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Orthostatic intolerance and presyncopal states in young adults: the role of dehydration, lifestyle, academic stress and autonomic factors – a narrative review

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Abstract

Introduction and purpose: Orthostatic intolerance is an increasingly recognized disturbance of circulatory regulation in young adults, particularly in academic settings where characteristic lifestyle patterns promote autonomic imbalance. The aim of this narrative review is to synthesize current knowledge on pathophysiological mechanisms, classification, prevalence and management of orthostatic intolerance in young adults, with particular emphasis on the role of dehydration, sleep irregularities, academic stress and low physical activity. Description of the state of knowledge: Available data indicate that early haemodynamic changes after standing, including initial orthostatic hypotension and impaired baroreflex adaptation, are key mechanisms underlying presyncopal symptoms in this age group. In many patients complaints are misinterpreted as manifestations of anxiety or panic, which leads to delayed diagnosis,

unnecessary cardiologic and neurologic investigations and failure to implement simple, effective lifestyle interventions. Studies in student populations show that recurrent presyncopal episodes, “brain fog” and exercise intolerance may significantly impair academic performance and quality of life, while remaining largely unreported. Summary (conclusions): Orthostatic intolerance in young adults rarely reflects severe structural disease but rather a mismatch between autonomic compensatory capacity and chronic environmental load. Early recognition, clear explanation of mechanisms and structured non-pharmacologic management focused on hydration, sleep hygiene, nutrition and physical activity usually lead to substantial symptom relief. In academic environments preventive measures and increased awareness among clinicians, students and university staff are essential to limit unnecessary diagnostics and to reduce the long-term functional impact of orthostatic intolerance.

Keywords: orthostatic intolerance; presyncope; young adults; postural orthostatic tachycardia syndrome; vasovagal syncope; autonomic dysfunction

INTRODUCTION

Orthostatic intolerance comprises a group of conditions in which the physiological mechanisms maintaining cerebral perfusion during the transition to upright posture are disturbed [1,2]. In young adults, this phenomenon is considerably more frequent and formal epidemiologic data substantially underestimate its prevalence [2,8,17,30]. Episodes of sudden weakness, dizziness or transient visual dimming are commonly interpreted by patients and, not infrequently, by clinicians as manifestations of emotional distress. The abrupt onset of symptoms, the accompanying sense of unreality and the awareness of a rapid heartbeat can readily be assimilated to the stereotypical image of a panic attack [2,16]. Such an interpretation favours psychogenic explanations and may obscure the underlying haemodynamic processes.

As a consequence, many young adults undergo extended diagnostic work-up in cardiology or neurology and ultimately receive the information that all test results remain within normal limits [2,7,27]. Despite this reassurance recurrent presyncopal episodes continue to interfere with daily functioning. This experience reinforces the belief that symptoms must be of psychological origin and diminishes motivation to explore lifestyle-related triggers such as dehydration, irregular meals, sleep deficit or prolonged static posture. A circular pattern is thus created: the

less tangible the somatic mechanism appears, the more difficult it becomes to link symptoms to simple, modifiable behaviours [16,26].

Survey studies conducted among university students show that a large proportion of presyncopal episodes never reach medical attention and are instead perceived as a “normal reaction to stress” or to periods of intensive studying [8,17,23,30]. It is not unusual for a young person to live for years with a diagnosis of anxiety disorder while the dominant mechanism of their complaints is orthostatic and haemodynamic rather than psychiatric [16]. The contexts in which symptoms occur are highly characteristic. They are particularly frequent during prolonged standing, in crowded and overheated rooms and during emotionally demanding situations such as oral examinations, public speaking or job interviews. This pattern points towards the combined contribution of postural stress, ambient conditions and autonomic lability.

Young adulthood is a period in which daily routines undergo profound reorganization [21-23]. Academic responsibilities, part-time work and social life often lead to highly irregular sleep, meals eaten at inconsistent times, variable levels of physical activity and frequent consumption of caffeine or other stimulants. In clinical interviews with students a recurrent theme emerges. The presyncopal episode is preceded by a sequence of seemingly minor omissions: inadequate fluid intake, skipped breakfast, several cups of coffee, a night of shortened sleep and many hours spent sitting [21-23]. From the patient’s immediate perspective the final episode appears sudden and dramatic. Yet when the preceding days or weeks are reconstructed, it becomes evident that the organism has been functioning close to the limits of its adaptive capacity. In many interviews students spontaneously underline that they had “seen it coming for a while” but did not perceive the individual elements as medically relevant. Only when these details are carefully reconstructed in the consultation room do they start to notice how small, everyday decisions gradually erode orthostatic tolerance.

AIM OF THE STUDY

The aim of this narrative review is to present a structured overview of orthostatic intolerance in young adults. The article discusses pathophysiological mechanisms and classification, the role of environmental and lifestyle factors, the clinical picture and diagnostic challenges, and therapeutic options with particular attention to the differential diagnosis from anxiety disorders, which often overlap with or mask autonomic symptoms.

MATERIAL AND METHODS

The present review has a narrative character. Publications were identified through searches in PubMed, Scopus and Google Scholar covering the years 2000 to 2025. The search strategy used combinations of terms referring to orthostatic intolerance, vasovagal syncope, postural orthostatic tachycardia syndrome, initial orthostatic hypotension, presyncope, dehydration, sleep deprivation, academic stress, lifestyle and autonomic nervous system function in young adults.

The analysis included narrative and systematic reviews, observational and interventional studies, as well as clinical overviews dealing with mechanisms of orthostatic regulation and tolerance of upright posture. Priority was given to studies conducted in young adult populations or to those in which results could be clearly extrapolated to this age group on the basis of design and reported data. Papers restricted exclusively to older adults or to patients with advanced chronic disease were excluded unless there was a clear rationale to generalize the findings. Particular attention was paid to research examining the influence of hydration status, sleep disturbances, academic stress and level of physical activity on orthostatic responses, especially in environments typical of university settings.

The available literature is heterogeneous with respect to terminology and diagnostic criteria. Certain authors focus on specific entities, such as postural orthostatic tachycardia syndrome, whereas others use broad terms such as “orthostatic intolerance” without a standard definition. For this reason the present article does not attempt a quantitative meta-analysis but rather aims to organize recurrent patterns and clinically relevant themes across studies.

PATHOPHYSIOLOGICAL MECHANISMS AND CLASSIFICATION

Assumption of the upright posture induces an immediate gravitational shift of venous blood towards the lower limbs and splanchnic circulation, which reduces ventricular filling and transiently lowers cardiac output [1,2,5]. In healthy individuals arterial baroreceptors detect this change and elicit a rapid increase in sympathetic tone with a parallel reduction in vagal activity.

Peripheral vasoconstriction and a moderate increase in heart rate restore arterial pressure and maintain cerebral perfusion.

In young adults the compensatory response may be excessively delayed, disproportionately intense or unstable over time. Initial orthostatic hypotension is an important example [3,4]. It is characterized by a brief, marked fall in arterial pressure during the first seconds after standing, occurring before full activation of compensatory mechanisms. Standard blood pressure measurements, usually performed after a delay of several tens of seconds, often fail to detect this phenomenon. Patients in whom initial orthostatic hypotension is the dominant mechanism typically describe visual dimming, the impression that the surroundings are slipping away or an abrupt sense of weakness immediately after rising.

Clinical descriptions of orthostatic disorders in young adults usually refer to four principal entities [2,6,27]. Vasovagal syncope is associated with a paradoxical reflex response in which peripheral vasodilation is combined with a relative reduction in heart rate. Events often occur during prolonged standing, emotional shock, pain or exposure to triggers such as the sight of blood. Postural orthostatic tachycardia syndrome is characterized by an excessive increase in heart rate after standing in the absence of sustained hypotension [7,9,10,25]. Proposed mechanisms include relative hypovolemia, heightened sympathetic drive, abnormalities in plasma volume regulation and physical deconditioning. Initial orthostatic hypotension, as discussed above, is transient and short-lived but can be highly symptomatic. Classical orthostatic hypotension, in which the blood pressure drop persists for several minutes, is rare in young adults and usually indicates a secondary cause such as endocrine disease, adverse effects of medication or severe weight loss [2,11,27].

Academic environments strongly influence autonomic balance. Chronic exposure to performance-related stress, fear of failure, sustained cognitive load, frequent “all-nighters” and high intake of caffeine promote enduring sympathetic activation [21-23]. Over time the autonomic nervous system may begin to respond in a labile, poorly predictable manner, alternating between episodes of excessive tachycardia and periods of pronounced fatigue or weakness. Hyperventilation, which commonly accompanies intense anxiety in situations such as examinations, reduces arterial carbon dioxide tension and, through cerebral vasoconstriction, further aggravates presyncopal symptoms even when changes in systemic blood pressure are modest [5,11,14].

Postural orthostatic tachycardia syndrome occupies a particular place in this spectrum [7,9,25,30]. Many young adults seek medical attention not because of complete syncope but because of distressing tachycardia and the subjective sensation that the heart is “racing out of control” after standing or during light activity. When these experiences are accompanied by throat tightness, tremor and vague feelings of being overwhelmed, they are easily interpreted as expressions of anxiety. However, in a significant proportion of cases the dominant factor is the cardiovascular response to upright posture rather than the emotional situation itself. The mechanisms underlying POTS are heterogeneous and may combine relative hypovolemia, exaggerated sympathetic activation and long-term deconditioning linked to low physical activity [7,9,19].

For affected individuals it is crucial to understand that orthostatic intolerance, including POTS, rarely indicates severe structural heart disease [2,7,27]. Nevertheless, the associated symptoms can be profoundly disabling, especially when they interfere with routine activities such as waiting in queues, attending long lectures or commuting in crowded transport in warm weather [8,17,18,30]. Failure to recognize the role of posture, hydration and environmental conditions may perpetuate the conviction that one’s “nerves are weak,” which in turn complicates the clinical picture and reduces adherence to lifestyle-based interventions.

EPIDEMIOLOGY AND CLINICAL SIGNIFICANCE

Orthostatic intolerance is observed across the life span but appears to be particularly prominent in late adolescence and early adulthood. Studies carried out in university populations suggest that symptoms such as sudden loss of visual clarity, unsteadiness, palpitations or brief episodes of near-fainting occur at least sporadically in a substantial fraction of students. However, only a minority report these events to medical professionals. Most episodes are attributed to temporary overwork, lack of sleep or stress and are accepted as part of academic life [2,8,12,13,17]. In everyday language these episodes are not framed in medical terms at all. Instead, students talk about “nearly blacking out on the tram” or “suddenly losing the thread during an exam”, and only retroactively try to impose a more formal diagnostic label on these experiences.

The underdiagnosis of orthostatic intolerance has important clinical consequences. In primary care settings, where consultation time is limited, the patient’s account of palpitations,

breathlessness and fear of collapse can easily be interpreted within the framework of panic disorder, especially if resting examination shows no abnormalities. If the relationship between symptoms and posture, environmental temperature, hydration status or prolonged standing is not systematically investigated, a diagnosis of anxiety may be made and psychiatric pharmacotherapy initiated without addressing the underlying autonomic dysregulation [16,23,27].

The clinical significance of orthostatic intolerance extends beyond rare episodes of complete syncope [8,17,18,30]. Recurrent presyncope, “brain fog,” difficulties with sustained attention and reduced exercise tolerance may substantially reduce learning efficiency and limit participation in academic and social activities [14-18]. Some students withdraw from situations that they perceive as risky, such as standing examinations or crowded events, and over time this avoidance can lead to diminished self-confidence and secondary mood symptoms. The fear that symptoms will recur at an inconvenient moment often becomes a maintaining factor in its own right.

In everyday practice many students develop spontaneous strategies to manage their vulnerability. They choose seats close to exits, leave lecture rooms “to get some air” when prodromal symptoms appear, and prefer peripheral positions in crowded spaces. These behaviours may not be explicitly reported during a brief consultation, yet they are highly informative if specifically inquired about, as they suggest a chronic pattern of orthostatic intolerance rather than isolated anxiety attacks [6,16].

ORTHOSTATIC INTOLERANCE, COGNITIVE FUNCTIONING AND ACADEMIC PERFORMANCE

An important and relatively underappreciated aspect of orthostatic intolerance is its impact on cognitive performance. Many young adults describe episodes of slowed thinking, difficulty maintaining concentration or a sense of being partially disconnected from the surroundings that arise after several hours of classes or intensive study. These episodes do not always progress to overt presyncope but nevertheless interfere with reading, note-taking or participating in discussions [14-16].

Experimental data indicate that transient reductions in cerebral blood flow can manifest subjectively as mental clouding or “brain fog” [5,14,15]. In individuals who experience such episodes repeatedly, even if each is brief, cumulative effects on learning and memory may become significant. Within academic settings these difficulties are often interpreted by students as proof of inadequate ability or poor study skills rather than as consequences of modifiable physiological strain [16,18].

Orthostatic intolerance may therefore constitute a hidden contributor to declining academic performance. Students who experience recurrent symptoms may adapt by avoiding demanding courses, oral examinations or activities that require long periods of standing. Although this strategy may temporarily reduce discomfort, it also limits opportunities for development and reinforces avoidant patterns that can be difficult to reverse [8,17,18,30].

ROLE OF LIFESTYLE FACTORS

Lifestyle and environmental factors play a central role in the expression of orthostatic intolerance in young adults. Inadequate hydration is one of the most important contributors. Many students drink relatively small amounts of water while consuming significant quantities of coffee, energy drinks or sugary beverages [19,21,24,28,29]. Although these drinks provide a short-term stimulant effect, they may increase diuresis and contribute to a net loss of fluids. When combined with irregular meals low in salt and energy, this pattern reduces circulating blood volume and compromises the body’s capacity to tolerate postural changes.

Dietary habits commonly observed in student populations are characterized by rapid consumption of highly processed foods, frequent postponement of meals until late in the day and a tendency to study or work through traditional mealtimes. Coffee on an empty stomach in the morning, a snack between classes and a large meal late at night together constitute a typical pattern. This arrangement favours fluctuations in glucose levels and alternation between periods of drowsiness and brief episodes of stimulation. Alcohol consumption, often occurring in the context of pre-existing dehydration and insufficient sleep, further exacerbates these fluctuations and may precipitate presyncopal events the following day [21-23,24,29].

Low levels of physical activity constitute a second key factor. Student life frequently involves many hours spent in a seated position, whether at a desk, in front of a computer or while

commuting. Prolonged inactivity is associated with reduced plasma volume, diminished cardiorespiratory fitness and an attenuated capacity to respond to orthostatic stress [1,7,19]. A student who seldom spends extended periods standing may experience intense symptoms when suddenly required to do so, for example while waiting in a queue or taking part in a ceremony. From the subjective standpoint such an episode appears sudden and inexplicable, whereas in reality it reflects long-term physiological adaptation to a predominantly sedentary lifestyle.

Sleep disturbances represent a third major element. Irregular bedtimes, frequent night-time studying and extensive use of electronic devices before sleep contribute to chronic sleep deficit and dysregulation of circadian rhythms [21-23]. These disturbances affect activity of the hypothalamic–pituitary–adrenal axis and alter autonomic balance. Sleep-deprived individuals more often exhibit heightened sympathetic tone and reduced tolerance of upright posture. The combination of sleep deprivation, dehydration and stress, which is typical of examination periods, creates conditions in which even relatively modest orthostatic challenges can provoke presyncopal symptoms.

Academic stress is not limited to the conscious sensation of being “under pressure.” It is accompanied by measurable physiological changes, including elevated catecholamine levels, increased muscle tension and altered respiratory patterns. Hyperventilation, which may occur before or during examinations or presentations, lowers arterial carbon dioxide levels and induces cerebral vasoconstriction, thereby aggravating orthostatic symptoms [5,11,14,16]. In many students the first presyncopal episode occurs in such an emotionally charged context. Subsequent attempts to face similar situations are then coloured by anticipatory fear, and the expectation of symptoms itself becomes a trigger for autonomic activation.

CLINICAL PRESENTATION AND DIAGNOSTICS

The clinical manifestations of orthostatic intolerance in young adults form a broad spectrum. Some patients experience classic presyncopal episodes with dizziness, visual dimming, nausea, cold sweats, palpitations and the compelling sense that loss of consciousness is imminent. Others report more subtle but chronic complaints, such as difficulties with concentration, generalized fatigue, limited exercise tolerance or a deterioration in well-being after rapid changes in posture, for example upon rising from bed. Still others describe brief episodes of disconnection or “switching off” while sitting in crowded public transport or after straightening

from a prolonged forward-bent position. Experienced clinicians often remark that it is these seemingly minor contextual details – where the patient was, how long they had been standing, what and when they last ate or drank – that ultimately reveal the orthostatic nature of the problem [2,6,11,12,13].

A careful medical history is the principal diagnostic tool. The clinician should explore the temporal relationship of symptoms to standing up, prolonged upright posture, warm or poorly ventilated environments, periods of sleep deprivation and irregular fluid intake. Questions about hydration habits, consumption of coffee or energy drinks, patterns of alcohol use and the regularity of meals can provide important clues. It is also essential to ascertain whether anxiety is the initial symptom or whether it arises as a reaction to unexpected bodily sensations [6,16,27].

Physical examination should routinely include measurement of blood pressure and heart rate in the supine and standing positions, with repeated readings after several minutes. When feasible, measurements taken during the first seconds after standing can reveal initial orthostatic hypotension that would otherwise remain undetected [3,4,11]. In patients with recurrent unexplained episodes, tilt-table testing may be considered to document cardiovascular responses objectively and to distinguish between vasovagal syncope, postural orthostatic tachycardia syndrome and classical orthostatic hypotension [11,12,27].

The scope of additional diagnostic procedures should be proportional to the clinical context. In a young adult without alarm signs such as chest pain, loss of consciousness without prodromal symptoms, focal neurological deficits or a family history of sudden cardiac death, basic laboratory tests addressing fluid and electrolyte balance, complete blood count and thyroid function, together with a resting electrocardiogram, are generally sufficient. Advanced imaging or invasive investigations should be reserved for situations in which there is a specific suspicion of organic disease [6,11,12,27].

DIFFERENTIAL DIAGNOSIS WITH ANXIETY DISORDERS AND OTHER CONDITIONS

The differentiation between orthostatic intolerance and anxiety disorders represents one of the principal clinical challenges in this field. Symptom profiles can be remarkably similar, as both

may include palpitations, shortness of breath, tremor, sweating, dizziness and the fear of impending collapse. The crucial distinction lies in the sequence and context of symptom development [14,16].

In orthostatic intolerance somatic symptoms related to posture, environmental conditions and recent lifestyle factors typically appear first. A young person may describe a sensation of warmth, nausea, visual narrowing and progressive weakness after several minutes of standing in a crowded lecture hall. Anxiety arises as a secondary reaction to the realization that fainting may occur. In contrast, in panic disorder episodes often begin with an overwhelming wave of fear or catastrophic thoughts, followed by physical manifestations such as tachycardia and hyperventilation. The relationship to posture is less pronounced, and symptoms may occur while sitting or lying down [16,27].

The time course of events also provides important diagnostic information. Vasovagal episodes usually evolve over tens of seconds, with recognizable prodromal symptoms, whereas panic attacks can develop more abruptly. In everyday clinical practice this distinction is often clearer when the entire sequence of events is reconstructed retrospectively than during the first, time-pressured consultation. Explaining these differences to patients is an essential element of management, as it helps to normalize their experiences and to reduce fear of "going crazy" or "losing control" [2,6,16,27].

The differential diagnosis extends beyond psychiatric conditions. Transient disturbances of consciousness may result from epileptic seizures, transient ischemic attacks, cardiac arrhythmias or rare hereditary syndromes associated with syncope. The presence of focal neurological signs, injuries due to sudden falls, loss of consciousness without warning symptoms or a family history of sudden cardiac death requires prompt and thorough evaluation and may justify referral to specialized centres [5,6,11,27].

PATIENT PERSPECTIVE AND THE ROLE OF COMMUNICATION

For many young adults the most distressing aspect of orthostatic intolerance is the perceived unpredictability of symptoms [8,17,30]. Presyncopal episodes often occur during routine activities that do not obviously seem demanding, such as attending classes, waiting in line or having a conversation with friends. When no clear medical explanation is offered, affected

individuals frequently turn to psychological narratives, concluding that they must be unusually sensitive or incapable of coping with stress. Several patients report that the turning point in their understanding came not with another normal test result, but with a simple sketch or explanation offered by the physician at the desk [16,26]. Seeing their everyday situations translated into a concrete physiological model often has a more reassuring effect than any additional negative investigation.

In this context the manner in which clinicians communicate the diagnosis is of central importance. A clear and coherent explanation of how blood redistributes after standing, why dehydration and irregular meals intensify symptoms and how specific daily behaviours influence orthostatic tolerance can, in itself, have a therapeutic effect. Instead of being told simply that "all tests are normal," the patient receives a structured account of what is happening in their body and concrete suggestions for change.

Some recommendations, such as increasing water intake or making small adjustments to salt consumption, may initially seem almost simple in relation to the severity of experienced symptoms. It is therefore useful to explain explicitly how these measures affect plasma volume, venous return and baroreflex function. Once young adults appreciate this physiological rationale, they are more likely to treat lifestyle modifications as integral components of treatment rather than as generic health advice [19,20,26,28].

MANAGEMENT AND TREATMENT

Management of orthostatic intolerance in young adults is based primarily on non-pharmacologic strategies. The first step is to provide individualized education and to discuss the mechanisms linking daily habits with symptom occurrence. In clinical practice many patients report noticeable improvement once they simply start drinking an adequate volume of water in the morning and at regular intervals during the day. In the absence of contraindications a modest increase in dietary sodium can be considered to support plasma volume expansion. Regular meals with sufficient caloric and salt content help to stabilize intravascular volume and to prevent abrupt glycaemic changes that may exacerbate autonomic instability [19,20,25-29].

Physical activity constitutes the second major therapeutic pillar. Gradual introduction of moderate aerobic exercise improves cardiovascular fitness and supports expansion of

circulating volume. Incorporating simple resistance exercises that involve the lower limbs may enhance muscle pump function and thereby facilitate venous return. In parallel, patients are encouraged to break up long periods of sitting by standing and walking for a few minutes whenever possible. Although these interventions appear straightforward, students often find them difficult to implement in the context of tight timetables and long commutes. Therefore, it is usually more effective to identify together a limited number of realistic behavioural goals and to anchor them to existing routines [1,7,17,19,20].

Teaching counter-pressure manoeuvres is another important component of management. Patients should know that at the earliest signs of deterioration they can reduce the risk of complete syncope by crossing their legs, tensing the muscles of the thighs and buttocks, or, when circumstances permit, squatting or sitting down with the head lowered. In individuals with more severe symptoms, graduated compression stockings may be useful, particularly during long periods of standing [6,20,26,27].

Pharmacologic treatment is reserved for cases in which symptoms remain frequent and disabling despite adherence to non-pharmacologic measures. In selected patients, agents that increase circulating volume, such as fludrocortisone, or that enhance peripheral vasoconstriction, such as midodrine, may be prescribed [7,9,19,25,27,28]. In some forms of postural orthostatic tachycardia syndrome, drugs that limit excessive heart rate increases, for example beta-blockers or ivabradine, can be considered [7,9,25,28-30]. Decisions regarding pharmacotherapy must be individualized, based on detailed assessment of potential benefits and risks and on exclusion of secondary causes of orthostatic dysfunction.

IMPORTANCE OF PREVENTION AND HEALTH EDUCATION

Prevention of orthostatic intolerance in academic environments is both feasible and clinically meaningful. Despite the ubiquity of hydration issues, sleep deprivation and stress, these topics are often addressed only superficially in institutional policies. Integrating basic education about lifestyle determinants of orthostatic tolerance into health promotion programmes for students could reduce the incidence of presyncopal events and improve overall well-being [17,18,21-23,26].

Organizational measures may also contribute. Ensuring ready access to drinking water in teaching buildings, scheduling short breaks during prolonged classes, avoiding excessive heat and overcrowding during examinations or ceremonies and adopting flexible rules for students who report symptoms of orthostatic intolerance are simple interventions with potentially significant impact. Physicians working in student health services and general practitioners caring for young adults should aim not only to exclude serious disease but also to provide practical strategies to reduce the risk of future episodes and to counteract unnecessary medicalization of mild presentations [19,21-24,27].

LIMITATIONS

The present review has several limitations that need to be acknowledged when interpreting its conclusions. First, it is a narrative rather than a systematic review, which means that the selection and synthesis of publications were unavoidably influenced by the judgement of the authors. Although an effort was made to include representative studies and to reflect the diversity of perspectives in the field, the material cannot be regarded as exhaustive. It is also possible that relevant papers, particularly those published in languages other than English or indexed in less widely used databases, were not captured by the search strategy. The conclusions of this article should therefore be regarded as interpretative rather than definitive.

A further limitation relates to the heterogeneity of definitions and diagnostic criteria used across the included studies [2,7,11,17]. Many authors employ broad terms such as “orthostatic intolerance” or “presyncope” without standardized operationalization, whereas others focus on narrowly defined entities such as postural orthostatic tachycardia syndrome or vasovagal syncope. This diversity makes direct comparison of results difficult and precludes formal quantitative aggregation. The present synthesis therefore relies on identifying recurring clinical patterns and mechanistic themes rather than on pooled effect estimates.

The evidence base concerning young adults is also uneven. A considerable proportion of the available data comes from cross-sectional surveys and retrospective analyses conducted in student populations. These designs are prone to recall bias, self-selection of respondents and limited control over confounding variables such as comorbid mental health problems, use of psychoactive substances or concurrent medical conditions. Longitudinal studies that would

allow assessment of symptom trajectories over time and of the long-term impact of lifestyle modification are still scarce.

Another important constraint is the limited number of interventional trials specifically targeting orthostatic intolerance in young adults, particularly in the context of academic environments. Recommendations regarding hydration, sleep hygiene, physical activity and stress management are grounded in physiological reasoning and extrapolation from broader cardiovascular and autonomic research, but direct evidence on the effectiveness of structured programmes in student populations remains modest. This gap is particularly relevant given that adherence to lifestyle interventions may be strongly influenced by institutional and social factors that are rarely examined systematically. As a result, the expected effectiveness of such interventions in routine student populations may be either overestimated or underestimated.

Finally, the review focuses primarily on young, otherwise healthy adults and on settings typical of higher education. The described mechanisms and clinical scenarios may not be fully generalizable to older populations, to individuals with substantial comorbidity or to occupational contexts that impose different types of physical and psychological demands. Future research should therefore aim to refine diagnostic criteria, develop standardized outcome measures and evaluate multifaceted interventions in diverse groups of young adults, including those outside university settings. Until such data are available, any generalization of the present synthesis beyond the described contexts should be made with appropriate caution.

CONCLUSIONS

Orthostatic intolerance constitutes one of the most frequent, yet often under-recognized, causes of presyncopal states in young adults, particularly in student populations. In the great majority of cases it does not indicate serious structural pathology but rather reflects an imbalance between the adaptive capacity of the autonomic nervous system and the cumulative demands imposed by lifestyle and academic pressures. Dehydration, irregular and low-salt meals, insufficient sleep, chronic stress and sedentary habits create a background in which normal compensatory mechanisms are easily overwhelmed [1,2,7,17].

Although these conditions rarely pose an immediate threat to life, they can profoundly affect quality of functioning, academic performance and participation in social life. Properly

conducted education, targeted lifestyle modification and training in simple techniques for managing early warning signs usually bring stable improvement and reduce the frequency of presyncopal episodes. From a broader perspective it is essential to increase awareness of orthostatic intolerance among students, primary care physicians and university staff. Early recognition of individuals who require more extensive diagnostic evaluation, combined with avoidance of unnecessary investigations in benign cases, may limit both the personal and systemic burden associated with these disorders [19,20,25-27].

DISCLOSURE

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Conceptualization: M.K.

Methodology: M.K., K.K.

Literature search: M.K., K.K., J.B., B.G., K.Kl.

Validation: M.K., K.K., J.B.

Formal analysis: M.K.

Investigation: M.K., K.K., B.G., K.Kl., P.R., M.K.L., A.S.

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CONFLICT OF INTEREST STATEMENT

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