

Anorexia and Amenorrhea: A Comprehensive Review of Their Relationship, Diagnosis, and Management

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Received date: 12 April 2023; **Accepted date:** 14 April 2023; **Published date:** 17 April 2023.

Citation: Dr Rajeev Gupta (2023), Anorexia and Amenorrhea: A Comprehensive Review of Their Relationship, Diagnosis, and Management. Archives of Gynaecology and Women Health 2(1). DOI: 10.58489/2836-497X/011

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Abstract

Anorexia nervosa and amenorrhea are commonly associated conditions with complex interactions. This review aims to provide an in-depth understanding of the relationship between anorexia nervosa and amenorrhea, the diagnostic approach, and current management strategies. We will discuss the underlying physiological mechanisms, consequences of this association, and the importance of a multidisciplinary approach to treatment.

Keywords: Anorexia, Amenorrhea, Anorexia nervosa, hypothalamic-pituitary-ovarian, Growth factor, Pituitary gland.

Introduction

Anorexia nervosa is an eating disorder characterized by an intense fear of weight gain, body image distortion, and persistent behaviour to prevent weight gain, leading to significantly low body weight [1]. Amenorrhea, the absence of menstruation, is a common feature in women with anorexia nervosa and is often regarded as a clinical marker of the severity of the disorder [2]. The relationship between these two conditions is complex and multifaceted, involving psychological, physiological, and hormonal factors. This review will focus on the interplay between anorexia nervosa and amenorrhea, examining the diagnostic process and discussing current management strategies.

Physiological Mechanisms and Consequences

The association between anorexia nervosa and amenorrhea is primarily due to the energy deficiency experienced by individuals with the eating disorder,

leading to disruptions in the hypothalamic-pituitary-ovarian (HPO) axis [3]. In response to energy deficiency, the secretion of gonadotropin-releasing hormone (GnRH) from the hypothalamus is suppressed, consequently affecting the secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the anterior pituitary gland. As a result, oestrogen production by the ovaries is reduced, contributing to amenorrhea [4]. Anorexia nervosa and amenorrhea have numerous physical and psychological consequences. The reduction in oestrogen levels increases the risk of osteoporosis and fractures, compromising bone health [5]. Additionally, amenorrhea in individuals with anorexia nervosa may lead to infertility and potential long-term effects on cardiovascular and mental health [6].

Hormonal Relationship in Anorexia and Amenorrhea and Its Effect on Young Adults

The hormonal relationship between anorexia nervosa and amenorrhea is complex, involving several hormonal imbalances that can have lasting effects on the health of young adults. In addition to the disruptions in the hypothalamic-pituitary-ovarian (HPO) axis mentioned earlier, other hormonal systems, such as the hypothalamic-pituitary-adrenal (HPA) axis and the growth hormone-insulin-like growth factor-1 (GH-IGF-1) axis, are also affected [3]. Cortisol, a stress hormone produced by the adrenal glands, is often elevated in individuals with anorexia nervosa due to chronic activation of the HPA axis [7]. This increase in cortisol levels may contribute to amenorrhea, as it can inhibit GnRH release from the hypothalamus [8]. Furthermore, high cortisol levels may negatively impact bone health, leading to reduced bone density and increased fracture risk [3]. The GH-IGF-1 axis plays a crucial role in growth and development during adolescence. In anorexia nervosa, GH levels are often elevated, while IGF-1 levels are reduced [9]. This altered GH-IGF-1 relationship is believed to be a result of malnutrition and may contribute to growth retardation and delayed puberty in young adults [10]. Furthermore, low IGF-1 levels have been associated with impaired bone mineralization and decreased bone density [11].

Leptin, an adipocyte-derived hormone, is another critical factor in the relationship between anorexia nervosa and amenorrhea. Leptin levels are typically low in individuals with anorexia nervosa due to reduced body fat [12]. Low leptin levels may disrupt the HPO axis, contributing to amenorrhea, and also lead to a state of relative energy deficiency, which can impair bone health [13]. The long-term effects of hormonal disturbances in young adults with anorexia nervosa and amenorrhea can be significant. Apart from bone health issues, such as osteoporosis and increased fracture risk, other potential consequences include infertility, delayed puberty, growth retardation, and negative effects on cardiovascular and mental health [6]. Early identification and intervention are crucial to mitigate these consequences and promote recovery in affected individuals.

Thus, the hormonal relationship between anorexia nervosa and amenorrhea involves a complex interplay among various hormonal systems, including the HPO, HPA, and GH-IGF-1 axes, as well as leptin levels. These hormonal imbalances can lead to several adverse effects on the health of young adults, such as impaired bone health, growth retardation, delayed puberty, infertility, and negative impacts on

cardiovascular and mental health. It is crucial to identify and address these hormonal disturbances as part of a comprehensive treatment plan for individuals with anorexia nervosa and amenorrhea. A multidisciplinary approach that includes medical, nutritional, and psychological interventions is necessary to promote recovery and minimize long-term consequences.

Diagnosis

The diagnosis of anorexia nervosa is based on the presence of specific psychological and behavioural criteria as defined by the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) [1]. Amenorrhea is no longer a diagnostic criterion for anorexia nervosa; however, it remains an important clinical indicator of the severity of the disorder [14]. The evaluation of amenorrhea in patients with anorexia nervosa involves a thorough medical history, physical examination, and laboratory tests to exclude other potential causes, such as pregnancy, polycystic ovary syndrome (PCOS), and thyroid dysfunction [15]. It is essential to differentiate between primary amenorrhea, where menstruation has never occurred, and secondary amenorrhea, which is the cessation of menstruation for at least three months in a woman who previously had regular menstrual cycles [16].

Management Strategies for Amenorrhea in Anorexia Nervosa

The management of anorexia nervosa and amenorrhea requires a comprehensive, multidisciplinary approach that includes medical, nutritional, and psychological interventions. The primary goal is to restore healthy body weight, normalize eating behaviours, and address any underlying psychological issues [17]. Medical management may include hormonal therapy to improve bone density and reduce the risk of osteoporosis, although this remains a subject of debate due to the potential side effects [18].

In fact, the management of amenorrhea in anorexia nervosa involves a multidisciplinary approach that addresses the underlying causes of both anorexia nervosa and amenorrhea. This approach typically includes medical, nutritional, and psychological interventions.

1. *Nutritional Rehabilitation*: Restoring a healthy weight is a critical component of treating amenorrhea in anorexia nervosa [3]. Nutritional rehabilitation focuses on gradual and supervised weight gain to ensure the safe recovery of body functions, including

menstrual function. A registered dietitian can provide guidance on designing meal plans and addressing any nutritional deficiencies that may have developed during the course of the eating disorder.

2. *Medical Monitoring:* Regular medical monitoring is essential to assess the progress of recovery and to identify and treat any complications that may arise. This monitoring may include tracking vital signs, assessing blood work, and evaluating bone density [19]. If necessary, appropriate medical interventions can be implemented, such as hormone replacement therapy, to help restore menstrual function and reduce the risk of long-term health consequences.
3. *Psychological Therapy:* Various psychological therapies have proven effective in treating anorexia nervosa, and they can indirectly help restore menstrual function by addressing the root causes of the eating disorder. Cognitive-behavioural therapy (CBT), family-based therapy (FBT), and interpersonal psychotherapy (IPT) are some of the evidence-based approaches used to treat anorexia nervosa [17]. These therapies aim to help individuals develop healthier attitudes towards food, weight, and body image while providing them with tools to cope with stressors and prevent relapse.
4. *Hormone Replacement Therapy:* In some cases, hormone replacement therapy may be considered to help restore menstrual function, especially if the patient does not respond to weight restoration alone [15]. Oestrogen and progesterone supplementation can help normalize menstrual cycles and improve bone density. However, it should be noted that hormone replacement therapy is not a substitute for weight restoration and should only be used as a complementary approach.
5. *Physical Activity Management:* Over-exercising can exacerbate hormonal imbalances and delay the recovery of menstrual function. Therefore, it is crucial to develop a balanced exercise plan that supports a healthy weight and helps reduce stress without negatively impacting hormonal and energy balance [20]. Exercise plans should be individualized and adjusted according to the patient's progress in recovery.

Overall, the management of amenorrhea in anorexia nervosa requires a comprehensive and tailored approach, including medical, nutritional, and psychological interventions. A multidisciplinary team of healthcare professionals is necessary to address the

unique needs of each individual and facilitate a successful recovery.

The importance of a well-coordinated, multidisciplinary approach to managing amenorrhea in anorexia nervosa cannot be overstated. Communication and collaboration among healthcare providers, including primary care physicians, dietitians, mental health professionals, and other specialists, are vital for effective treatment and recovery.

In addition to the above, the value of family and social support as well as monitoring the progress is crucial for successful outcome.

- *Family and Social Support:* The involvement of family members and other support systems can play a crucial role in the recovery process. Family-based therapy (FBT), also known as the Maudsley Approach, has been shown to be particularly effective for adolescents with anorexia nervosa [21]. FBT empowers family members to support their loved one by helping them restore their weight, improve eating patterns, and address any psychological challenges they may face. Additionally, support groups and educational resources can help patients and their families better understand the complexities of anorexia nervosa and amenorrhea and learn strategies to cope with the challenges of recovery.
- *Regular Follow-Up and Monitoring:* To ensure long-term success, it is important to have regular follow-up appointments with healthcare providers to monitor the patient's progress, make any necessary adjustments to their treatment plan, and address any relapses or complications that may occur [22]. Long-term care may be required for some patients, as the recovery process can be complex and may take a considerable amount of time.

Conclusion

Anorexia nervosa and amenorrhea are closely linked conditions with complex interactions and significant consequences on an individual's health. Understanding the underlying physiological mechanisms and addressing both the physical and psychological aspects of the disorders is crucial for effective management. A multidisciplinary approach, including medical, nutritional, and psychological interventions, is essential for the successful treatment of anorexia nervosa and amenorrhea. We need a multifaceted approach that addresses the underlying eating disorder and any associated complications. By focusing on nutritional

rehabilitation, medical monitoring, psychological therapy, hormone replacement therapy (when appropriate), physical activity management, and family and social support, patients can work towards recovery and the restoration of their menstrual function, ultimately improving their overall health and well-being.

Conflict Of Interest

The authors declare no conflict of interest.

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