

Epidemiology and Consequences of ARFID

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Avoidant/Restrictive Food Intake Disorder (ARFID) is an avoidant/restrictive food intake disorder identified in the DSM V (Diagnostic and Statistical Manual of Mental Disorders) diagnostic criteria for mental disorders in 2013, which replaced feeding disorder of infancy and early childhood (FEDIC), among others.

Keywords: ARFID ; feeding disorders ; eating disorders

1. Introduction

ARFID (Avoidant/Restrictive Food Intake Disorder) is an avoidant/restrictive food intake disorder identified in the DSM V (Diagnostic and Statistical Manual of Mental Disorders) diagnostic criteria for mental disorders in 2013, which replaced feeding disorder of infancy and early childhood (FEDIC), among others ^[1]. In earlier DSM IV, this disorder of a somewhat similar nature was diagnosed in children up to 6 years of age ^[2]. ARFID does not only affect children. It can also affect adults, in whom the disorder has persisted since childhood or first appears in adulthood. Consequently, this includes some patients who did not meet the diagnostic criteria for FEDIC due to their adult age, or were classified as having an eating disorder not otherwise specified (EDNOS) ^{[3][4]}. ARFID is most often diagnosed in older children and younger adolescents; usually, pediatricians are the first to consider making the correct diagnosis. People with sensory sensitivity, in particular, may avoid eating certain foods, such as meats, vegetables, and/or fruit, due to a dislike of certain tastes, textures or smells. Other reasons for dietary restriction in ARFID may be due to lack of interest in food or low appetite ^[5].

2. Epidemiology of Avoidant/Restrictive Food Intake Disorder (ARFID)

The prevalence of ARFID in the pediatric population is still largely unknown, and validated screening tools are lacking. One recent study from Switzerland estimated the prevalence of ARFID among children aged 8–13 years at approximately 3.2% ^[6]. In specialist psychiatric and medical settings, it is estimated to range from 5–14% to 22.5% in an outpatient pediatric eating disorder treatment program. Studies have shown that it affects boys more often than girls ^{[7][8][9][10]}. The clinical characteristics of children with complex feeding difficulties are currently poorly described in the literature, making it difficult to identify and plan necessary services. Little is currently known about the rate of ARFID in adults in the general population ^{[7][8]}. Recent studies show that it affects approximately 9.2% of adult patients with eating disorders. It affects women much more often than men ^{[11][12]}. Dinkler et al. conducted a cohort screening study for ARFID. This research was conducted using a newly developed screening tool. It also attempted to estimate how many children with physical disabilities and psychosocial disorders manifested difficulties in food intake, resulting in the development of ARFID. Data were collected from 3728 children aged 4–7 years. The proportion of children with a positive ARFID screening result was 1.3%; half of these children met ARFID criteria based on psychosocial impairment alone, while the other half met diagnostic criteria for physical impairment (and in many cases additionally psychosocial impairment). Sensory sensitivity to food traits (63%) and/or lack of interest in food (51%) were the most common factors for food avoidance. ARFID-positive children were characterized by lower body weight and height, exhibited more problematic behaviors related to mealtimes and nutrient intake, were more likely to eat selectively, and were more responsive to feelings of satiety ^[13].

Dietary assessment should be part of the routine examination in pediatric practice, as children and adolescents are increasingly adopting restrictive dietary behaviors that carry the risk of serious nutritional deficiencies. ARFID can occur at any stage of a person's life, but recent research has focused mainly on children and adolescents. Therefore, this systematic research focuses on children and adolescents with ARFID and the different therapies used to treat it.

This research aims to review the existing knowledge on ARFID, in particular, to present the DSM-5 diagnostic criteria, the consequences of nutritional deficiency due to ARFID, and management strategies in ARFID, including dietary strategies.

3. Consequences of ARFID

The consequence of avoiding/restricting food intake, beyond that preferred by the patient, may be micronutrient and macronutrient deficiencies. As mentioned above, this is difficult to capture in normal weight or overweight individuals, so it is an important issue to be assessed by a physician or dietitian. Health problems and abnormal development in children, resulting from a highly restrictive diet during their most intense growth and development, are dependent on which nutrients are chronically missing from the diet. Vitamin B₁, B₂, B₁₂, C, and K deficiencies and mineral deficiencies including zinc, potassium, and iron are most commonly observed in ARFID patients. A lower intake of protein, fats, and carbohydrates is also observed, which consequently results in a lower energy value of the diet, inadequate to the patient's energy requirements [6][14]. ARFID can lead to severe medical sequelae due to malnutrition [10]. In **Table 1**, researchers have outlined the health consequences of different dietary restrictions resulting from not providing particular food groups with the diet. **Table 1** also considers how to diagnose specific deficiencies of components from the diet.

Table 1. Signs and symptoms of specific vitamin-mineral deficiencies due to dietary restrictions [10][15][16][17].

Type of Food Avoided	Nutrient Deficiency	Basic Parameter	Health Consequences of Deficiency
Cereal products	carbohydrates	body weight and height	hypotrophy
	fiber	e.g., screening for cancer, atherosclerosis, cholelithiasis	Atherosclerosis, gallstones, diverticulosis, and colorectal cancer, breast cancer in women.
Milk and milk products	calcium	PTH, alkaline phosphatases	rickets, hypocalciuria, reduced bone mineral density, osteopenia, bone weakness or fractures, and osteoporosis.
Animal products and dairy products	Riboflavin/Vitamin B2	the serum concentration of vit. B2	Low energy levels, poor growth, dry skin/skin problems, hair loss, dry cracked lips or cracks at the corners of the mouth, magenta tongue swelling, itchy and/or red eyes, sore throat, loss of lean body mass, anemia, and cataracts
	total protein	Plasma protein, albumin, prealbumin	malnutrition, edema
	vitamin B12 Cobalamin	plasma cobalamin	Hyperhomocysteinemia, megaloblastic or macrocytic anemia, low energy, weakness, numbness or tingling in hands or feet, difficulty walking or instability, constipation, anorexia, confusion, poor memory, mood changes, psychosis, and mouth/tongue discomfort
	Iron	Plasma ferritin, the plasma iron	Microcytic anemia, pallor, weakness, fatigue or drowsiness, irritability, poor concentration, learning, cognitive difficulties, mood changes, reduced exercise endurance, headaches, temperature intolerance, weakened immune system, and reduced appetite due to mucosal changes (disappearance of tongue papillae with taste buds, reduced saliva production)
	Selenium	Selenium in plasma	Oxidative stress
	Zinc	Plasma zinc	Oxidative stress, poor growth, and development, anorexia, weakened immune system, impaired night vision, taste and smell changes, hair loss, diarrhea, and poor wound healing
Fish	omega-3 acids	omega-3 acids in plasma	central nervous system disorders and cardiovascular disorders
	vitamin D3	plasma vitamin D3	rickets, osteomalacia, and osteopenia
Vegetables and fruits	folates	plasma folate	Hyperhomocysteinemia, megaloblastic or macrocytic anemia, persistent fatigue, pallor, palpitations, dyspnoea, headache, mouth ulcers, increased risk of birth defects, poor concentration, increased irritability, and weight loss
	Vitamin C	Vitamin C in plasma	Microcytic anemia, scurvy, petechiae, easy bruising, bleeding, and swollen gums, anorexia, anemia, malaise, muscle, joint pains, corkscrew, perianal hemorrhage, wound healing disorders, hyperkeratosis, weakness, and mood disorders

Type of Food Avoided	Nutrient Deficiency	Basic Parameter	Health Consequences of Deficiency
Animal and vegetable fats	Vitamin E	Vitamin E/lipids	Oxidative stress
	Vitamin A	Plasma vitamin A	Hemeralopia, poor night vision/night blindness, weakened immune system, hyperkeratosis, and impaired wound healing
	Vitamin K	Plasma vitamin K	Bruising and easy bleeding and prolonged prothrombin time
	Fat	observation	Weight loss and absence of menstruation

PTH: Parathyroid hormone (PTH).

People who exclude cereal products from their diet are at risk of low carbohydrate and fiber intake. Conversely, when dairy products are excluded from the diet, calcium may be deficient. If you exclude animal products such as meat, fish, and dairy products from your diet, you may be deficient in riboflavin, total protein, and all the amino acids needed for the body to function properly, vitamin B12, iron, selenium, and zinc. By eliminating fish from the diet, there is a deficiency of omega-3 acids and vitamin D3. If vegetables and fruit are not included in the diet, folate and vitamin C deficiencies may occur. Moreover, by eliminating both vegetable and animal fats from the diet, an adequate supply of fat-soluble vitamins such as A, D, E, and K is compromised, as well as fat, especially omega-3 fatty acids ^{[10][15][16][17]}. Many people with ARFID take vitamin supplements (e.g., multivitamins) prophylactically, so supplementation may mask the severity of malnutrition, making it difficult to assess baseline medical sequelae and their potential resolution during treatment ^{[10][14]}.

Restricted food intake may result in dependence on oral nutritional supplements and, in extreme cases, enteral feeding. This may be due to the need to bypass the oral cavity and esophagus in the process of food intake, thus avoiding unpleasant sensations ^{[1][18]}. The diagnosis of significant nutritional deficiencies in children with ARFID is based on nutritional history, clinical and biological assessment (e.g., dietary intake assessment, physical examination, and laboratory tests), and the presence of clinical physical health consequences. The severity of these consequences is greater than those resulting from mental anorexia (e.g., hypothermia, bradycardia, and anemia) ^[19]. Restrictive behavior may induce specific deficiencies related to the nature of the excluded foods. In severe cases, especially in infants, the resulting malnutrition may even be life-threatening. The nutritional consequences of ARFID remain poorly described. Most articles have referred to low body weight or weight loss ^[18]. Patients may report symptoms associated with acute malnutrition including fatigue, dizziness and fainting, and/or long-term malnutrition, such as abdominal pain, constipation, cold intolerance, amenorrhea, dry skin, and hair loss. On examination, signs of malnutrition may include cachexia, hypothermia, bradycardia, orthostatic tachycardia and hypotension, abdominal swelling, lanugo, and pallor ^[20].

Due to avoidance/restriction of food intake, family, work, and social interactions may be disrupted. Children with ARFID may avoid family gatherings, birthday parties, or school trips for fear of having to eat foods that are not acceptable to them. Fear of peer pressure causes these children to start avoiding such gatherings, gradually withdrawing from social life ^{[1][21]}. Inadequate nutritional and energy intake can also indirectly affect the psychological sphere. Insufficient growth resulting from nutrient deficiencies may be the cause of a lack of acceptance by peers. Decreased self-esteem affects the avoidance of social contact ^[22]. Lack of acceptance in educational institutions—where the aim is to avoid highly processed products—may cause a feeling of shame and failure in children with ARFID. Sometimes, these types of products are the only ones accepted by the child, and a lack of understanding of what the disorder is can lead to conflict.

These four diagnostic criteria help make the diagnosis. However, to make the diagnosis, it is also necessary to rule out three important aspects that are found in the DSM V and described below. ARFID cannot be explained by a lack of availability of food, e.g., for financial or housing reasons, or by a neglectful style of parenting or caring for children. Neither do religious or cultural considerations directly influence the etiology of ARFID, although, in a study by Conney et al. ^[23], concern for animal rights emerged as a reason for food refusal ^{[1][23]}.

Both children and adults with ARFID are not concerned about their weight, and they may be unhappy with their body shape, but this is not a factor in restricted food intake. Avoidance/restriction of food intake is not related to fear of gaining weight. However, the so-called ARFID “Plus” is not excluded, which may be a consequence of the development of symptoms of anorexia nervosa ^{[21][24]}. Rare cases are also known in which ARFID has developed into anorexia ^[25].

A disorder such as ARFID cannot be attributed to a current illness or other psychiatric disorder if elements from the diagnostic criteria, e.g., weight loss or significant nutritional deficiencies, appear as a consequence, although this is currently debatable ^{[1][8]}. When medical factors or psychiatric disorders produce similar symptomatology, a detailed clinical

analysis should be performed, which should demonstrate that the severity of the symptoms is not solely the result of the underlying disease or psychiatric disorder.

Although ARFID as a disease has existed in the DSM V diagnostic criteria for more than eight years, it is still at the beginning of its journey both diagnostically and therapeutically. Among professionals, knowledge of ARFID is still negligible. Lack of awareness results in children and adults not being properly diagnosed. Lack of proper diagnosis means a lack of proper management leading to recovery. The worsening problem adds to the frustration in families, where the child is often treated as simple non-eaters who will grow out of it. Raising awareness among both the public and professionals about the eating disorder ARFID is very important and vitally needed [22]. Just as important as the knowledge and awareness of this disorder, essential in the whole diagnostic and therapeutic process, is the understanding of what the patient with ARFID struggles with in everyday life. Understanding this disorder is essential in choosing the right management strategy, as there is still a lack of management standards for ARFID [25].

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