

Prevalence of Child's Behavioural Feeding Problems, Body Mass Index and Mental Health Issues Among Parents and Children with Autism in Malaysia

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Abstract

Autism Spectrum Disorder (ASD) is defined as a group of pervasive neurodevelopmental disorders that include significantly impaired functioning in terms of cognitive skills and socialization, verbal and receptive communication, and repetitive behaviors. Several problems arise when handling children with ASD which of them is related to eating behavior. The challenges in daily life that need to be faced by parents of ASD children during mealtime are increased food selectivity, food refusal, and problematic mealtime behaviors. A cross-sectional study was carried out to identify prevalence of child's behavioural feeding problems, body mass index and mental health issue experience by both parents and children with ASD in Malaysia. A total of 213 parents participated in this study. Data on sociodemographic, eating behavior were collected using a questionnaire. Respondents completed the self-reported Sociodemographic form, anthropometry form and Behavioral Paediatric Feeding Assessment Scale (BPFAS) questionnaire, Strength and Difficulty questionnaire and answer 10-item perceived stress scale to evaluate the intended measures. The prevalence abnormal of eating behavior is higher among the participants was 80.8% (n=172). For BMI, 49.8% (n=106) of the respondents reported the highest prevalence of overweight. Peer and pro-social problems were the most frequently reported mental health issues among ASD children, but emotional, behaviour, and hyperactivity issues were reported less frequently. The majority of parents surveyed in this study assessed themselves to be under considerable stress (93.4 percent). In conclusion, this cross-sectional study demonstrated a high frequency of behavioural feeding difficulties, mental health concerns, and obesity among children with autism spectrum disorders in Malaysia. The findings from this study will contribute to the body of information regarding the nutritional health of children with autism spectrum disorders. The increased prevalence of overweight and obesity in children with ASD is one of the indicators that this study should investigate additional factors that may influence children's weight status.

Keywords: Autism spectrum disorder (ASD), Psychological, Eating Behavior, BPFAS (Malay-version), SDQ (Malay-version), BMI

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Introduction

Autism spectrum disorder (ASD) affects around one in every 88 children in the United States^[1,2]. New data released by the Centers for Disease Control and Prevention (CDC) in 2014 confirmed that autism is more prevalent in the United States than previously thought. 1 in 68 children, 1 in 42 boys, and 1 in 189 girls were found to have ASD during this surveillance study^[3]. There is currently no epidemiological research in Malaysia regarding the prevalence of autism. An estimate derived from a feasibility study conducted by the Ministry of Health that the prevalence of ASD in Malaysia is approximately 1.6 in 1,000 children aged 18 to 26 months^[4].

Eating behaviour is a broad term that includes food selection and motivations, feeding behaviours, dieting, and eating-related disorders such as obesity, eating disorders, and feeding disorders^[5]. Feeding difficulties are prevalent in children, affecting between 70 and 89 per cent of children with developmental impairments^[6]. According to previous research, eating or feeding behaviour is more prevalent in the pediatric population, affecting children with developmental delays and medical problems^[7]. These children also exhibit disrupted feeding patterns because of their ASD symptoms, including severe food rejection, a limited food repertoire, and frequent single item intake. This is most often linked to routines, repeated behaviours, obsessions, and sensory-related food rejection. As a result, children with ASD are disproportionately at risk of becoming underweight or overweight in their later life^[8].

Selective feeding may be detrimental to both ASD children and their families. Parents of children with ASD frequently express concern over their child's eating patterns, followed by stress. Parenting a child with ASD can be difficult for both parents and families. The unique characteristics of a child with ASD may require ongoing care to help the individual achieve his or her highest potential. Thus, this may have multiple impacts, including an increase in stress for the parents, an increase in mental problems, and a decrease in the overall quality of life for the entire family. Although the data is not conclusive, several studies indicate that children with ASD may be at risk of nutritional deficiencies due to lower variety. Between 58% and 67% of parents of children with ASD keep track of their child's limited or selective eating^[9]. Clinical presentation of children with ASD and selective eating is quite challenging. Aggression, internalizing habits, externalizing behaviours, repetitive behaviours, fear, and sensory sensitivity have all been linked to eating difficulties in the literature. The difficulties that children with ASD face are frequently related to their eating habits, including selective food dieting and eating-related problem^[5].

The psychological characteristics of children also seem to relate to their eating behaviour^[10]. Children with less expressive language skills and special education children more commonly have problems in a prior study. They also noticed that age was a significant predictor, with older children often less prevalent problems^[11]. Therefore, it is suggested that there is a connection between psychological and parental eating behaviour.

Research and studies on autism spectrum disorder (ASD) problems in children in Malaysia continue to be lacking^[12], particularly in eating behaviour and mental health. The necessity for greater awareness and more studies on eating behaviour has thus constantly been emphasized. Therefore, this study was conducted to provide an insight into the current prevalence of behavioural feeding problems, mental health issues and body mass index (BMI) among ASD children in Malaysia.

Materials and Methods

Subject recruitment

This present study applied an online cross-sectional study design. Study participants were recruited from 20 social media Facebook pages or groups related to Autism in Malaysia between 1st March until 31st May 2021. Inclusion criteria included parents of children aged between 4 to 16 years old, able to communicate in Malay, literate and provided consent to participate. Parents of children with other types of disability were excluded from this study. This study received formal permission from Jabatan Kebajikan Masyarakat, Malaysia (Ref. no: JKMM 100/12/5/2: 2017/459) and was ethically approved by UniSZA Human Ethics Research Committee (Protocol code: UniSZA/UHREC/2021/211).

Sample size calculation

The sample size was calculated using single single proportion formula. To achieve a 95%, confidence interval of width $\pm 5\%$ based on a previous study^[13] which found that prevalence of children with autism is 36.9%, the total number of participants should be included in this study is 358 participants after considering a 20% dropout rate.

Measures

The data were collected in a set of questionnaires disseminated to a selected 20 autism support group from the Facebook application in Malaysia via a google form link. Every group administrator was first contacted to get permission to post the questionnaire's link through their page. Upon approval, all eligible parents were invited to participate, and the link was made available in the group throughout the study duration. Only one email per participant was allowed to answer the question to reduce redundancy and potential bias. The estimated time required to fill in the online questionnaire was 15 minutes.

The questionnaires consisted of four sections, namely Section A (socio-demographic and self-reported child's anthropometric data), Section B (Validated Malay version-Behavioural Paediatrics Feeding Assessment Scale), Section C (Validated Malay version Strength and Difficulty Questionnaire) and Section D (Validated Malay version Perceived Stress Scale). The questionnaire used was the validated Malay version to improve the understanding and responding rate of participants.

Instruments

Socio-demographic and anthropometric profile

The required data include gender, age, ethnicity and state of living, monthly income, current marital status, number of children, parent education level, children's other diseases and parents' occupation. For the anthropometric data of the children, the parents reported the latest (up to the previous three months) weight and height. The children's body mass index (BMI) was calculated and compared using the WHO^[14] BMI-for-age growth chart 5 to 19 years and 2 to 5 years (percentiles). Children whose BMI was between the 15th to 50th percentile was categorized as normal BMI, and any value below or above this percentile was categorized as underweight and overweight, respectively.

Assessment of behavioural feeding status

The Validated Malay version Behavioural Paediatrics Feeding Assessment Scale (BPFAS) was used to assess mealtime and eating behaviour in children and adolescents aged 2 to 18^[15]. It is reliable and valid for screening for eating problems in a broader range of children, including those with eosinophilic gastrointestinal disorder^[16], type 1 diabetes^[17], cystic fibrosis, and developmental disabilities. It consists of 35 items, the first 25 of which assess child behaviour and the remaining 10 of which capture the description of parental feelings and strategies during mealtime. Parents were asked to rate the frequency of problematic mealtime behaviour on a 5-point Likert scale, with scale one indicating that it never occurs and five indicating that it always occurs. Afterwards, parents must determine whether each of the 35 items causes a challenge for them (yes) or whether it is otherwise acceptable (no). The BPFAS score indicates how frequently individuals encounter feeding-related difficulties during mealtimes and how frequently their parents use different coping mechanisms.

Meanwhile, the parent's perception of feeding as a problem indicates how concerned parents were about the child's mealtime behaviour (i.e., problem). After rating the behaviour, the parent was asked to indicate if that behaviour was a problem. The BPFAS score ranges from 35 to 175, whereas the parent's perceived feeding as a problem score is 0 to 35. Scoring of this instrument involves calculating two main separate scores; overall 'Total Frequency Score' (TFS) and 'Total Problem Score' (TPS). In addition, each of the subtests is for child and parent.

A higher BPFAS score indicates that individuals have more feeding-related issues and more maladaptive parental coping mechanisms during meals. Meanwhile, a more assertive parent impression of feeding as a difficulty indicates a higher parent experience of mealtime stress. The scale was verified in the Malay language in a previous study (Cronbach-alpha=0.775, $r = 1.00$)^[18].

Assessment of mental health issues

This study implemented the Strengths and Difficulties Questionnaire (SDQ) and the Perceived Stress Scale (PSS). The 25-item SDQ evaluated children's psychological

attributes such as behavioural and emotional concerns in which parents completed the questionnaire for children between the ages of 4 and 16. It contains five subscales: emotional symptoms (e.g. 'many concerns, often seem worrying'), problems with the behaviour or conduct (e.g. 'often fighting or harassing with other kids'), hyperactivity (e.g. 'over-active and unable to remain still long'), problems between peers (e.g. 'rather solitary, tends to play alone) and pro-social behaviour (e.g. 'reviewing others'). Each item contains three answers (not accurate, a bit true, always true), scored 0–2 or 2–0 depending on the wording of the item. Higher scores imply more dysfunctional conduct, with high scores showing less dysfunctional social interaction. Mental health is classified as "probably" (high risk), "possible" (borderline), or "unlikely" by the algorithm (normal). We combined the categories "possible" and "probable" in the current study to form "possible/probable," and all comparisons were made between this category and the "unlikely". It has validated its content, reliability and validity and is suitable for clinical and non-clinical parental reporting classes. SDQ is valid for usage with persons with an ID and set out in children's examples, including children with autism^[19] evaluated the reliability and validity of the Malay version of the SDQ based on parent's reports. Cronbach's Alpha values of 0.74, 0.77, and 0.78 were acceptable for all parent, teacher, and child-report data, respectively, while maintaining validity ($r=0.4-0.8$).

Another instrument was the 10-item Perceived stress scale (PSS) questionnaire to evaluate the parents' perceptions of stress. This Malay version of PSS-10 has been validated in Malaysia, and it demonstrated a satisfactory level of validity and reliability in accessing stress perception^[20]. This self-administered questionnaire consists of 10 questions that assess thoughts and feelings in the previous month. Each item is scored from 0 (never) to 5 (very often) with a possible sum of scores that range from 0 to 40. A lower score indicates a low level of stress, while a higher score indicates a high level of stress. The Malay version of PSS-10 was translated and validated by Mazlan and Ahmad which Cronbach's alpha coefficient was 0.64, and test-retest reliability was reported as 0.72.

Statistical analysis

The obtained data from the online form were automatically gathered in a spreadsheet. All data were transferred and analysed using the IBM SPSS software (SPSS v22.0). The frequencies were described as a percentage.

Results

Socio-demographic characteristics

There were 213 parents of autistic children who participated in this study (48.8% response rate). Among the participants, 179 autistic children were boys (84%), and 34 were girls (16%), aged from 7 to 12 years old (48.4%) and only 11.3% children aged from 13 to 16 years old. Most of the study participants were from Central Region state (39.4%), Malay (87.8%), parents who are currently married (94.4%), parents who obtained a university degree (82.5%), parents currently working with government sector (50.2%) and have moderate income (50.2%). Table 1 details the socio-demographic characteristics of the participants in this study.

Table 1. Socio-demographic characteristics of study participants

Characteristic	Frequency n (%)
Children's proxy	
Gender	
Boys	179 (84)
Girls	34 (16)
Age	
4-6 years old	66 (40.4)
7-12 years old	103 (48.4)
13-16 years old	24 (11.3)
Parents' proxy	
Race	
Malay	187 (87.8)
Others	26 (12.2)
State	
Central Region	84 (39.4)
Southern Region	30 (14.1)
Eastern Malaysia	30 (14.1)
East Coast Region	29 (13.6)
Northern Region	40 (18.8)
Marital status	
Married	201 (94.4)
Divorcee	12 (5.6)
Profession	
Government	107 (50.2)
Private sector	48 (22.5)
Self-employed	35 (6.4)
Not working/retiree	23 (10.8)
Number of children	
1-2 children	108 (50.7)
3-4 children	90 (42.3)
At least 5 children	15 (7.0)
The family income per month	
Low income	107 (50.2)
Moderate income	79 (37.1)
High income	
Parent's educational level	
Tertiary education	175 (82.2)
At least secondary education	389 (17.8)

Prevalence of body mass index (BMI) status among ASD children

The majority of the ASD children in this study were reported to be either overweight or obese. The BMI status of the study participants is presented as prevalence according to the selected socio-demographic characteristics in Table 2. The majority of underweight children were boys (81.9%) and aged 7-12 years old (56.9%). A similar majority prevalence was also obtained in the gender for the normal and overweight/ obese BMI category with the prevalence of 77.1% and 87.7%, respectively, except that overweight/obese child were majority aged 4-6 years old (44.3%).

Table 2. Prevalence of BMI status among ASD Children according to selected socio-demographic factors

Variables	Body Mass Index (BMI) n (%)		
	Underweight	Normal	Overweight/ obese
Overall	72 (33.8)	35 (16.4)	106 (49.8)
Gender			
Boys(n=179)	59 (81.9)	27 (77.1)	93 (87.7)
Girls (n=34)	13 (18.1)	8 (22.9)	13 (12.3)
Age			
4 – 6 years (n=66)	28 (38.9)	12 (34.3)	47 (44.3)
7 - 12 years (n=103)	41 (56.9)	17 (48.6)	44 (41.5)
13 - 16 years (n=24)	3 (4.2)	6 (17.1)	15 (14.2)

n: number of participants
Data are frequencies (%)

Prevalence of behavioural feeding problem among ASD children

ASD children and their parents' behavioural feeding problem scores were categorized into normal (not having any problems) and abnormal (behaviour feeding problem). The total frequency and total problem score indicated that the majority of the children and parents in this current study were facing behavioural problems related to mealtime. The prevalence for its subtests reported the same result as shown in Table 3.

Table 3. Prevalence of behavioral problems among ASD children

Measure	Normal n (%)	Abnormal n (%)
Children	41 (19.2)	172 (80.8)
Frequency Score		
Parents Frequency Score	13 (6.1)	200 (93.9)
Total Frequency Score (TFS)	24 (11.3)	189 (88.7)
Children Problem Score	93 (43.7)	120 (56.3)
Parents Problem Score	95(44.6)	118(55.4)
Total Problem Score (TPS)	100 (46.9)	113 (53.1)

n: number of participants
Data are frequencies (%)

Prevalence of mental health issues among ASD children and their parents

The prevalence of mental health problems according to SDQ scores are presented in Figure 1. Indicators of peer problems and pro-social problems were the most prevalent mental health issues among the ASD children, while the indicators of emotional, conduct and hyperactivity were reported less frequently among the children in this study.

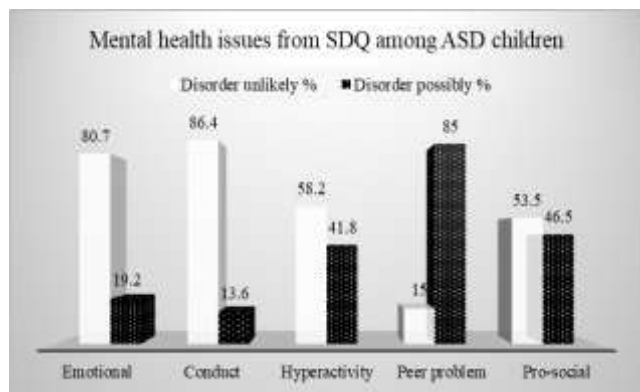


Figure 2. The prevalence of mental health issues according to SDQ among ASD children

The majority of parents in this study perceived themselves as having high stress levels (93.4%). Table 4 shows the prevalence of parental perceived stress reported among parents of ASD children in this study.

Table 4. Prevalence of parental perceived stress

Variables	Low stress level	High stress level
	n (%)	n (%)
Overall	14 (6.5%)	199 (93.4%)
Gender		
Boys (n=179)	12 (85.7)	167 (83.9)
Girls (n=34)	2 (14.3)	32 (16.1)
Age		
4-6 years (n=66)	6 (42.9)	80 (40.2)
7-12 years (n=103)	6 (42.9)	97 (48.7)
13-16 years (n=24)	2 (14.3)	22 (11.1)

n: number of participants
Data are frequencies (%)

Discussion

This study was conducted to identify the prevalence of behavioural feeding problems, mental health issues and BMI status among autism spectrum children in Malaysia. The finding from this study will act as preliminary knowledge for any planned intervention regarding ASD children in the future.

Although abnormal weight status is common reported in the previous study, there are indications that the BMI status of ASD children have become an important-health related problem around the world. In this study, the prevalence of ASD children with overweight or obese was 49.8%. The finding of this current study was consistent with those of a previous study on the association of BMI status, dietary intake and feeding problems among Turkish children with ASD. A cross-sectional study conducted in four autism rehabilitation centres in Istanbul, Turkey, included children with ASD aged 4 to 18 years who reported a high prevalence of overweight and obese children in their study. The evaluation was done based on self-assessment questionnaires and one-to-one interviews at the centres. The body mass index (BMI) increment was postulated to be related to the increment in the calorie intake per day. Even though the study was the first study to report the weight status, dietary intake and feeding problems among Turkish children with ASD⁹, the interpretation on those relationships should be considered with caution as the study implemented the cross-sectional study design.

A recent study in Malaysia discovered that 11.3% of children and adolescents with ASD were overweight, and 21.9% were obese. The cross-sectional study was carried out by Nor *et al.* (2019)^[21] at the UKMMC Child Development Centre (CDC) among outpatient children and adolescents aged 2-18 years who had been diagnosed with ASD according to DSM IV criteria concluded that Malaysian children and adolescents with ASD are disproportionately obese and overweight^[21].

An interesting study to assess overweight, obese prevalence in children with ASD and investigate factors related to overweight were carried out by Egan *et al.* (2013)^[22]. Among children with autistic disorder, 17.16% had a BMI percentile in the overweight range, and 21.89% had a BMI percentile in the obese range. Obesity and overweight are concerns for children with ASD, and they are at greater risk for weight problems than children with Asperger's disorder. Although some research has been carried out on the prevalence of overweight or obesity among ASD children, few empirical investigations have identified factors related to overweight in children with ASD^[22]. Among children who have been diagnosed with ASD, it is still important to address this issue because children who being overweight/obese may affect their future health^[23]. Based on research on the relationship between obesity and autism conducted in the United States and Canada, the study studies discovered that the prevalence of unhealthy weight is significantly higher among children with ASD when compared to the general population^[24].

Abnormal eating behaviours and feeding difficulties are common. In the context of a meal, the term "feeding problems" refers to various problematic behaviours that occur during the meal. Few systematic investigations to

identify the specific form of feeding problems that affected this population group were done previously^[9,25,26]. According to the findings of a meta-analysis, children with ASD were approximately five times more likely to experience a feeding problem than their typically developing peers^[27]. Following previous findings by Sharp et al. (2013), children with ASD experience more feeding difficulties as measured by feeding problems questionnaires^[28]. The current findings validate this previous research. In this study, BPFAS scoring was used to determine the child's eating behaviour; a higher result for the prevalence of abnormal feeding among ASD children (80.8%) was reported indicate that most of the participants have feeding problems. In the previous study conducted^[29] in a few locations in Malaysia, it was discovered that children with ASD have a positive relationship with a variety of eating behaviours. The most commonly observed eating behaviours are food refusals of specific textures and refusal of foods from specific food groups (100%). This was followed by behaviours such as eating only a small amount of food but doing so repeatedly (73.9%), overeating food very often (56.5%), and refusing to eat specific colours of food regularly (47.8%).

Mental health issues related to children with ASD in the current study were comparable with few previous researches. One particular study revealed that non-significant variations of anxiety and depression among mothers of disabled children were related to gender, race, and parental profession^[30]. Other studies have reported similar findings, with no significant differences were observed between high-functioning children with ASD and their peers^[31,32]. Although there was no difference in the oppositional behaviours of boys and girls with ASD, there was a significant difference in boys and girls externalizing and internalizing symptoms concerning gender. In the general population, the relative prevalence of oppositional behaviour among boys is more significant than among girls, but this is not the case in the children population. This might be related to issues with social interactions, inhibition, and communication. The only variations between the genders were in their levels of learning difficulties, inattention, and executive functioning over time^[33].

The research found that young girls referred for mental health services were more depressed than young boys who had been referred. However, girls exhibited greater depressive symptoms throughout preadolescence than boys^[34]. In comparison, the anxiety levels in preadolescent and adolescent girls were higher than boys in the overall population. The hypothesis is that in autism, there are no gender effects because of a common neurobiological deficit^[35]. This study revealed that both boys and girls with ASD had levels of anxiety, inattention, defiance, poor social skills, learning difficulties, executive functioning, and overall levels of development at a similar rate over a year. It was shown that boys had higher degrees of hyperactivity. However, girls exhibited a more significant number of symptoms of social anxiety. This gender gap was not limited to those with ASD and was found in the general population.

Many parents of children with ASD described their life as stressful when taking care of children based on several studies that have been observed^[36]. Maternal emotions and anxiety were expected to be highly linked with child feeding practices based on research in this field. However, correlational analyses indicated no significant correlations

between child feeding habits and maternal anxiety levels^[37]. Previous research investigating anxiety and depression levels in parents of children with autism has found that these mothers experience high levels of anxiety and depression and that high anxiety and depression levels are linked to poor quality of life^[38]. In interventions for families caring for children with ASD, stress management practices should be included to help caregivers reduce stress related to their parenting role^[39].

However, some studies found that the gender of children was associated with parents' psychological attributes. This statement has been proved from a study conducted by previously^[40] in which parents, especially mothers with male children, express high-stress levels ($p=0.001$). This study reported a higher stress level among parents with younger age children. A previous study conducted previously^[37] showed that parents with younger children reported a higher level of stress related to problematic feeding behaviour than parents with older children. Moreover, parents of ASD children experienced episodes of stress when their child was in early childhood and the preschool-age rather than children in older ages^[40].

Mealtimes are generally reported to be difficult for children with ASD, both in terms of food variety and the emergence of problematic behaviours. Eating behaviour is common in children with autism spectrum disorder (ASD), significantly affecting their families. As mothers are generally the primary caregivers, the researcher has focused on the impact of disruptive feeding patterns on them^[37].

Conclusion

In conclusion, this cross-sectional revealed a prevalence of behavioural feeding problems, mental health issues and BMI among autism spectrum disorder children in Malaysia. The findings from this study will add to a body of knowledge in studying the nutritional status of ASD children. Parents have greater problems related to mealtime behaviours to contend with link socioeconomic characteristics and children's psychological well-being (gender, age, and disease). The higher prevalence of overweight and obesity among children with ASD is one of the signs that this study should further investigate the other factors that could lead to changes in the children's weight status.

Limitation of the Study

The limitation of the current study was that the cross-sectional study design that was carried out at one point in time and over a short period did not allow the conclusion to be drawn the causality. There was no follow-up session in this study that provides a full view of the trend of observing the child's eating behaviour. The participants were given an online questionnaire at a specific point in time. Their child behaviour of eating may change over time. Other than that, this study was limited to children with ASD. There was no information available on typically developing children from the general population at the study time. This study compares the prevalence rate of obesity in children from the general population to the prevalence rate of obesity in our study, which was previously established through previous research. The overall response rate for this study was less than the calculated precision correction value. However, due to the time constraints, this study's response rate was not

following precision correction. This has the potential to have an impact on the precision of the outcomes. Besides, no statistical analysis on any relationship has been identified between the study variables that make this study a descriptive study. Dietary data such as 24-hour diet recall is recommended to obtain more information related to nutritional status. Thus, it can help in early identification and intervention of poor oral motor as it is needed to improve overall oral motor function in mild CP children before progress to severe level.

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