

Mothers' Perspectives of Nutritional Status of Children with Autism Spectrum Disorders (ASD) in Saudi Arabia

Dr. Faihan Alotaibi^{1*} Dr. Mudi Alharbi²

1. Department of Special Educational Needs at King Saud University, Riyadh 12372, Saudi Arabia

2. Specialist of Nutrition and health wellbeing, Riyadh, Saudi Arabia

Abstract

Autism Spectrum Disorder (ASD) affects children's neurological development, which in turn affects the digestive system and can cause distressing gastrointestinal symptoms. This often means that children with ASD develop different eating habits. This study examined mothers' perceptions of eating behaviours in children with ASD. The study involved 70 mothers whose children were registered in autism clinics in various centres across Riyadh in Saudi Arabia. The findings of the study indicate that mothers were getting their nutrition information from different sources and many of them agreed that some of the sources are not credible. Accordingly, mothers of children with ASD were less confident about their nutritional knowledge. The study also found that mothers had different perceptions about their children's nutrition. Similarly, the majority of mothers were worried about their children's feeding behaviour. The research concludes that mothers with children with ASD experience many challenges in feeding their children, but nonetheless they still try to offer their children the best diet possible. Accordingly, this study recommends that mothers should get information on nutrition for their children from credible and reliable sources, including their children's dietitian and physicians.

Keywords: Autism Spectrum Disorder (ASD), Mothers, nutrition information and feeding behaviour.

1. Introduction

Autism Spectrum Disorder (ASD) is associated with an individual's neurological development and the symptoms of the disorder will be present throughout the individual's life. The nutritional status of the autistic patient is important, since healthy nutritional status helps to prevent the onset of gastrointestinal symptoms which might aggravate other symptoms of the patient's condition and be challenging to manage. In fact, according to a study by Ranjan and Nasser (2015), though nutrition alone cannot treat ASD symptoms, nutritional therapy is an important element of the ASD management regime. Another important factor that makes nutritional therapy essential for autistic patients, especially children, is that individuals with ASD conditions tend to have repetitive interests, which can have a significant effect on the individual's overall health. Kawicka and Regulska-Ilow (2013) add that adapting a proper dietary regime is essential in helping to alleviate the severity of the symptoms of ASD. Assessing the nutritional status of autistic children helps in making necessary dietary changes so that any metabolic indicators of imbalance or deficiency are improved appropriately. Moreover, previous and current literature indicate that there is a need to address any nutritional deficiencies in autistic children, either with nutrients or a combination of nutrients, where dietary therapy by a dietitian identifies such issues (Ranjan & Nasser, 2015).

The nutritional vulnerability of individuals with ASD has been recognized as a critical aspect when conducting dietary assessments with ASD patients. Mari-Bauset, Llopis-González, Zazpe, Mari-Sanchis, and Morales Suárez-Varela, (2016) highlights the importance of continuous evaluation of the nutritional status of individuals with ASD. The authors compared the dietary status of child patients with ASD and those without and found that the children with ASD needed further nutritional intervention in order to promote healthy development. This shows the important role caregivers and parents play in ensuring healthy growth and development in children with ASD.

1.1 Statement of problem

Past research has showed that individuals with ASD can be nutritionally vulnerable, which is compounded by the fact that children with the condition often display selective eating patterns, predisposing them to have a restricted dietary intake. Since children with ASD sometimes display challenging mealtime behaviours, these aspects can greatly impact parents' feeding experiences and perspectives on the nutritional status of their children. While there has been a significant amount of effort devoted to highlighting the need for nutritional interventions in children with ASD, little effort has been dedicated to understanding or highlighting mothers' perspectives on the nutritional status of children with the condition, especially considering the intricate connections between feeding, mothering, and ASD. Understanding mothers' perspectives on the nutritional status of their ASD-diagnosed children is a vital step towards improving nutritional interventions for the children with ASD while at the same helping to facilitate richer mother-child interactions. The existing gap in the literature concerning mothers' perspectives provides a justification for exploring this further. Addressing this issue will not only improve professionals' understanding of feeding difficulties from a mother's point of view, but will also help in

improving mealtime interactions between mothers (and indeed fathers and other carers) and their autistic children.

1.2 Aim of the study

The aim of this study is to examine mothers' perceptions of the nutritional status of children with ASD in Riyadh city, Saudi Arabia.

1.3 Study questions

- Question 1: Are mothers of children with ASD confident about their nutritional knowledge?
- Question 2: What are mothers' perceptions of the nutritional status of their children with ASD?
- Question 3: What are mothers' perceptions about sources of nutritional knowledge?
- Question 4: What are mothers' perceptions of children's feeding behaviours in Saudi Arabia?

2. Study Background

There is limited literature on the perceptions of parents of children with ASD regarding the nutritional status of their autistic children. Nonetheless, Lockner, Crowe and Skipper (2008) found that nearly 50% of children aged 3-9 were considered 'fussy eaters'. In addition, the study found that nearly 70% of parents who had children with ASD aged between 1-12 years felt frustrated, worried, and irritated when their children failed to consume a balanced diet. Lockner, Crowe and Skipper (2008) assert that children both with and without ASD may disagree with their parents on eating habits and may fail to understand why it is important for them to eat a balanced diet. In another study done by Nadon, Feldman, Dunn and Gisel (2011) it was established that the family mealtime environment is linked with parents' eating patterns. In this study, for example, the researchers found that watching television during mealtime resulted in a decrease in the amount of vegetables and fruits consumed. There were fewer arguments about eating behaviour, however (Nadon et al., 2011). Children with disabilities are more often considered to be 'fussy eaters' than non-disabled children, leaving many parents frustrated. Ranjan and Nasser (2015) note that parents' perceptions of their children's nutritional state helps dietitians and other healthcare professionals to provide more effective interventions. In a study by Schmitt, Heiss, and Campbell (2008) parents of children with ASD were requested to complete a one-week diet record that they had to fill in daily, as well as answering a questionnaire about their beliefs and attitudes regarding nutrition. Nearly all the parents recorded that there was a relationship between a positive attitude towards food, diet, and nutritional behaviour. Similarly, these parents reported that positive attitudes influenced the importance they attached to nutrition. The study also found that some parents of children with ASD felt that their children were under-nourished. Such parents were highly likely to feel frustrated or worried when they fed their autistic children (Schmitt et al., 2008).

Schreck and Williams (2006) found that some parents felt that when changes were made to their child's diet, it made a difference to the child's emotions and behaviour. Ranjan and Nasser (2015) observed, however, that since there is a lot of information available online, and they note that in many cases, parents feel anxious or stressed, since they want to offer their child the best nutrition possible, but it could be hard for them to apply their nutritional knowledge, particularly when they lack confidence. As such, parents' perceptions regarding their individual nutritional knowledge as well as their perception on the nutritional status of their child can offer dietitians an understanding on how best to treat a child with ASD and offer nutritional education to parents. Schmitt et al. (2008) underline that studies have shown that children with ASD are nutritionally susceptible because they often show 'picky eating' behaviours that dispose them to limited food consumption. In these cases, some parents feel they have to restrict their child in terms of what they eat to improve their eating behaviours.

However, due to the nature of the needs of children with ASD, getting the right nutritional information is essential in managing the symptoms of ASD and ensuring the child gets a balanced diet. Holt (2008) found that the majority of mothers with autistic children do not seek information from qualified dietitians or nutritionists, which raises the question of where mothers are getting their nutritional information and whether this information is a) professionally sound and b) adequate to help maintain or improve the nutritional status of an autistic child. In a similar study, it was established that there was a marginal correlation between the belief in the adequacy of the information received and confidence in the nutritional status of children with ASD (Adams et al., 2011). Similarly, Holt (2008) found that there is a fringe relationship between the mother's belief in the adequacy of nutritional information available and searching for information from credible sources. Some past studies have revealed that mothers are getting nutritional information for their children from the internet or physicians. Adams et al., (2011), for instance, revealed that mothers who sought nutritional information from the internet mostly sought information relating to the 24-hour recall and the recommended minimum daily dietary intake for an autistic child. Nonetheless, Holt (2008) points out that despite the internet becoming a major source of information for many mothers and there is a wealth of information available online, not all of these sources of information are credible or sound, which raises several concerns.

According to the findings of the study by Barnhill, and Gutierrez (2015), self-imposed dietary restrictions in autistic children accompanied by mothers' general confusion means there is a need for parents to access information from credible sources. This could be a vital element for autistic children's health. Barnhill and Gutierrez (2015) point out that parents of autistic children often experience confusion and doubt, making it even more important that they seek information only from credible and sound sources such as a professional dietitian or nutritionist. Mari-Bauset et al (2016) add that seeking information from a professional dietitian not only assures nutritionally sound information, but also guarantees a comprehensive nutritional evaluation, which is essential for developing specific, tailored guidelines for an individual child with ASD.

The importance of accessing the right sources of information for autistic children has been shown by Ranjan and Nasser (2015) who point out that assessing the nutritional status of autistic children is vital in making necessary dietary changes to improve metabolic indicators appropriately. These recommendations are best made by professionals, since parents can inadvertently seek information from sources that could give conflicting information. Furthermore, existing literature indicates that there is a need to combat dietary deficiencies in autistic children, which is an integral part of the overall management of ASD and thus must be approached in a professional manner as part of the child's care plan (Ranjan & Nasser 2015). However, feeding behaviours described an individual's attitudes towards the food they eat and their actions when having a meal (Collins et al., 2003). The existing literature on the feeding behaviours of non-autistic children presents a starting point for understanding feeding behaviours in children with ASD. Collins et al (2003), adds that children with ASD often show complex feeding behaviours and emotional responses to food because they tend to have underdeveloped gastrointestinal tracts and usually have problems with the digestive system. Accordingly, tackling feeding behaviour problems in children with ASD could result in improving the outcomes of interventions for these children.

According to Collins et al (2003), one of the major issues in the feeding behaviours of children with ASD is narrow food preferences. No matter whether the child has mild or severe ASD, a child may only like to eat one or two types of food. Moreover, some children only prefer their food to be a certain texture. As such, these limitations make meeting the nutritional requirements of children with ASD challenging, since these feeding behaviours restrict the essential nutrients the child will consume in their diet. In addition, regurgitation, rumination, and pica are commonly reported among children with ASD. As explained by Collins et al. (2003), regurgitation occurs when the child ejects food from the stomach, while rumination occurs when the child continuously chews the food without ingesting. Pica occurs when a child consumes non-edible items such as paper or dirt. Emotional behaviours in children with ASD can further complicate their feeding. Anxiety and discomfort, for example, could result in a child vomiting, spitting, crying, or just playing around when eating. Williams et al (2008) established that there was a strong link between mealtime, behaviours, nutrition, and temperament. Accordingly, they found that more 'easy-going' children with ASD generally got enough nutrition compared to children considered to be 'fussy' or experiencing trouble around eating.

Generally, past findings indicate that non-autistic children can also be 'fussy eaters'. This was captured in a study by Warren et al. (2008) among children aged 3-5 and 7-11 years in Wales. The study found that many of the children exhibited preferences for unhealthy foods despite the many healthy food varieties that were offered to them. Ranjan and Nasser (2015) observed that children with ASD can show ritualistic behaviours, particularly during mealtimes. Nonetheless, ritualistic behaviours have also been reported in young children without ASD in relation to food choices. Martins et al (2008) found, however, that children with ASD showed more restricted food choices and displayed more difficult feeding behaviours compared to neurotypical children. The external environment also affects eating behaviours in children with ASD. In their study, Schreck and Williams (2006) noted that non-autistic children also exhibited different food preferences. The time of the day that the meal is served and the types of food served have also been found to influence eating behaviour in children with ASD.

3. Methodology

3.1 Participants

In undertaking the present study, the researchers used a sample of 70 mothers of children with ASD. The mothers who participated were registered in autism clinics in various autism centres across Riyadh in Saudi Arabia. All the participants were given a form explaining the objectives of the study and requesting their consent to take part in the study. The form mentioned the various questions that would be asked and the benefits of the study. Similarly, the mothers were informed of any potential risk they may face by participating in the study. The researchers assured them of the confidentiality of any information given and the timeframe the study would take.

3.2 Survey instrument

Questionnaires were used to collect the data for the study. The questionnaires used followed the Behavioral

Pediatric Feeding Assessment Scale (BPFAS). This scale has passed the validity test as proposed by Lukens and Linscheld (2007). In developing the questionnaire, the researchers focused on these three areas:

- 1.0 Mothers' nutritional knowledge
- 1.1 Nutritional status of child
- 1.2 Nutritional information sources
- 1.3 Child feeding behaviours

3.3 Procedure

The procedure involved an online survey, where the mothers participating in the study had to fill in selected questions online. The survey started in October 2016 and ended in February 2017. The questions had to be answered based on a 5-point Likert-type scale. Out of the 100 questionnaires that were sent out to the participants, only 70 of them were fully completed. This translates to a 70% response rate.

3.4 Data analysis

Owing to the nature of the data and the objectives of the study, the researchers opted for descriptive analysis as data analysis approach. This was informed by the fact that views or perceptions are best explained rather than measured. As such, the researchers applied descriptive statistical analysis to explain the common attributes arising from the data collected. Furthermore, the results of the data were summarized in simple graphs and charts for analysis, as suggested by Briggs and Coleman (2007). The SPSS program was applied to analyse the statistical data.

4. Results

When asked about their perceptions of their nutritional knowledge and background regarding the meals they give their children, it was surprising that only 30.5% of the mothers stated they were confident in their nutritional knowledge. The majority of them (59.5%) disagreed, meaning that they did not feel confident. When asked if they were confident about where they obtain their nutritional knowledge, only 24% agreed that they were confident, while 30.5% reported that they were neutral, meaning that they were not sure. The majority disagreed with the question, indicating that they were not confident in the sources of information they received about nutrition. Similarly, a majority of the participants (35.5%) agreed that they did not feel they had basic nutritional knowledge. A higher percentage, 47.5%, stated that they were neutral, while a small percentage of 17% disagreed, implying that they did have basic nutritional knowledge. When asked if they would like to obtain nutritional information, 79.5% of the respondents agreed that they were willing to obtain more information. 8% responded that they did not know and 12.5% said they were not ready to obtain more nutritional information. Lastly, the participants were asked if they had seen a dietitian for their child. The majority of the mothers (44%) had not visited a dietitian for their child. Only 25.5% had made that visit, while 30.5% were neutral (see Table 1).

4.1 Table 1: Nutritional Knowledge and background

Nutritional Knowledge and background	Agree	Neutral	Disagree	N=
1. Are you assured of your nutritional knowledge?	30.5%	10.0%	59.5%	69
2. Are you assured of where you get your nutritional knowledge?	24%	30.5%	45.5%	65
3. Do you lack basic nutritional knowledge?	35.5%	47.5%	17%	68
4. Do you have the adequate nutritional knowledge to care for your child?	26.5%	24.5%	49%	67
5. Is there need to get additional nutritional information?	79.5%	8%	12.5%	69
6. Have you ever visited a dietitian for your child?	25.5%	30.5%	44%	69

The second set of questions touched on the nutritional status of children with ASD. The first question asked about the mothers' feelings concerning their children's nutrition status. 58% of the 68 mothers felt that the nutrition of their children was fine, but 22% felt that their child's nutritional status was inadequate. 20% remained neutral. When asked about the amount of vitamins/minerals they thought their children were getting, 48% were positive that their children were getting the right amounts, while 35% felt the opposite. 16% said they did not know (neutral). Similarly, 73% of the mothers were worried about the nutrition of their children, compared to 20% who were not worried. When asked if they felt that their children were of normal weight, 50% agreed, 40% disagreed and 10% remained neutral. The next question asked the mothers if they felt that their children were eating enough food/nutrients. 61.5% of the 67 agreed and 26% disagreed. The remaining 12.5% did not know (neutral response). When asked whether they agreed with the statement: I do not think my child is a healthy weight, 35.5% of mothers said that their children did not have weight issues, 8.5% remained neutral, while 56% felt that their children did indeed have weight issues. When asked if they felt that their children were

underweight, the majority (72%) of the mothers disagreed, but 20.5% agreed that their children were underweight. Lastly, the mothers were asked about their feelings about how medication(s) affected their child's nutritional status. 29 % of the mothers agreed that medication affected their children's nutritional status, while 58.5% disagreed with this view. The remaining 12.5% remained neutral (see Table 2).

4.2 Table 2: Nutritional Status of Children with ASD

Nutritional Status of Child	Agree	Neutral	Disagree	N=
7. I feel that my child's nutrition status is good.	58	20	22	68
8. I feel my child is not getting enough vitamins/minerals.	48	16	35	69
9. The nutritional status of my child worries me.	73	6.5	20	69
10. I feel that my child is a normal weight.	50	10	40	69
11. I feel that my child gets enough food/nutrition to eat.	61.5	12.5	26	67
12. I do not think my child is a healthy weight.	35.5	8.5	56	68
13. I feel that my child is underweight.	20.5	7.5	72	69
14. I believe that my child's medication(s) affects their nutritional status.	29	12.5	58.5	69

The third set of questions was on sources of nutritional knowledge. The researchers asked eight questions in this section, starting with: *Do you get your nutritional information from family and friends?* 49% of respondents agreed that they got their nutritional information from family and friends, while 26% disagreed, and 24% remained neutral. When asked if they got their nutrition information from their physicians, the majority agreed (59%), while 10% reported that they were neutral and 40% disagreed. The third question was whether they got their nutrition information from the internet. 59% of the mothers agreed, while 25% disagreed and 15% did not know (neutral). The next question asked whether they considered sources like medical journals to be credible. Only 12% of 70 mothers felt that these sources were credible, while 57% disagreed. 30% responded neutrally. The researchers then asked the mothers if they had visited a dietitian for additional information. 35% of 60 mothers gave a positive answer by agreeing, while 44% out of 69 mothers disagreed and 20% remained neutral. The following question asked if the mothers had sought additional nutritional information, 45% of mothers agreed that they did seek additional information, while 29% disagreed and 25% were neutral. When the question *Do you trust the nutritional information you get?* was asked, 23% of 69 mothers agreed that they trusted the information they received, while 31% out of the 69 mothers disagreed and 45% remained neutral. Lastly, the questionnaire asked if the mothers felt that they were ill-informed on nutritional information for their child. The majority (53%) of the mothers agreed, while only 21% disagreed and 25% reported they were neutral. See Table 3 for the detailed results from this section.

Table 3: Sources of Nutritional Knowledge

Sources of Nutritional Knowledge	Agree	Neutral	Disagree	N=
15. Do you get your nutritional information from family and friends?	49.5	24.5	26	70
16. Do you get your nutritional information from a physician?	49.5	10.5	40	69
17. Do you get nutritional information from the internet?	59.5	15.5	25	68
18. Do you obtain your information from academic sources like medical journals and books?	12.5	30	57.5	69
19. Do you visit your child's dietitian for additional information?	35.5	20.5	44	69
20. I do not seek additional nutritional information.	45.5	25.5	29	68
21. Do you trust the nutritional information you get?	23.5	45.5	31	69
22. I feel that I am ill-informed on nutritional information for my child.	53.5	25.5	21	69

The fourth section of the questions was on the feeding behaviours of children with ASD. The first question asked if mothers felt that their child's feeding behaviours affected their nutritional status. 81% of 69 mothers agreed that their children's feeding behaviours affected their nutritional status of their child, while 12% disagreed, and 6.5% were neutral. The second question was around whether the mother felt it was okay for their child with ASD to eat alone. The majority disagreed (55.5%), and only 32% agreed, with 12.5% remaining neutral. The survey then asked if mothers were worried about feeding their children. The majority, 49.5% disagreed, while 20.5% agreed that they felt worried and 30% were neither worried nor unconcerned (neutral). The mothers were asked if their child habitually threw food during mealtimes. An overwhelming majority, 92% disagreed, while just 1.5% agreed and 6.5% were neutral. When asked, *Does your child not eating at school*

worry you? 20.5% of the respondents agreed that they were worried, while 49% disagreed and 30.5% remained neutral. The next question asked if their child refused to eat new types of foods. 24% agreed that their child refused new foods, while 55.5% disagreed and 20.5% were neutral. The second last question asked if the mothers felt anxious/stressed when feeding their child, and 25.5% agreed. 58.5% reported that they were anxious and 16% responded neutrally. The last question asked if the mothers thought that their child misbehaved because he/she did not like the food given to them. 31% agreed with this, while 48.5% disagreed and 20.5% were neutral. See Table 4 below for a more detailed breakdown.

Table 4: ASD Child Feeding Behaviours

ASD Child Feeding Behaviours	Agree	Neutral	Disagree	N=
23. Is it true that your child's feeding behaviours affects his/her nutritional status?	81.5	6.5	12	69
24. I feel it's okay for my child to eat alone without joining others at the table.	32	12.5	55.5	69
25. I am not worried about feeding my child.	20.5	30	49.5	67
26. My child habitually throws food during mealtimes.	1.5	6.5	92	70
27. Does your child not eating at school worry you?	20.5	30.5	49	69
28. Does your child refuse to try new types of foods?	24	20.5	55.5	69
29. Do you feel anxious/stressed when you have to feed your child?	25.5	16	58.5	70
30. Do you think your child misbehaves at mealtimes because they dislike the food given to them?	31	20.5	48.5	70

5. Discussion

The results of this study indicate that most mothers did not feel assured of the nutritional knowledge they possessed, since 59.5% disagreed that they were confident in the knowledge they had. More so, only a few mothers were assured of the credibility of the places they were getting their nutritional knowledge, while quite a few of them were not sure. This implies that many mothers may not be getting information from reliable sources, which could be why they are not confident in the knowledge they have. These results echo the findings of Holt (2008) who established that the majority of mothers of autistic children did not seek information from qualified dietitians or nutritionists. Despite this, most of the mothers agreed that they had enough basic nutritional knowledge to feed their autistic children. Certainly, this results from the fact that they can at least access some sources of information on how to feed their child. They can also gain knowledge from their past experiences with feeding their children.

The results from the questionnaire show, however, that most of the mothers only had basic nutritional knowledge and felt they lacked sufficient knowledge. Indeed, this corresponds with the existing literature, which has established that there is a relationship between parents' belief in having adequate information and the nutritional status of children with ASD (Adams et al., 2011). Indeed, the majority of the mothers who responded to this study felt they did not have the right nutritional knowledge to provide their children with the right diet. This may be because they are not obtaining professional advice. This could be due to cultural factors in Saudi Arabia, since women are not encouraged to visit public places, therefore it is more difficult to get the required information directly from professionals. From the survey, most mothers reported that they realized the importance of gaining nutritional knowledge, which could explain why the majority of them said that they would like to gain additional information. Nonetheless, very few reported visiting a dietitian, an observation also made by Holt (2008).

In spite of the challenges that mothers face, they still felt that their child's nutrition status was good. It may be that these children manage to eat reasonably well even though they have some problematic eating behaviours. Yet again, many still felt that their child was getting less vitamins/minerals than they needed, which was a concern for them. This finding is similar to Skipper's (2008) study, which established that 50% of children aged 3-9 were 'fussy eaters'. Moreover, the researchers found that about 70% of the parents who had children with ASD aged between 1-12 years felt frustrated, worried, and irritated when their child failed to consume a balanced diet. Many of the mothers in this study clearly stated that they felt worried about the nutritional status of their child. Though the mothers were worried, however, the majority of them still felt that their children were getting enough to eat. This could stem from the fact that children, whether they have ASD or not, can be 'fussy eaters', which comforts mothers as they understand that their child's eating behaviours could simply be a result of being a young child, not necessarily due to their condition. Indeed, the majority of mothers felt that their children's weight was normal, which is similar to the findings of Schmitt, Heiss and Campbell (2008), who found that only a few parents felt that their children were underweight. Most importantly, a few mothers also thought that medication affected their child's nutrition.

The sources of nutritional information from which mothers get their knowledge is extremely important,

because It's evident that mothers will get the right information, but how does having the right information affect how they feed their children. The survey shows that family and friends are a key source of nutritional information for mothers. Ranjan and Nasser's (2015) study also points out that knowing an autistic child's nutritional status is vital in making necessary dietary changes. The mother can only implement the necessary dietary recommendations. Many mothers in this study reported getting information from their physician. As a professional in the field, I would assert that this is a good source of information that can help them make the right nutritional decisions. The internet also has become a leading source of information, since 60% of the mothers reported getting their information from the internet, underlining its importance. Sadly, very few mothers considered the sources they were obtaining information from credible. Indeed, this has been expressed in the literature; Holt (2008) found, for example, that many parents with autistic children were not getting information from professional sources. Indeed, few mothers in this study reported visiting their children's dietitian, which could explain why most of the mothers agreed that they felt ill-informed concerning nutrition.

The majority of mothers agreed that their child's feeding behaviours affected their nutritional status. This underlines that mothers are aware that if their child has 'fussy eating habits', their nutritional status could be affected. This corresponds with the findings of Collins et al. (2003) who found that children with ASD showed 'fussy eating' behaviours and complex emotional responses to food because they have underdeveloped gastrointestinal tracts and problems with the digestive system. Accordingly, the digestive problems often seen in children with ASD could contribute to poor nutritional status. Most mothers in this study, however, were not worried about feeding their child, possibly because they also reported having some general nutritional knowledge around what their child required. In addition, the survey revealed that only a few mothers were worried about feeding their children. Certainly, having some general knowledge of how best to feed their children will help mothers feel confident about it. Children with ASD can show problematic eating behaviours. This was reported by nearly 1.5% of the mothers in this study who stated that their children had a habit of throwing food when they eat. This is also reflected in the literature, as Warren et al. (2008) found that many children exhibited unhealthy food choices in spite of the many healthy food varieties being offered to them. They can do this by throwing what they do not like away from them. Indeed, a few children even refused to eat any new foods they are given. Most of the mothers in this study believed that the introduction of new types of food was not the reason for their children misbehaving, indicating agreement with the assertion that children in general can show challenging eating behaviours.

6. Conclusion

This study concludes that the nutritional status of children with ASD is important because a healthy nutritional status assists in preventing the onset of gastrointestinal symptoms which might aggravate the child's symptoms and present additional challenges for parents, particularly the main caregiver (more often than not the mother). Though challenging feeding behaviours are found in children both with and without ASD, in many cases they are more pronounced in autistic children. In many cases, the mothers of children with ASD lack knowledge and professional input around their children's nutrition and diet. This is because many of them do not visit their child's dietitian or physician to get credible and tailored knowledge. This is a big challenge in trying to deal with problematic eating behaviours in autistic children, since mothers are often limited to using the little general knowledge they have, as well as knowledge from family and friends, which although well-meaning, may not be correct. Indeed, many mothers reported being worried about their children's eating habits and expressed a desire for more information. Challenging eating behaviours in children with ASD can be treated by providing the right environment when eating and through parents displaying a positive attitude towards food, which can impact positively on children. It is clear that most mothers in this study had positive perceptions about their children's eating habits, though they did report getting worried and actively trying to ensure that their children got the right nutrition and healthy food.

6.1 Recommendations:

- Parents and carers should get information from the right sources, including visiting dietitians and physicians. The right nutritional information will boost confidence and guide caregivers in providing their children with adequate nutrition.
- Parents understand that children's feeding behaviours affect their nutritional status. Accordingly, it is important to know the right methods they can use to improve their children's eating behaviours. Knowing the right foods for the child, what to do when the child refuses to eat, and the best environment in which to feed a child, for example, are all factors that can contribute to improving feeding behaviours. Certainly, learning from the experts and getting the right information will help parents and carers in dealing with this aspect of their child's care.
- Parents should monitor their children's nutrition and weight. In addition, they should show a positive attitude towards their children and towards food, as well as ensuring that they do not depend on

information from the internet alone on how best to feed their children.

References

- Adams, J., Audhya, T., McDonough-Means, S., Rubin, R., Quig, D., & Geis, E. et al. (2011). Nutritional and metabolic status of children with autism vs. neurotypical children, and the association with autism severity. *Nutrition & Metabolism*, 8(1), 34. <http://dx.doi.org/10.1186/1743-7075-8-34>
- Barnhill, K., & Gutierrez, A. (2015). Analysis of Dietary Intake and Nutritional Status in Children with Autism Spectrum Disorder. *Autism-Open Access*, 05(03). <http://dx.doi.org/10.4172/2165-7890.1000154>
- Collins, M, Kyle, R., Smith, S., Laverty, A., Robers, S. & Eaton-Evans, J. (2003). Coping with the usual family diet: Eating behaviour and food choices of children with Down's syndrome, Autism Spectrum Disorders or Cri du Chat syndrome and comparison groups of siblings. *Journal of Learning Disabilities*, 7(2), 137-155.
- Holt, Rachel Corliss, (2008). "Parental Perceptions of Nutritional Status Of Children With Autism" *University of Kentucky Master's Theses*. Paper 542. http://uknowledge.uky.edu/gradschool_theses/542
- Kawicka A, & Regulska-Ilow, B (2013). How nutritional status, diet and dietary supplements can affect autism. A review. *Rocz Panstw Zakl Hig*. 64(1):1-12
- Lockner DW, Crowe TK, Skipper BJ(2008). Dietary intake and parents' perception of mealtime behaviors in preschool-age children with autism spectrum disorder and in typically developing children. *J Am Diet Assoc*;108:1360–3
- Mari-Bauset, S., Llopis-González, A., Zazpe, I., Mari-Sanchis, A., & Morales Suárez-Varela, M. (2016). Comparison of nutritional status between children with autism spectrum disorder and typically developing children in the Mediterranean Region (Valencia, Spain). *Autism*, 21(3), 310-322. <http://dx.doi.org/10.1177/1362361316636976>
- Martins, Y., Young, R. & Robson, D. (2008). Feeding and eating behaviors in children with Autism and typically developing children. *Journal of Autism and Developmental Disorders*,
- Nadon G, Feldman DE, Dunn W, Gisel E (2011). Mealtime problems in children with autism spectrum disorder and their typically developing siblings: a comparison study. *Autism*;15:98–113.
- Ranjan, S and JNasser, J (2015). Nutritional Status of Individuals with Autism Spectrum Disorders: Do We Know Enough? *Adv Nutr* vol. 6: 397-407
- Ranjan, S., & Nasser, J. A. (2015). Nutritional Status of Individuals with Autism Spectrum Disorders: Do We Know Enough? *Advances in Nutrition: An International Review Journal*, 6(4), 397-407. doi:10.3945/an.114.007914
- Schmitt L, Heiss CJ, Campbell EE (2008) A comparison of nutrient intake and eating behaviors of boys with and without autism. *Topics Clin Nutr*;23:23–31
- Schreck KA, Williams K (2006). Food preferences and factors influencing food selectivity for children with autism spectrum disorders. *Res Dev Disabil*;27:353–63.
- Williams, P., Dalrymple, N. & Neal, J. (2000). Eating habits of children with Autism. *Pediatric Nursing*, 26(3), 259-264.

ABOUT THE AUTHORS:

Faihan, Alotaibi, (Riyadh, 1982). BA in (intellectual disability, King Saud University, Saudi Arabia), MA in Autism, University of Nottingham, in UK. He is lecturer at special education need department in Education College at King Saud University, Saudi Arabia; He is a PhD student in autism at the department of education at Reading University in UK.

Mudi Alharbi, BSc (Saudi Arabia) and MSc (Glasgow/UK) in clinical nutrition, PhD in food and Nutritional sciences (Reading/UK). Post doctorate research at department of food and nutritional sciences, University of Reading.