CHARACTERISTICS AND OUTCOMES OF ATYPICAL ANOREXIA NERVOSA IN ADOLESCENTS AND CHILDREN: A SYSTEMATIC REVIEW

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Abstract

Objectives: To summarize current research on the characteristics and outcomes of atypical anorexia nervosa (AAN) in children and adolescents. Methods: A total of 299 pertinent publications were found after a comprehensive search across four databases. 34 full-text publications were examined after duplicates were eliminated using Rayyan QCRI and relevance was checked; four studies finally satisfied the requirements for inclusion. Results: We included six studies with a total of 2059 participants and the majority 1791 (87%) were females. Adolescents with AAN, particularly those with a history of being overweight or obese, experience delayed diagnosis and treatment due to significant weight loss masking disordered eating patterns. Regardless of initial weight, rapid and extensive weight loss correlates with poor health outcomes, including deteriorating medical and nutritional status. Bone health is a significant concern, with low bone mineral density (BMD) linked to pre-illness BMI, placing adolescents with AAN at physical risk even without low body weight. Psychologically, adolescents with AAN exhibit more purging, body shape concerns, self-harm, and drug overdoses, along with higher hospitalization rates compared to those with traditional anorexia nervosa, highlighting the severity of their condition. Conclusion: sAN is a prevalent but poorly identified illness in adolescents and children. Earlier recognition due to weight loss patterns and psychological symptoms in higher-weight individuals can definitely help provide better results. These identified strategies will go a long way in improving treatment-including the use of FBT-and enhancing clinicians' awareness for decreasing health compromise. Future research needs to be directed at long-term outcomes and towards developing standardized diagnostic tools so that timely and accurate identification of AAN is done across diverse populations.

Keywords: Atypical anorexia nervosa; Eating disorders; Children; Adolescents; Systematic review.

Manuscrito recibido: 01/12/2024
Manuscrito aceptado: 15/12/2024

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Introduction

Choosing weight-based treatment targets for young people with AAN is a common problem that Quon & Kelly address in their data presentation on clinical outcomes. We expand on the discussion of this issue in our article and raise doubts about the efficacy of weight stabilization as a deliberate therapeutic goal, especially for kids and teenagers [1].

Because clinicians are trained to use low weight as the primary marker for malnutrition, they have historically under recognized the constellation of clinically significant eating disorder (ED) symptoms that are more recently categorized as AAN. This has resulted in treatment delays and an increased risk of medical and psychiatric sequelae. Studies have shown that medical consequences, ED cognitive abnormalities, anxiety, psychosocial impairment, and suicidality in AAN might be considerably more severe than in AN, indicating that this risk is not simply equal to that observed in "typical" AN [2–6].

There is little data and research on the medical consequences of AAN [7]. Physical and psychological morbidity in this subgroup of patients is comparable to that of AN, according to the research that is currently available. Even in the absence of severe underweight, adolescents with AAN often need immediate hospitalization to treat medical problems associated with starvation and weight loss [8].

AAN is a variant of AN characterized by significant weight loss and severe psychological distress in the absence of low body weight, which has conventionally been considered a diagnostic criterion for AN. This increasingly recognized condition affects children and adolescents, those especially vulnerable to the physical and psychological consequences of disordered eating. Due to the atypical presentation of AAN, there are numerous cases underdiagnosed or misdiagnosed, which contributes to delayed treatment and increased severity of symptoms. An understanding of the characteristics and outcomes of AAN in young populations is necessary in developing targeted interventions, refining diagnosis criteria, and preventing chronic health complications. This review synthesizes the literature comprehensively on the prevalence, symptomatology, and prognosis of AAN among children and adolescents.

The objective of this systematic review is to analyze and summarize current research on the characteristics and outcomes of AAN in children and adolescents.

Methods

Search strategy

The PRISMA and GATHER criteria were followed for the systematic review. An overall search was conducted to identify relevant studies related to the characteristics and outcomes of AAN in children and adolescents. The following four electronic databases were used by the reviewers for searching: SCOPUS, Web of Science, Cochrane, and PubMed. We removed any duplicates and uploaded all the titles and abstracts we could find through electronic searches onto Rayyan. After that, all the study texts that met the inclusion criteria based on the abstract or title were collected for a full-text examination. Two reviewers independently evaluated the extracted papers' suitability and discussed any discrepancies.

Study population-selection

The PEO (Population, Exposure, and Outcome) factors were implemented as inclusion criteria for our review: (i) Population: Children and adolescents diagnosed with or exhibiting symptoms of AAN, (ii) Exposure: Diagnostic challenges, psychological distress, weight loss, and disordered eating behaviors without meeting the low body weight criterion, (iii) Outcome: Improved diagnosis, treatment efficacy, psychological well-being, and reduced physical health complications.

Data extraction

Data from studies that satisfied the inclusion requirements were extracted by two objective reviewers using a predetermined and uniform methodology. The following information was retrieved and recorded: (i) First author (ii) Year of publication, (iii) Study design, (iv) Country, (v) Sample size, (vi) Age, (vii) Gender, (viii) Disease duration (in months), (ix) AAN diagnostic criteria, (x) Main outcomes.

Quality review

Since bias resulting from omitted factors is frequent in studies in this field, we used the ROBINS-I technique to assess the likelihood of bias since it enables a thorough examination of confounding. The ROBINS-I tool can be used for cohort designs where individuals exposed to different staffing levels are tracked over time and is designed to assess non-randomized studies. Each paper's risk of bias was evaluated independently by two reviewers, and any differences were settled by group discussion [9].

Results

The specified search strategy yielded 511 publications (Figure 1). After removing duplicates (n = 261), 250 trials were evaluated based on title and abstract. Of these, 206 failed to satisfy eligibility criteria, leaving just 42 full-text articles for comprehensive review. A total of 6 satisfied the requirements for

eligibility with evidence synthesis for analysis (Figure 1).

Sociodemographic and clinical outcomes

We included six studies with a total of 2059 participants and the majority 1791 (87%) were females. Regarding study designs, three studies were retrospective cohorts [11, 15, 16], two were cross-sectional studies [13, 14], and one was a case-control [12]. Two studies were conducted in the USA [12, 15], two in Singapore [13, 16], one in Canada [11], and one in Turkey [14]. The earliest study was conducted in 2017 [15] and the latest in 2024 [13].

One important finding relates to the history of weight associated with AAN. Indeed, more diagnoses of AAN were found in the group of adolescents who previously were overweight or obese. Therefore, it seems that significant amounts of weight loss might mask the extent of the disturbance in eating patterns, leading to later identification and thus delayed treatment. Weight restoration within FBT also demonstrated more significant enhancements in those with more adherence to the course of treatment in which weight gain was prescribed [11].

Another important observation underlines the worsening medical and nutritional status in adolescents with AAN or traditional AN. Irrespective of initial weight, a rapid and extensive weight loss over a prolonged period correlated with worse health outcomes [12]. Another major concern was bone health, in which low BMD posed a serious risk for the teenagers with AAN. Poor bone health was linked to the patient's pre-illness BMI. This means that adolescents with AAN are seriously at risk as far as their physical health is concerned, without even having low body weight [13, 14].

Other differences were also noted in the psychological results between the adolescents with AAN and those with traditional AN. Adolescents with AAN reported higher frequencies of purging, body shape concerns, and psychological comorbidities such as self-harm and drug overdose. This group also showed a higher frequency of hospitalization, reflecting the complexity and severity of their psychological health challenges [15, 16] (Table 1, Table 2).

Discussion

These findings from this review emphasize the great physical and psychological burden of AAN in children and adolescents. Data suggest that previous overweight or obesity often postpones diagnosis, as clinicians may overlook symptoms of eating disorders in patients who are not underweight. A lack of diagnosis like this could worsen the health outcomes, including serious psychological comorbidities: self-harm, purging, and substance abuse. More importantly, reduced bone health has been noted in all individuals, including even those at a normal weight or above, hence emphasizing health screening beyond weight assessments. Brennan et al. reported that patients with AAN and AN who appear with the greatest weight loss and those with a mBMI below 70% are considered to be at the most risk. They found that adolescents with the highest levels of malnutrition are at the most risk for medical instability. Their extremes of low body weight, their quick weight loss, or a combination of these two characteristics could serve as proof of this [17].

Malnutrition associated with quick or severe weight loss, in the absence of underweight, provides similar health risks as usual presentations of AN, according to a recent review by Frei zinger et al. that examined assessment and therapy in adolescent AAN in contrast to AN [18]. Medical consequences resulting from AAN were also rated as a high priority in a recent Delphi analysis examining research priorities in the illness [19].

A patient's weight, stature, and BMI-for-age percentile ranges in their growth history should be closely examined since they can help determine where on the curves they will show signs of recovery. There are concerns over the necessity or recommendation of returning to previous trajectories when a patient with AAN has tracked at high percentiles [20]. Parents and clinicians may raise concerns about bullying or health problems, but weight bias is probably also at work [21]. However, there are several situations where past growth curves may not be a legitimate or trustworthy standard. Significant variation in a person's path may be secondary to certain factors that can be evaluated throughout the psychiatric history collection procedure. For instance, loss-of-control eating, melancholy, insomnia, and internalized weight stigma are recognized correlates of higher weight, possibly over one's "natural" body size [22-25].

Clinical Implications

Physicians should broaden their diagnosis to include weight history and amount of weight loss rather than just using the patient's current weight. Early identification of the patient means better prevention of the medical complications such as reduction of bone density. The review reinforces

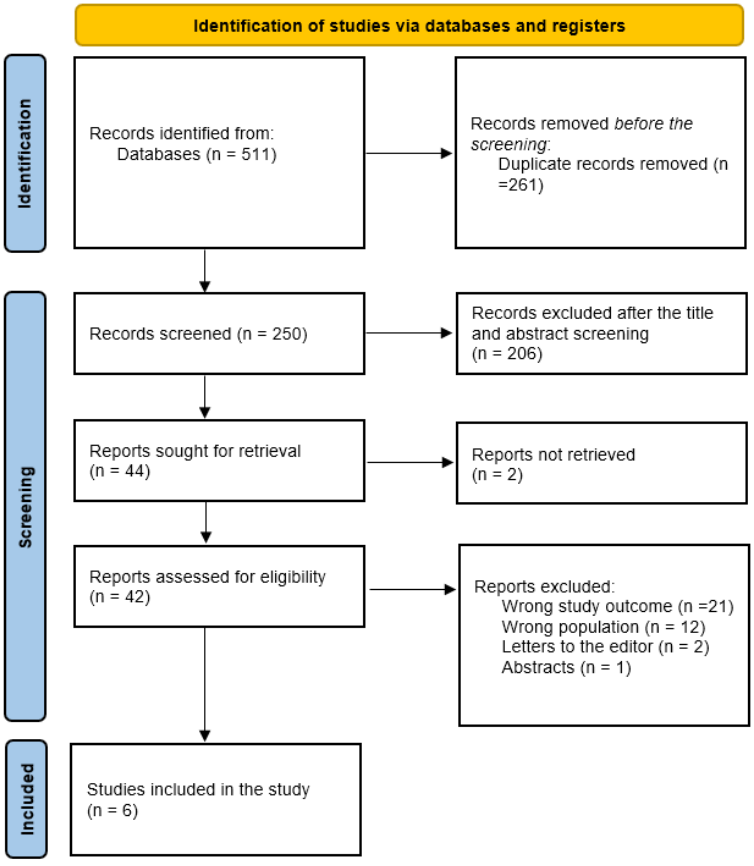

Figure 1. PRISMA flowchart [10].

Table 1. Outcome measures of the included studies.

Study ID	Study design	Country	Sociodemographic	AAN duration (months)	AAN diagnostic criteria	Associated factors/ causes
Quon et al., 2023 [11]	Retrospective cohort	Canada	N= 144 Mean age: 14.7 Males: 35 (85.4%)	11.2 (11.5)	DSM-5 criteria	substantial weight increase during FBT for AAN, particularly in those who finished therapy and those who were advised to gain weight.
Garber et al., 2019 [12]	Case-control	USA	N= 116 Mean age: 16.3 Males: 105 (90.5%)	15.4 (15.4)	DSM-5 criteria	Independent of entrance weight, the medical and nutritional status of adolescents with AAN or AN who lost more weight, more quickly, or for a longer period of time was much worse. Participants with AAN by definition had a substantially higher mBMI admission proportion than those with AN.
Davis et al., 2024 [13]	Cross-sectional	Singapore	N= 213 Mean age: 14.2 Males: 213 (100%)	8.1 (6.4)	DSM-5 criteria	Compared to AAN, a diagnosis of AN was associated with a lower BMD.
Pehlivanturk-Kizilkan et al., 2021 [14]	Cross-sectional	Turkey	N= 53 Mean age: 14.2	5.7 (4.7)	DSM-5 criteria	Disordered bone health is another risk factor for AAN patients. The estimated relevant criterion for the risk of reduced BMD in teenagers with AAN was their BMI before the illness.
			Males: 43 (81.1%)			
Kennedy et al., 2017 [15]	Retrospective cohort	USA	N= 1074 Mean age: 15.6 Males: 981 (91.3%)	14.2 (16.9)	DSM-5 criteria	Individuals who had a history of being overweight or obese were more likely to be diagnosed with AAN.
Chew et al., 2023 [16]	Retrospective cohort	Singapore	N= 459 Mean age: 14.1 Males: 414 (90.2%)	7.9 (6)	DSM-5 criteria	Adolescents with AAN experienced more purging (45.1% vs. 14.8%), more shape issues, and higher rates of self-harm and drug overdose (14% vs. 1.5%) that required admission.

Table 2. Risk of bias assessment using ROBINS-I.

Study ID	Bias due to confounding	Bias in the selection of participants into	Bias in the classification of interventions	Bias due to deviations from the intended interval	Bias due to missing data	Bias in the measurement of outcomes	Bias in the selection of reported result	Overall bias
Quon et al., 2023 [11]	Mod	Mod	Low	Low	Low	Low	Low	Low
Garber et al., 2019 [12]	Low	Mod	Low	Low	Low	Mod	Low	Low
Davis et al., 2024 [13]	Low	Low	Low	Low	Low	Low	Mod	Low
Pehlivanturk-Kizilkan et al., 2021 [14]	Mod	Low	Mod	Mod	Low	Low	Mod	Moderate
Kennedy et al., 2017 [15]	Mod	Mod	Low	Low	Low	Mod	Mod	Moderate
Chew et al., 2023 [16]	Mod	Low	Mod	Mod	Low	Mod	Low	Moderate

that FBT has proved effective, particularly for adherers to the treatment recommendations. It strengthens the family members' importance in the process of recovery. Close monitoring by clinicians in regard to psychological health should also be undertaken as there is the occurrence of high rates of self-harm and hospitalization across AAN adolescents.

Strengths and limitations

The strength of this review is that it is comprehensive; it gathers data from various studies done on different populations and in different settings to give a whole understanding of AAN among young people. This wide-ranging approach means that several aspects of AAN will be discussed, ranging from physical health risks to psychological challenges. However, the review is limited by the variability in the study methodologies and diagnostic criteria used, which may introduce inconsistencies in the findings. Moreover, comment on sustained treatment outcome and recurrence is difficult to make because of a lack of follow-up data.

Conclusion

AAN is a prevalent but poorly identified illness in adolescents and children. Earlier recognition due to weight loss patterns and psychological symptoms in higher-weight individuals can definitely help provide better results. These identified strategies will go a long way in improving treatment-including the use of FBT-and enhancing clinicians' awareness for decreasing health compromise. Future research needs to be directed at long-term outcomes and towards developing standardized diagnostic tools so that timely and accurate identification of AAN is done across diverse populations.

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