Z = -3.53, p = .000$). There was also significant difference in Indonesian autistic and TD children ($Z = -2.14, p = .03$). Autistic children showed higher in mean scores than TD children (table 4).

Table 4. Mean and Standard Deviation of BAMBI in Japan and Indonesia

| Japan | | | Indonesia | | |
|----------------|---------------|------------|----------------|---------------|-----------|
| Normal (N=197) | Autism (N=39) | p | Normal (N=144) | Autism (N=13) | p |
| 29.5±6.9 | 37.3±11.6 | $p < .001$ | 36.7±7.5 | 38.8±7.5 | $p < .05$ |

Significant different in p -value was analyzed by Wilcoxon test.

Fisher exact test has been conducted to evaluate responds of eating behaviors as problem by Japanese parents (table. 5) and Indonesian parents (table.6). Both Japanese and Indonesian autistic parents reported that their children had more food refusal behavior than

TD children ($p<0.001$) for turn his/ her face and body away from food (BAMBI item No. 2).

For limited variety of food behaviors, in both countries, autistic children were reported that they had more problems in BAMBI item No. 10, willing to try new food (Japanese $p<0.01$ and Indonesian $p<0.05$) and BAMBI item No. 11, dislike certain food and won't eat them (Japanese, $p<0.01$ and Indonesian, $p<0.05$). In preferring the same food at each meal (BAMBI item No. 13), 29 % of Japanese autistic children were reported significantly difference comparing with TD children 9.7% ($p<0.01$) while in Indonesia, although there was no significant difference, autistic children (15.4%) showed higher in percentage than TD children (5.5%).

For preferring food served in particular way (BAMBI No. 16) 16.1% Japanese autistic showed significant difference compared with 4.6% TD children ($p<0.05$) while in Indonesia, although there was no significant difference for this item, 23.1% Indonesian autistic children prefers food which is prepared in particular way (BAMBI item No. 18) compared with 3.9% TD ($p<0.05$).

The feature of autism in eating behaviors, both Japanese ($p<0.01$) and Indonesian ($p<0.01$) autistic children were reported that they had more problems than TD in remains seat at the table until meal is finished (BAMBI item No. 3). Furthermore, Japanese ($p<0.01$) and Indonesian ($p<0.05$) autistic children were also reported that they were more aggressive during mealtimes (BAMBI item No. 5) than TD children. For Japanese, feature autism reported that autistic children refused to eat foods that require a lot of chewing (BAMBI item no. 12) than TD children ($p<0.05$) while in Indonesia, although there was no significant difference, autistic children (7.7%) showed higher in percentage than TD children (6.3%).

The problem in flexibility about mealtime routines (BAMBI No. 9) was reported significantly different in Indonesian autistic children compared with TD children ($p<0.01$), while in Japanese, although there was no significant difference, autistic children (16.1%) showed higher in percentage than TD children (10.3%).

Table 5 Japanese Parents Report of Eating Behaviors as Problem

| Questions | Japan | | | | |
|--|-------------------|--------------------|---------------------|----------|-----|
| | Normal (N=175) | | Autism (N=31) | | p |
| | No | Yes | No | Yes | |
| My child... | | | | | |
| Food Refusal | | | | | |
| 1. Cries or Scream during mealtimes | 172(98.3) | 3(1.7) | 29(93.5) | 2(6.5) | n.s |
| 2. Turn his/her face or body away from food | 164(93.7) | 11(6.3) | 24(77.4) | 7(22.6) | ** |
| 4. Expels food that he/she has eaten | 158(90.3) | 17(9.7) | 26(83.9) | 5(16.1) | n.s |
| 7. Is disruptive during mealtimes | 171(97.7) | 4(2.3) | 29(93.5) | 2(6.5) | n.s |
| 8. Closes mouth tightly when food is presented | 172(98.3) | 3(1.7) | 29(93.5) | 2(6.5) | n.s |
| Features of Autism | | | | | |
| 3. Remains seated at the table until meal is finished | 141(80.6) | 34(19.4) | 15(48.4) | 16(51.6) | ** |
| 5. Is aggressive during mealtimes | 170(97.1) | 5(2.9) | 26(83.9) | 5(16.1) | ** |
| 6. Displays self injurious behavior during mealtimes | 172(98.3) | 3(1.7) | 30(96.8) | 1(3.2) | n.s |
| 9. Is flexible about mealtime routines | 157(89.7) | 18(10.3) | 26(83.9) | 5(16.1) | n.s |
| 12. Refuses to eat foods that require a lot of chewing | 159(90.9) | 16(9.1) | 24(77.4) | 7(22.6) | * |
| Limited Variety | | | | | |
| 10. Is willing to try new foods | 141(80.6) | 34(19.4) | 13(41.9) | 18(58.1) | ** |
| 11. Dislike certain foods and won't eat them | 116(66.3) | 59(33.7) | 13(41.9) | 18(58.1) | ** |
| 13. Prefers the same food at each meal | 158(90.3) | 17(9.7) | 22(71.0) | 9(29.0) | ** |
| 14. Prefers "crunchy" foods | 158(90.3) | 17(9.7) | 23(74.2) | 8(25.8) | n.s |
| 15. Accepts or prefers a variety of foods | 143(81.7) | 32(18.3) | 21(67.7) | 10(32.3) | n.s |
| 16. Prefers to have food served in particular way | 167(95.4) | 8(4.6) | 26(83.9) | 5(16.1) | * |
| 17. Prefers only sweet foods | 162(92.6) | 13(7.4) | 28(90.3) | 3(9.7) | n.s |
| 18. Prefers food prepared in particular way | 163(93.1) | 12(6.9) | 26(83.9) | 5(16.1) | n.s |
| <i>n.s., not significant</i> | <i>*p<.05.</i> | <i>**p<.01.</i> | <i>***p<.00.</i> | | |

Table 6 Indonesian Parents Report of Eating Behavior as A Problem

| Questions | Indonesia | | | | |
|--|-------------------|--------------------|---------------------|---------|-----|
| | Normal (N=128) | | Autism (N=13) | | p |
| | No | Yes | No | Yes | |
| My child... | | | | | |
| Food Refusal | | | | | |
| 1. Cries or Scream during mealtimes | 114(89.1) | 14(10.9) | 12(92.3) | 1(7.7) | n.s |
| 2. Turn his/her face or body away from food | 104(81.3) | 22(17.2) | 9 (69.2) | 4(30.8) | ** |
| 4. Expels food that he/she has eaten | 116(90.6) | 12(9.4) | 12(92.3) | 1(7.7) | n.s |
| 7. Is disruptive during mealtimes | 116(90.6) | 12(9.4) | 12(92.3) | 1(7.7) | n.s |
| 8. Closes mouth tightly when food is presented | 108(84.4) | 20(15.6) | 10(96.9) | 3(23) | n.s |
| Features of Autism | | | | | |
| 3. Remains seated at the table until meal is finished | 112(87.5) | 16(12.5) | 7(53.8) | 6(46.2) | ** |
| 5. Is aggressive during mealtimes | 127(99.2) | 1(0.8) | 11(84.6) | 2(15.4) | * |
| 6. Displays self injurious behavior during mealtimes | 127(99.2) | 1(0.8) | 13(100) | 0(0) | n.s |
| 9. Is flexible about mealtime routines | 126(98.4) | 2(1.6) | 9(69.2) | 4(30.8) | ** |
| 12. Refuses to eat foods that require a lot of chewing | 120(93.8) | 8(6.3) | 12(92.3) | 1(7.7) | n.s |
| Limited Variety | | | | | |
| 10. Is willing to try new foods | 112(95.3) | 6(4.7) | 10(76.9) | 3(23.3) | * |
| 11. Dislike certain foods and won't eat them | 109(85.2) | 19(14.8) | 7(53.8) | 6(46.2) | * |
| 13. Prefers the same food at each meal | 121(94.5) | 7(5.5) | 11(84.6) | 2(15.4) | n.s |
| 14. Prefers "crunchy" foods | 115(89.8) | 13(10.2) | 9(69.2) | 4(30.8) | n.s |
| 15. Accepts or prefers a variety of foods | 118(92.2) | 10(7.8) | 10(76.9) | 3(23.1) | n.s |
| 16. Prefers to have food served in particular way | 126(98.4) | 2(1.6) | 13(100) | 0(0) | n.s |
| 17. Prefers only sweet foods | 116(90.6) | 12(9.4) | 9(69.2) | 4(30.8) | * |
| 18. Prefers food prepared in particular way | 123(96.1) | 5(3.9) | 10(76.9) | 3(23.1) | * |
| <i>n.s., not significant</i> | <i>*p<.05.</i> | <i>**p<.01.</i> | <i>***p<.00.</i> | | |

Discussion

This study provided several information related to children's eating behavior. Firstly, it revealed eating behavior in normal population children and its relationship with age and gender. Secondly, it compared eating behavior between autistic and TD children in Indonesia and Japan.

Eating behavior in normal population children

This study showed consistency with other previous studies that reported refuse food and eat limited food behaviors were common in children (Wright et al, 2007; Charruth et al, 2000; Yen et al, 1994; Charruth et al, 2003). In the correlation between gender and eating behaviors, this study was in line with previous study that reported males and females were not differ in eating behaviors (Lukens et al, 2008).

In the relationship between eating behavior and age, it was still conflicting how eating problems can be changed by age. Some studies reported eating problems could be decreased by age (Pliner, 1994; Charruth, 1998) while other studies reported it was stable during childhood (Galloway et al, 2003). Our result demonstrated that limited food behavior was same as through the ages between 3 to 6 years both in Japan and Indonesia but in food refusal behavior; Indonesian children's was decreased when they got older while Japanese was relatively stable. This difference could be related to the differences of family eating behavior, environment, and culture that could influence the development of children eating behavior.

It was interesting that the score of Indonesian children's eating behavior was significantly higher than Japanese. Since the BAMBI was a parent's report of their perception and it did not measure of child's eating behavior directly, the scores could be different in each country. The difference of eating behaviors might due to differences in cultural backgrounds in each country. The mealtime a day in both countries might demonstrate that Indonesia and Japan have different eating habits while Japanese children majority ate 3 times a day and Indonesian varied between 1 and 4 times a day (table 1). Additionally, there was a significant difference in the average of height but not in the weight between Japanese and Indonesian TD children (table 1). We supposed it might due to the difference in racist, not due to nutritional problem.

Eating behavior in autistic children

It was confirmed by BAMBI that Japanese and Indonesian children with autism had different eating behavior from TD children. The results of this study supported previous findings that autistic children showed more frequent eating problems than children without autism (Schreck et al, 2004; Johnson and Handen, 2008; William et al, 2005)..

Parents of autistic children reported that their children more frequently avoided food by turning his/ her face and body away from food than TD children. This finding supported the previous studies that children with autism particularly refuse foods and more likely to avoid foods than children without autism [Schreck et al, 2004; Johnson and Handen, 2008,

Martins et al,2008). Our results also supported the previous study that autistic children had limited variety of food behavior such as unwilling to try new food, dislike certain food and won't eat them (Williams et al, 2000). Additionally, our study showed that autistic children have more behavior in preferring the same food at each meal rather than TD children. Those behaviors can be related to typically repetitive and restricted focus and interest in autistic disorder. Previous study also mentioned food refusal might be due to sensory difficulties, instance of sameness and lack of communication to express refusal verbally (Williams et al, 2000). Our study also in line with previous study that reported autistic children insisted on prepared food in certain way (William et al, 2005).

This study also confirmed previous study that autistic children were more aggressive during mealtimes (Ahearn et al, 2001). It also found that autistic children had problem to remain seated until meal was finished and problem in flexibility in mealtime's routine. Those behaviors may due to disability in expressing their needs associated with autistic disorder. Another study estimated gastrointestinal abnormalities such as reflux esophagitis correlated with the sudden irritability or aggressive behavior which might produce behavioral problems in eating (Horvarth et al, 1999).

The notion that autistic children were selective in food, accepting only pureed or low textured food was also supported by this study (Ahearn et al, 2001; Schreck et al, 2004). Our study revealed that autistic children demonstrated refusal to eat foods that require a lot of chewing. This can be associated with developmental delay in sensory motor, tactile sensitivity and abnormal response to taste. It also supported previous finding that speculated autistic children have difficulty in chewing which made them sometimes avoid swallowing foods that were difficult to eat (William et al, 2005).

One interesting finding was Japanese autistic children were older than TD children but the BAMBI scores of them were higher than TD children. It might be considered that there is a delay in the eating development in autistic children.

Although this study did not assess the relationship between nutritional status and eating problem in children, previous study demonstrated that autistic children are less vegetable and thus, had lower vitamin K and inadequate iron (Johnson and Handen, 2008). This study also supported estimation, if the children with autism had more refuse and ate only limited in variety of food, and then they were placed on restriction diet, such as gluten and casein free diet, it probably may increase feeding problems and produce more health problems (Ahearn et al, 2001). It is important to educate parents with autistic children to give more attention in children's eating behavior in order to prevent eating problem influence

nutritional status. Encouraging parents to repeat to serve unfamiliar food may decrease food refusal and increase the variety of food, which can support adequate nutrition. Effective treatment of severe feeding problem may be required to prevent failure to thrive in children with autism.

As in previous study mentioned that cultural, socioeconomic background can influence eating behavior (Charruth et al, 2003; Omar et al, 2009), we may draw conclusion that the difference in the score of BAMBI between Indonesian and Japanese eating was related to the difference in cultural backgrounds in each country. We had better modify BAMBI based on cultural background that can lead to correlated cultural implication in autistic's eating behavior.

In the term of the overall reliability of BAMBI, several factors need to be considered. Some parents failed to complete all the questions, which could make the result unstable. Explanation to parents in more detailed ways might encourage parent in completing the questionnaire, which might give more accuracy in the result.

Another concern is that the ratio of males and females was different in the groups, especially in the autistic group, males was significantly higher than females. It given prevalence rates for autism are four to five times higher in males than females (American Psychiatric Association, 1994). More samples of autistic children are needed to get data that are more accurate.

This study did not evaluate the correlation between eating behavior with gender or age in autistic children. However, previous study indicated that eating behavior in autistic children did not differ in gender (Lukens et al, 2008) or age (William et al, 2005).

Conclusion

Our study provided information that commonly preschool children had eating behavior problems and gender did not relate to eating behavior. Children with autistic showed more problems than TD children. Our study estimates that autistic children have a delay in eating development that may influence their eating behaviors.

Although problem in eating behavior is not a core feature of autism. Clinicians and parents should increase the level of awareness continually as an associate feature in autism. Because eating is an important aspect in childhood, it is necessary to give more attention in eating problems especially in autistic children to prevent failure to thrive that can potentially threaten children's growth and development process. A direct measure with more

comprehensive methodology may need to be addressed for more optimal data of eating behavior in autistic children.

One additional finding is that cultural background can be considered as another influencing factor in the difference of eating behavior in each country. Thus, treatment of eating behaviors problems may need a cultural approach based on background of each country.

References

- Ahearn W, et al. An assessment of food acceptance or pervasive developmental disorder-not otherwise specified. *J Autism and Dev Disorders*, 2001, 31: 505–511.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. Washington, DC, 1994.
- Charruth B, et al. Revisiting the picky eater phenomenon: neophobic behaviors of young children. *J. American Collage of Nutr*, 2000, 19, 771-780.
- Carruth B, et al. Prevalence of picky eater among infants and toddler and their caregivers 'Decision about offering a new food'. *J. Am Diet. Assoc*, 2003, 103, 692-698.
- Charruth B, et al. The phenomenon of picky eater: A behavioural marker in eating patterns of toddlers. *J Am. Coll Nutr*, 1998, 17, 180-186.
- Cooke L, et al. Relationship between parental report of food neophobia and everyday food consumption in 2-6-year-old. *Appetite*, 2003, 4, 205-206
- Galloway A T, et al. Predictors and consequences of food neophobia and pickiness in young girls. *J. Am. Diet. Assoc*, 2003, 103: 692-698
- Honda H, et al. No effect of MMR withdrawal on the incidence of autism: a total population study. *J Child Psychology and Psychiatry*, 2005, 46, 572–579,
- Horvarth K, et al. Gastrointestinal abnormalities in children with autistic disorder. *J Ped*, 1999, 135, 559-563.
- Johnson C R, Handen B L. Eating habits and dietary status in young children with autism. *Journal Dev Phys Disabil*, 2008, 20, 437-448.
- Lukens C, et al. Development and validation of an inventory to assess mealtime behavior problems in children with autism. *J Autism Dev Disord*, 2008, 38, 342-352.
- Martins Y, et al. Feeding and eating behaviors in children with autism and typically developing children. *J Autism Dev Disord*, 2008, 38, 1878–1887.
- Omar Dev R, et al. Rural urban differences in body image perception, body mass index and dieting behavior among malay adolescent malaysian schoolgirls. *European J. Scien Res*, 2009, 34, 69-82.
- Pliner P. Development of measures of food neophobia in children. *Appetite*, 1994, 23: 147-163.
- Rapin I. Neurologic basis of autism: Differential diagnosis and management. *Jac Medicine*, 2000.
- Rogers S J, et al. Parents reports of sensory symptoms in toddler with autism and those with other developmental disorder. *J Autism Dev Disord*, 2003, 33, 631-642.
- Schreck W, et al. A comparison of eating behaviors between children with and without autism. *J Autism and Dev Disorders*, 2004, 34, 433–438.

- William K, et al. Comparing selective eaters with and without developmental disabilities. *Journal Dev Phys Disabil*, 2005, 17, 299-309.
- Williams P, et al. Eating habits of children with autism. *Pediatric Nursing*, 2000, 26: 259-264.
- Wright, Charlot, et al. How do toddler eating problems relate to their eating behavior, food preferences, and growth?. *Paediatrics*, 2007, 120, 1069-1075.
- Yen L L, et al. Problem eating behavior among young children with normal development in Taipei country. *Chin J Public Health*, 1994, 13, 95-104.