

# Assessing Dietary Practices of Children with Avoidant Restrictive Food Intake Disorder (ARFID) - A Cross-Sectional Study

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## ABSTRACT

**OBJECTIVE:** The current study aimed to find children's dietary patterns with Avoidant Restrictive Food Intake Disorder (ARFID) and its characteristics in children.

**METHODOLOGY:** This mixed-method cross-sectional study was conducted in April 2021 among children with Avoidant Restrictive Food Intake Disorder. Thirty participants of the age group (5-12 years) were selected from the Pediatrics and Children Ward of Ittefaq Hospital, Lahore, with a purposive sampling technique. Outpatient children aged between 5 and 12 years were included, whereas the children who had any congenital disabilities and were diagnosed with any other eating disorder were excluded. A focus group discussion was held for the formulation of the questionnaire. A diagnostic criteria questionnaire for ARFID was taken from the Canadian Pediatric Surveillance Program 2017, including anthropometric data and general characteristics/behavioral features. A self-structured food frequency questionnaire was used. Informed consent was taken from all participants. Qualitative interviews were reported as thematic analysis, and Quantitative data were analyzed using SPSS version 25 as statistical analysis for data visualization, simple statistics to generate summary charts, and customized graphs.

**RESULTS:** Patients with ARFID were primarily female and relatively young, with a mean age of 8.35±0.46. Most of the participants were underweight (77%). The mean BMI (kg/m<sup>2</sup>) of the children was 13.7±0.26. Most patients with ARFID also reported a lack of interest in eating, loss of appetite, aversion due to sensory characteristics and avoidance of certain foods.

**CONCLUSION:** ARFID is prevalent in all populations, but the lack of awareness among healthcare professionals and the general population makes the diagnosis difficult.

**KEYWORDS:** ARFID, Eating Disorders, Food aversions, Food Frequency Questionnaire, Loss of appetite, Underweight.

## INTRODUCTION

Avoidant Restrictive Food Intake Disorder (ARFID) was first presented by the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) as an eating disorder. It is a redefinition of infancy and early childhood feeding disorder<sup>1</sup>. According to the criteria, if a child is not getting enough food due to food insecurity or belongs to a poor socio-economic background, they can not be diagnosed with ARFID.

According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition DSM-5, an individual with ARFID has profound characteristics like marked weight loss (or failure to achieve weight gain or flattening of growth in children), significant nutritional deficiency, dependence on EN feeding or oral nutritional supplements, marked interference in psychosocial functioning"<sup>2</sup>.

"Causes for avoidance or restriction may include lack of interest in food or loss of appetite; fear of aversive characters or discomfort from eating, e.g. choking,

abdominal pain, or vomiting; or due to sensory characteristics of the food"<sup>3</sup>.

ARFID was incorporated in the DSM-5 so that more patients who formerly were identified with an Eating Disorder Not Otherwise Specified (EDNOS) could be correctly identified. On presentation, the patients with ARFID often display as underweight because of either restriction of eating or long-term malnutrition that causes a significant weight loss. Moreover, they do not undergo body shape concerns like those with anorexia nervosa or bulimia nervosa.

Most likely, the patients of ARFID are to be younger, male, with a higher incidence of comorbid medical or psychiatric disorders compared to those of other eating disorders<sup>6</sup>.

The prevalence of ARFID in an eating disorder clinic population is between 14% and 22.5%, and the diagnosed patients are consistently younger than those diagnosed with other eating disorders<sup>7</sup>.

In ARFID, food restriction is not caused by a lack of food, cultural or religious practices, or a mental or general medical disorder<sup>8</sup>.

The difference between ARFID and other EDs is that ARFID patients feel safer eating foods they have been eating for a long time. They have a fear of trying new food because of their perception of new food as having strange or intense tastes, textures, or smells;

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this may be because they have had unpleasant encounters with their diet, like vomiting, gagging, choking, or allergic reaction, so they stop eating altogether. Others lack interest and don't feel hungry often, so they consider eating a chore<sup>9</sup>.

Avoidant Restrictive Food Intake Disorder (ARFID) is a newly recognized eating disorder characterized by persistent avoidance or restriction of certain foods, leading to significant weight loss, malnutrition, and other health problems. Children with ARFID risk developing nutritional deficiencies, growth retardation, and psychological distress. As a result, it is essential to assess the dietary practices of children with ARFID to understand their nutritional status and identify potential interventions to improve their health outcomes.

This research article aims to investigate the dietary practices of children with ARFID and identify the factors contributing to their eating behaviors. The study will collect data through a questionnaire and interviews with children and their parents or caregivers. The study will focus on children aged 5-12 years diagnosed with ARFID.

## METHODOLOGY

This mixed-method cross-sectional study was conducted in April 2021 among children with Avoidant Restrictive Food Intake Disorder. Study participants were selected from the Pediatrics and Children Ward of Ittefaq Hospital, Lahore. Participants were selected based on the nonprobability convenient sampling technique. The sample size was calculated through Open Epi version 3.0 using the Randomized Clinical Trials formula. A sample size of a total of 30 participants was selected. ARFID is not diagnosed enough in the Pakistani population, hence a small sample size. Doctors and Nurses with excellent work experience of at least six months in Pead's Unit helped in the data collection of the sample. Doctors and Nurses who have not worked at least six months in Pead's Unit were excluded from this study in the data collection of the sample. A qualified professional delivered the training session for about two hours and repeated it twice a week for different participants. The session provided information about the diagnosis of ARFID in the DSM-V by describing the characteristics of individuals ages 5-12 and the step-by-step component of assessing their dietary choices through a food frequency questionnaire. The participants' mothers took the consent as they were minors. All of them belonged to the middle class and upper middle class. In AFRID, avoidance & restriction of food are not caused by any lack of food<sup>8</sup>. An institutional permission letter for conducting the research was taken from the Ittefaq Hospital, Lahore, and an IRB (Institutional Review Board) form was also granted by NUR International University. Data collection was done via the MS Excel sheet. Data were analyzed in SPSS version 25 for data visualization and simple statistics to generate summary charts, customized

graphs, and figures.

## RESULTS

### Qualitative Results

A mixed-method study was conducted for this research. Due to AFRID being a relatively new diagnosis in DSM-5, there was no particular questionnaire to measure all the characteristics and food frequency of the patients. Due to this limitation, a focus group discussion was conducted between the mothers of 4 children suffering from ARFID and the parents of 3 girls and one boy who participated in this discussion. The age range of participants was 5-12 years.

The study's first theme focused on children's appetite patterns with Avoidant Restrictive Food Intake Disorder (ARFID). Most mothers reported that their children had poor appetites and were picky eaters, resulting in limited types and quantities of food intake. The second theme was related to food preferences, with children having strong aversions towards certain food groups, especially fruits, vegetables, and nuts. The third theme highlighted the psychological associations of children with food, with many reporting physical symptoms such as gagging and vomiting while eating undesirable food and some experiencing anxiety while eating due to sensory averseness towards food.

### Quantitative Results

After having a focus group discussion and identifying themes, a questionnaire was formulated, which comprised anthropometric indices, diagnostic criteria for DSM-5, general characteristics, behavioral features, and Food Frequency.

### Socio-Demographic Characteristics

In this research, 30 participants were taken. 53% of them were Female, and 47% were reported Males. Participants aged 5-8 years were taken for this study, and the mean age of participants was 8.53yr.±2.56. 77% of children were underweight, and 23% fell into the healthy weight category. The participants' mean weight (kg) and height (cm) were 21.8±7.4 and 123.7±16.29, respectively. BMI derived from these self-reported heights and weights ranged from 11 to 19.8 kg/m<sup>2</sup> (Mean =13.7±1.45).

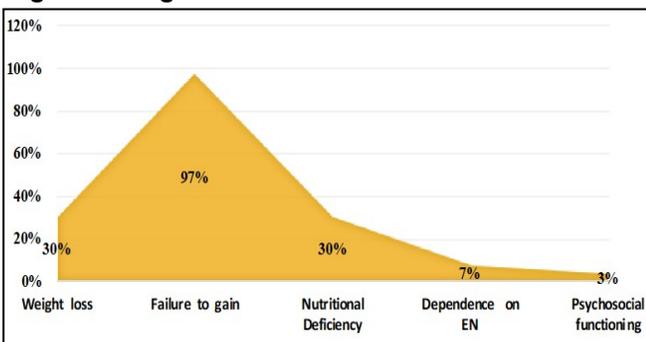
**Table I: Total mean of age, weight, height and BMI**

	Age	Weight (kg)	Height (cm)	BMI (kg/m <sup>2</sup> )
Total Mean (±SD)	8.53±0.46	21.8±1.35	123.7±2.97	13.7±1.45

### Diagnostic Criteria

Figure 1 show the percentages of diagnostic criteria met by participants. The highest failure to gain weight was reported among the participants, i.e., 97%. Weight loss and nutritional deficiency were reported to be 30% for each. Meanwhile, dependence on enteral supplementation and interference in psychological functioning were reported to be 7% and 3%, respectively.

**Figure I: Diagnostic Criteria**



The most prominent diagnostic feature was the failure to gain weight, whereas impaired psychosocial functioning was the most obscure.

**General Characteristics and Symptoms**

**Figure II** shows the percentages of general characteristics of the participants. Gastrointestinal symptoms were reported in 30% of participants, 60% revealed that the people still have not stopped serving them their disliked food items, and 10% had swallowing difficulties.

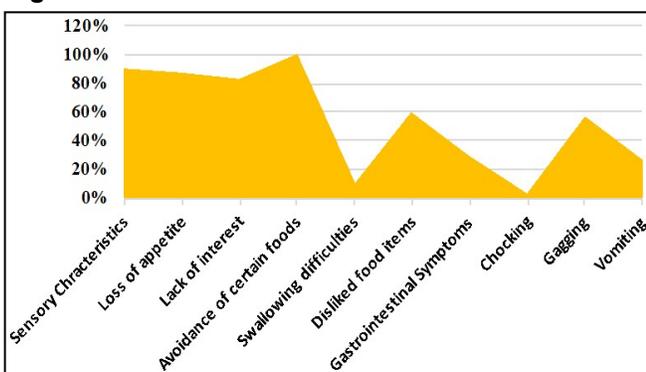
All the participants reported that they avoid certain foods. A lack of interest in eating was seen among 83% of children; 87% said the loss of appetite, 90% stated that the sensory characteristics of food make their eating experience bad, and 47% of participants reported having anxiety while eating.

Attributes of ARFID patients include feelings of choking, gagging, and vomiting. **Figure II** depicts that 3% of participants complained of choking while eating. Gagging was seen among 57% of children, and 27% of participants complained of nausea/vomiting while eating.

Food allergy was found to be in 23% of participants with ARFID. Common food allergies reported by participants were peanuts, coconuts, eggs, gluten allergy, and lactose intolerance.

**Sensory Characteristics**

**Figure II: General Characteristics**

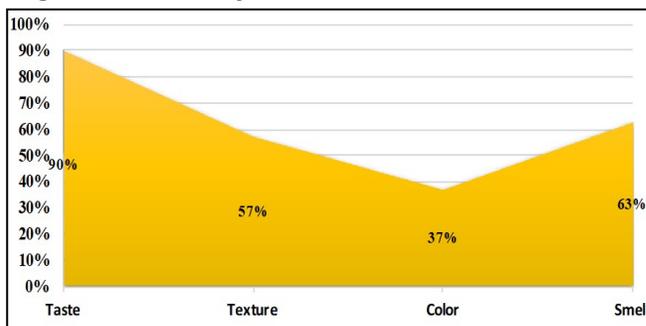


The most common general characteristic was avoiding certain foods; however, swallowing difficulties and choking were the least chosen options.

**Figure III** shows patients with ARFID also encompassed food aversions due to sensory

characteristics like taste, texture, color, and smell. 90% of participants refused to eat/drink because they disliked the taste of a particular food. Avoidance due to texture was recorded in 57% of participants. Food aversion due to color was reported in 37% of children and 63% because of the smell.

**Figure III: Sensory Characteristics**



The questionnaire found that smell was the most decisive factor when choosing a food item, followed by texture and color.

**Food frequency questionnaire**

**Starches**

The bread was consumed mainly by participants 2-3 times a day, i.e. 30%, while 26.7% reported consuming it 2-4 times a week. Chapatti and rice are a staple food in south-Asian households, especially in Pakistan, India, Bangladesh and Afghanistan. Chapatti was taken daily by 56.7% of participants. On the other hand, the majority took rice 2-4 times per week (26.7%). Porridge was consumed rarely (60%) by most of the children.

Most participants reported that they rarely consumed beans (70%). At the same time, 16.7% finished it once a month. On the other hand, Lentils were taken once a month by 40%, and 26.7% of children took it rarely. Peas were reported rarely by 36.7% of participants, and 30% said that they took it 2-4 times per month. More than half of the sample (56.7%) had a rare consumption of chickpeas.

In the case of bread, about 80% of children used to take white bread, while 13.3% and 6.7% consumed bran and wholegrain bread, respectively. In the case of chapatti, whole wheat and white flour chapatti were taken by 56.7% and 43.3% of children, respectively. The majority of the participants consumed white rice, i.e. 96.7%. 27% had lima beans, and 20% of the sample used to take kidney beans. In the lentils category, yellow, brown and green were taken at 63%, 50% and 30%, respectively.

**Fruits**

The majority of the participants rarely consumed fruits due to the high sensory characteristics of fruits. Because of this, most children with ARFID found fruits to be aversive. 40% of children reported that they take apples rarely, and 23.3% said they intake weekly. Banana was taken rarely by 33.3%, while 30% used to take them 2-4 times/week. On the other hand,

Guava was taken least by children of all fruits, and 80% of the participants reported it rarely. More than half of children (56.7%) rarely consumed mangoes.

Orange was consumed rarely by 66.7% of participants, and 16.7% consumed it once a month. Strawberry consumption was reported rarely by 50% of children, and it was consumed once a month by 20% of the sample. On the other hand, dried fruits and juices were rarely taken (63.3%), and any other fruits included grapes, peaches, apricots, melons, etc.

#### **Dairy products**

Most children used to take milk once a day, i.e., 36.7%. The majority of the children consumed yogourt rarely (36.7%). On the other hand, cheese was consumed rarely (73.3%) by the majority of participants and cream was reported rarely by 83.3% and once a month by 16.7%. When reporting the type, 30% revealed the intake of whole milk and yogourt, while 70% used to take skim milk and yogourt.

#### **Vegetables**

Potato was mainly taken once a month and 2-4 times/day (23.3%). Most of the participants reported tomatoes rarely (53.3%). More than half of the participants (63.3%) reported onion consumption rarely. Cucumbers (30%) and carrots (46.7%), on the other hand, were reported rarely by the majority of the children. Eggplant (63.3%), pumpkin (93.3%), and bitter gourd (86.7%) were all reported rarely by the majority of the participants. Any other vegetables included cauliflower, bell pepper, okra, etc.

#### **Meat products**

The participants consumed chicken mainly once a week and 2-4/week. Beef/mutton (73.3%), fish (76.7%) and egg (33.3%) were majorly reported rarely among children.

#### **Fats and oils**

Most participants took Ghee and butter rarely, i.e. 33.3% and 66.7%, respectively. Vegetable oil, on the other hand, was consumed once a day by 60% of children.

Desi ghee and banaspati ghee are consumed by 56.7% and 23.3% of the participants, respectively. In the case of vegetable oils, mustard oil (23.3%), canola oil (30%), olive oil (10%), and sunflower oil (36.7%) were reported to be used.

The majority of the participants consumed cashews (86.7%), peanuts (70%), walnuts (76.7%), and almonds (50%) rarely. Almond was eaten once a week by 23.3% of children. The questionnaire added two types of seeds, chia seeds and flax seeds, and it was found that none of the children had ever consumed flaxseeds. On the other hand, chia seeds are consumed rarely by 6.6% of the sample.

#### **Snacks**

Different snacks consumed by children with ARFID. Ice cream was reported once a month by 40% of respondents, and Custard was eaten rarely by 56.7% of participants. Most children ate bakery products 2-4 times/week (36.7%). Chocolate was eaten rarely by

20% of children, and 20% used to eat it rarely. Samosa was consumed rarely (46.7%) by most respondents.

According to the table, rolls (53.3%), pizza (43.3%), burgers (53.3%), and soft drinks (56.7%) were found to be taken rarely by the participants. Packaged juice was consumed the most, rarely (26.7%) and once a month (26.7%).

Candies (36.7%), bubble gums (70%), and jellies (73.3%) were all mostly eaten, rarely by children. Chips were reportedly consumed 2-4 times/week (26.7%) and once daily (26.7%). On the other hand, French fries were eaten 2-4 times/week by 40% of children.

## **DISCUSSION**

### **Socio-Demographic Characteristics**

The difference in the percentage of the diagnosed patients relating to gender did not vary much in our study. However, Zimmerman J 2017<sup>6</sup> research with ARFID reported a significant portion of males compared to other eating disorders (20.5% for ARFID vs. 4.5% for other EDs).

Our study was solely done on children, but other recent research on ARFID suggested that most of the patients were children as it is seen that the onset of this eating disorder is early compared to other EDs<sup>11</sup>.

Most participants were seen to be overweight, and the rest all fell into a healthy weight category. That is because most patients with ARFID have good caloric intake but insufficient nutrient density due to their restrictive dietary patterns, as they tend to binge on high-calorie food. Duncombe Lowe K et al.<sup>12</sup> research indicated that 63.7% were underweight and 36.3% were healthy-weight participants.

### **General Characteristics and Symptoms**

All the patients encompassed different symptoms and general characteristics of the disorder. According to the research of Fisher MM et al.<sup>14</sup>, the categories of ARFID patients included 21.4% with generalized anxiety, 28.7% with picky (selective) eating since early childhood, and 19.4% with GI symptoms. It was also indicated that 13.1% of the participants feared eating due to choking or vomiting.

A study concluded that more than half of households restrict their diets because of food allergies beyond what is required, affecting normal growth parameters. It was estimated that 56% of children restricted their intake of foods beyond the known/suspected allergens<sup>15</sup>. Other studies have also explored this component, Fisher MM et al.<sup>14</sup> and Lieberman M 2019<sup>4</sup> reported the prevalence of food allergy in their samples to be 4.1% and 12.3%, respectively.

The sensory characteristics of food greatly influenced the food preferences of participants. Kurz S 2015<sup>16</sup> reported that 60.9% of children have limited intake because of the sensory attributes of food. Another case was by Goldberg HR et al.<sup>17</sup> said that the child had food neophobia because of the specific taste, smell, color or certain consistency.

### **Starches**

According to this study, the percentage of consumption of starches was low in children with ARFID, not meeting their daily intake dietary guidelines for the grains food group. Only the consumption of chapatti and rice was more because they are a staple food in South Asian households. Similar trends were seen in this study as in the previous research by Harshman SG et al.<sup>18</sup>, who compared the dietary habits of ARFID participants with the healthy control group and reported that 33% of participants with ARFID were not meeting their daily intake dietary guidelines for Grain's food group concerning American recommendations.

### **Fruits**

The current study assessed fruit consumption in children with avoidant/restrictive food intake disorder. The reported frequency of fruit consumption was consistently low due to the sensory characteristics of fruits. In another study, Harshman SG et al.<sup>18</sup> reported that in fruits, the percentage of ARFID participants who did not meet the daily intake of dietary guidelines for American recommendation was significantly more significant than healthy controls (72% vs. 57%).

### **Dairy products**

Dairy product consumption was assessed, and the reported frequency was low. Almost similar trends were seen in this study as in the previous one. A prior study by Harshman SG et al.<sup>18</sup> evaluates the Mean and percentage intake of different food groups between ARFID and healthy control samples. In dairy, 39% of ARFID participants did not meet the daily dietary guidelines for American recommendation. Also, there was no significant difference between mean intake and percentages of participants not meeting recommendations in the ARFID and control groups.

### **Vegetables**

The current study assessed vegetable consumption in children with avoidant/restrictive food intake disorder. The reported frequency of vegetable consumption was consistently low. In a study, almost 86% of the participants with ARFID and 65% of healthy controls were not meeting the daily dietary guidelines for American recommendations of vegetables per day<sup>19</sup>.

### **Meat products**

Meat product consumption was assessed, and the reported frequency was low. Almost similar trends were seen in this study as in the previous one. According to the previous research by Harshman SG et al.<sup>18</sup>, the current recommendations of daily protein intake by USDA (United States Department of Agriculture) dietary guidelines for American recommendations were considerably lower among the ARFID group (76%) as compared with the healthy control (50%).

### **Fats and oils**

Fat and oil consumption, including seeds and nuts, was assessed in children, and the reported frequency

was low. Similar trends were seen in this study as in the previous one. According to the previous research by Harshman SG et al.<sup>18</sup>, the percentage of samples not meeting the daily dietary oil guidelines for American recommendations with ARFID was 24%.

### **Snacks**

In the present study, the percentage of children with ARFID consuming snacks, especially carbohydrates, was higher. On the other hand, it was hypothesized by Schmidt et al. 2021<sup>20</sup> that ARFID children would report a high intake of carbohydrate-rich foods and processed foods such as snacks, sweets and bakery items. A low intake of fruits, vegetables, and meat products was assumed.

### **CONCLUSION**

The study found that children with ARFID, primarily female and underweight, reported avoidance of certain foods and sensory aversion to foods. Failure to gain weight was declared as the highest diagnostic criterion. Gagging was a common symptom reported by the participants, and they were often distracted during mealtime. The children's food choices varied, with fruits, vegetables, and nuts being the least consumed food groups and Starches, fats and oils, and milk being consumed the most.

### **RECOMMENDATIONS**

Data about the prevalence should be collected, and a large sample size should be taken for future studies to make the results generalizable. Studies should also be done in the adult population, as ARFID also progresses to adulthood in some cases. Primary care physicians and psychiatrists/psychologists should study treatment modalities for ARFID.

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**Data Sharing Statement:** The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publically.

### **AUTHOR CONTRIBUTIONS**

Shafiq R: Data collection, Referencing

Aziz A: Data collection, Referencing

Asif G: Data collection, Training sessions

Hussain MI: Manuscript write-up, data analysis, Co-Supervision of research

Hayee A: Overall supervision of research, Supervisor

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