

According to a person's attitude to the conflict, the following are distinguished: conflicts that are evaluated as undesirable (a defensive position of the individual appears); conflicts perceived by a person as necessary (a person behaves more naturally, adequately).

Causes of conflicts. Conflict specialists and psychologists-practitioners claim that the occurrence of conflicts, as a rule, related to the psychological characteristics of the individual, his behavior and needs. The main characteristics of an individual that determine his behavior include: - natural properties of the personality, its individual and psychological properties features; system of needs, motives, interests of the individual; - an individual's internal idea of himself, his "I"-image. The natural properties of the personality are what are embedded in it from birth and is expressed by such dynamic characteristics as activity and emotionality [2].

To the characterological prerequisites of the occurrence of conflicts include persistent qualities and character traits that can, under certain conditions, lead to a collision of the individual with others: intolerance to the shortcomings of others, reduced self-criticism, impulsivity, intemperance of feelings, tendency to aggression, lack of manners, etc.

#### **Conclusions.**

Conflicts in modern society represent the origin and manifestations of objectively existing social contradictions. The contradictions of society are a specific reflection of its essence, a decisive and driving force of development. Each contradiction is specifically manifested in the context of the entire system of contradictions and requires an adequate solution.

Basic rules of constructive conflict resolution situations are as follows: the focus should be only on the problem conflict, not personality; participants in the conflict are not enemies; participants in the conflict should not succumb to negative emotions and feelings; the interests of all its parties must be represented in the resolution of the conflict.

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**OPTIMAL PHYSICAL ACTIVITY FOR MAINTAINING HEALTHY SKELETAL MUSCLE FUNCTIONING IN ADULT  
ATHLETES WITH T1DM**

The article analyzes various types of physical activity to find the best option for maintaining healthy skeletal muscle function in adult athletes with type 1 diabetes mellitus. Regular exercise is shown to effectively normalize their condition, while muscle training improves glucose absorption without insulin, significantly increasing muscle sensitivity both during and after exercise.

The study highlights that proper blood sugar control and avoiding hypoglycemia or hyperglycemia during structured physical activity are crucial for managing insulin-dependent athletes. Exercise effects vary based on the sport, intensity, and individual factors influenced by external and internal conditions.

The research stresses setting realistic goals for athletes with T1DM to ensure positive outcomes, focusing on avoiding stress. The study also explores physiological responses to different exercises and offers individual or group training recommendations that balance muscle training, condition management, socialization, and a normal lifestyle.

**Keywords:** T1DM, adult athlete, type 1 diabetes mellitus, muscle function, physical activity, adulthood, diabetes.

**Серпутько О., Грабовський Ю., Глухова Г., Юдіна Н., Степанюк С. Оптимальна фізична активність для здорового функціонування скелетних м'язів у дорослих атлетів з ЦД1.** В представлений статті здійснено аналіз видів фізичної активності з метою пошуку оптимального варіанту для забезпечення здорового функціонування скелетних м'язів дорослих спортсменів зрілого віку з цукровим діабетом 1 типу.

Визначено, що регулярна фізична активність є ефективним способом нормалізації стану хворих на цукровий діабет першого типу, крім того, тренування скелетних м'язів сприяє їх ефективному засвоєнню глюкози без інсуліну, при цьому значно підвищується чутливість м'язів до нього, як під час фізичних навантажень, так і тривалий час після них.

Виявлено, що належний контроль рівня цукру та уникнення станів гіпоглікемії та гіперглікемії під час організованої належним чином фізичної активності є незамінною частиною терапії для інсулінозалежних атлетів зрілого віку, проте не всі види фізичної активності мають однаковий вплив на реакцію організму хворого на діабет першого типу, це стосується як окремих видів спорту та рівня навантаження, так і індивідуальні показники та реакції окремого індивіда, котрі можуть змінюватися, залежно як від зовнішніх, так і від внутрішніх факторів.

В ході дослідження було виявлено, що для досягнення позитивного результату важливо ставити розумні цілі перед спортсменом з ЦД1, вкрай важливо уникати стресових ситуацій та пікових навантажень, тому для таких атлетів змагальний компонент не повинен бути головним. Крім того, безперечно найбільш ефективними є індивідуальні тренування, що дозволили б спеціалізованому тренеру та спортсмену з ЦД1 будувати збалансоване щотижневе навантаження з урахуванням його кардіометаболічних та нейроендокринних процесів з постійним контролем життєвоважливих показників. Тим не менш, індивідуальна робота виключає можливість соціалізації, а тому представлена робота описує не тільки особливості реакції атлета з ЦД1 на різні види навантаження, а й є спробою узагальнення всіх вимог до такого фізичного тренування з метою надання оптимальних варіантів групових занять, в ході яких атлет отримав би вирішення питання функціонального тренінгу скелетних м'язів, нормалізації свого стану, а також соціалізації та ведення нормального образу життя.

**Ключові слова:** ЦД1, дорослий спортсмен, цукровий діабет 1 типу, функціонування м'язів, фізична активність, зрілий вік, діабет.

**Formulation of the problem.** According to the information given by IDF Diabetes Atlas [4], published by International Diabetes Federation and World Health Organization, for the beginning of 2024 around 8.7 million people worldwide have type 1 diabetes mellitus (T1DM), and approximately 85–90% of people with Type 1 diabetes are adults.

It is known that the positive effects of physical exercise on blood and urine sugar levels were recognized as early as the 6th century BCE. Physical exercises were widely used as a key method to improve the condition of individuals with diabetes, even after the discovery of insulin. As knowledge about the body's response to insulin therapy in people with type 1 diabetes mellitus (T1DM) advanced, the risks of hypoglycemia and hyperglycemia became apparent, caused by factors such as insulin dosage, exercise intensity and duration, dietary habits, and the individual's psychological state at any given time.

Today, individuals with T1DM have access to a wide range of traditional and modern devices and gadgets to monitor and manage blood glucose levels, theoretically enabling a normal life. However, according to international statistics and our experience with adult athletes with T1DM, individual variations in physiological, biochemical, and psychological processes, along with inconsistent performance of glucose monitors and insulin pumps, still present challenges. These issues make it difficult to predict the body's response and plan life activities, including sports and physical exercise.

Therefore, our study focuses on identifying optimal types of physical activity for adults with T1DM that avoid triggering crises, promote skeletal muscle development to enhance insulin sensitivity, improve blood glucose control, boost cardiorespiratory endurance, and provide opportunities for social interaction to help counter stress and negative emotional states.

**Analysis of recent research and publications.** Despite the vast number of scientific studies and experimental research on type 1 diabetes mellitus, both in medical and physiotherapeutic fields, we have not found studies that combine medical and coaching expertise with the psychological and emotional aspects, while simultaneously incorporating feedback from the patients themselves. This, in our view, is crucial since the practical goal of any therapy, especially those involving physical culture and sports, is to achieve the best possible balance between everyday life and future planning. Such therapies aim to activate the body's internal potential, its ability for self-regulation and adaptation.

The strategic role of skeletal muscles in the natural absorption of glucose and the necessity of their development is well-documented in the works of Dial A.G. (2021) [1], Hawke T.J. (2022) [2], and Rebalka I.A. (2024) [5], which fully align with our

findings and support our hypothesis that the condition of skeletal muscles is a key factor in maintaining the physical health of adult athletes with type 1 diabetes mellitus.

Regarding the thorough understanding of how individuals with diabetes respond to different types of exercise and varying levels of intensity, we find the studies of Paldus B. (2022) [7], Herzig D. (2023) [3], and Riddell M.C., Peters A.L. (2023) [6] particularly valuable. These research findings were also influential in shaping our own study.

**The aim of this study** was to find out the optimal physical activity for maintaining healthy skeletal muscle functioning in adult athletes with type 1 diabetes mellitus for both individual and group training.

To achieve the research objectives, we employed the following **research methods**: literature and medical documentation analysis, analogy and comprehensive research methods, theoretical and systematic analysis, as well as practical experience and observations during both individual and group work with adult athletes with type 1 diabetes mellitus.

**Results of the research and discussion.** Today, the fitness industry is highly developed, offering a broad range of training and recreational programs for different age groups and functional needs. Individuals with type 1 diabetes mellitus, regardless of their prior fitness level, can, with the use of modern devices for glucose monitoring and timely insulin therapy, choose a fitness direction that suits their preferences and offers maximum comfort based on individual priorities.

However, not all sports and fitness disciplines have the same effect on stabilizing glucose levels in people with type 1 diabetes mellitus, particularly in mature adults. Physical exercise remains one of the primary tools for maintaining an optimal lifestyle with diabetes. Guided by the objective of finding the most effective forms of physical activity, we analyzed the most common and popular fitness programs available today. Based on our observations, coaching experience, and feedback from monitored participants, we identified the most beneficial activities for further development and adaptation to help athletes with type 1 diabetes mellitus maintain physical and mental health.

**Key priorities for structuring training programs for athletes with type 1 diabetes mellitus:**

1. **Glycemic Control:** The top priority is achieving control over blood glucose levels during exercise. This not only helps avoid stress during and after workouts but also allows for progressive training, enhancing the body's adaptive capacity and even achieving specific athletic goals without compromising the athlete's well-being and health [7].

2. **Glucose Utilization:** The second priority is to ensure glucose contributes to muscle development and recovery through exercise. This supports balanced recovery processes, which form the foundation of a relatively healthy lifestyle and enable athletes to plan their life and professional activities more freely, reducing stress caused by the unreliability of devices and glucose monitors [3].

3. **Training Adaptation:** Lastly, the aim is to select a training regimen that fully meets the needs of an individual with type 1 diabetes mellitus, can be performed both individually and in groups, and fosters steady physical development. This allows for setting and achieving further athletic and life goals [6].

Despite the constant improvement of modern methods and devices for monitoring and normalizing the condition of athletes with type 1 diabetes mellitus (T1DM), glucose response during various exercises remains highly unpredictable and complex. Based on exercise goals and conditions, we identified key exercise types that are both effective for skeletal muscle development and adaptable to the individual needs of each athlete. These include strength training, endurance exercises, and interval training. Each type of exercise can either complement the others or differ in execution depending on the athlete's objectives and training plan [3, 6].

**Strength exercises** focus on skeletal muscle development by overcoming resistance, using equipment such as barbells, dumbbells, kettlebells, or body weight. They can target muscle hypertrophy with submaximal weight, endurance with lighter weight and higher repetitions, or strength through low repetitions and maximal weight. It's recommended to vary the intensity of strength exercises throughout the week.

**Endurance exercises** involve increasing intensity for a short fixed period or performing lower-intensity exercises for a prolonged period. These exercises initially spike oxygen demand, which then stabilizes, preventing lactic acid buildup and ensuring quick recovery after training.

**High-intensity interval training (HIIT)** boosts anaerobic capacity through short bursts of intense exercise followed by brief active rest. Session duration depends on the athlete's fitness level, usually lasting 5–30 minutes. These should be performed at moderate intensity at the start of a session or high intensity towards the end [7].

For individuals with T1DM, the best time for exercise is in the morning or afternoon, about 1-1.5 hours after a meal, once glucose levels are stabilized. Training should last at least 45 minutes, with an optimal duration of 1.5-2 hours, performed 3-4 times a week, depending on the athlete's health, work specifics, and cardio-respiratory and nervous system functions.

Each session must include a 20-minute warm-up at a comfortable pace and a cooldown to recover breathing, assess performance, and address any weak points. The main focus should be on strength exercises, alternating between upper and lower body workouts, and maintaining a steady pace without extreme exertion. Rest periods between exercises should be 1 minute, and 30 seconds within the set.

Coaches must create a monthly workout plan tailored to the specific needs, goals, and conditions of the athlete with T1DM. The plan should allow for flexibility in case adjustments are needed based on the athlete's condition. Sharing the plan with the athlete is essential to avoid stress or emotional strain, which could affect glucose levels and diminish the training outcome [8, 9].

Given the need for constant glycemic control and the ability to personalize training based on the body's responses, it might seem optimal to plan individual sessions for athletes with T1DM. However, our experience shows that such a strategy should not be the primary approach. Individual training should focus on refining specific technical skills, not solely because of diabetes. Group training is far more beneficial for athletes with T1DM, as it helps them focus on results and technique rather than the

disease. Additionally, a motivating environment among like-minded individuals in a group – whether or not they also have diabetes – has a positive impact on the athlete's psychological state and promotes socialization [9, 10].

Coaches need not only to master their discipline but also to continuously update their knowledge and develop a deep understanding of the neurohormonal responses of athletes with T1DM to different types of physical activity and methods for stabilizing these responses. This knowledge is crucial not only for organizing effective training but also for earning the trust of athletes with T1DM. Achieving positive results is only possible through cooperation and coordinated actions.

It is important to understand the risks associated with sports training for athletes with type 1 diabetes mellitus. Beyond the challenges of hyperglycemia and hypoglycemia, these athletes are much more prone to various types of injuries, prolonged muscle soreness, and unpredictable bodily reactions to physical exertion [5].

Explosive exercises, high-intensity workouts (both short and long duration), and competitive activities can trigger either hyperglycemia or hypoglycemia, depending on numerous factors and individual responses. Monitoring blood glucose levels before training and checking insulin presence in the blood are key factors for safely starting physical activity. Training should be planned according to a structured load schedule, and athletes must prepare properly, including reducing basal insulin 1.5-2 hours before exercising [1].

**Conclusions.** The results of the study lead to the following conclusions. For athletes with type 1 diabetes mellitus, strength exercises, complemented by interval training and endurance exercises, can be considered optimal for promoting healthy skeletal muscle function. This approach not only improves overall physical and emotional well-being but also significantly enhances glucose control, extends the positive effects of exercise on insulin-independent glucose absorption, and helps halt the muscle breakdown and degradation commonly seen in older adults with type 1 diabetes mellitus.

Future **research prospects** involve developing tailored training systems for mature individuals with type 1 diabetes mellitus, taking into account gender and age periodization.

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