



Article

Enhancing Resilience in Rescue Workers

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Abstract: This article examines the concept of endurance, its types, and its interaction with the body's internal systems. Endurance is categorized into general (aerobic) and specific types, including speed, strength, and coordination. General endurance, which involves exercises that engage the cardiovascular and respiratory systems, improves overall fitness, while specific endurance focuses on specialized activities like speed-based, strength-based, and coordination exercises. The article also identifies negative factors that affect endurance, such as physical fatigue and environmental stressors, and explores methods to enhance endurance, including tailored training exercises that resemble competitive activities.

In the context of rescue workers, physical endurance plays a critical role in ensuring their ability to perform under stress. The demands on rescuers require both high individual and group training levels, as well as mental and physical resilience. The article emphasizes the importance of maintaining a high physical condition to overcome obstacles, manage psychological stress, and execute complex movements during emergencies. It concludes with practical recommendations for improving the physical endurance of rescuers, including the incorporation of strength, speed, and coordination exercises into training programs, aimed at enhancing their overall preparedness for emergency situations.

Keywords: rescuer, endurance, speed, strength, muscle, exercise, endurance factors

1. Introduction

Endurance is the ability of muscles to resist physical fatigue during their activity. There are two types of endurance: general and specific [2]. The development of general endurance (aerobic) involves exercises that force the cardiovascular and respiratory systems to work at a high level [1]. In turn, specific endurance is divided into the following types:

Speed-based (cyclic exercises such as running, racewalking, and others);

Strength-based (strength exercises such as bodybuilding, weightlifting);

Coordination endurance (individual sports, team games, gymnastics).

Specific endurance refers to the ability to perform a particular work process or sports activity effectively. The development of specific endurance (speed-based, strength-based, coordination-based, speed–strength-based, and other types) is achieved through specially designed exercises. These exercises are tailored to closely resemble the competitive form, structure, and impact on the functional systems of the body [3].

General and specific endurance differ in the characteristics of the neuromuscular control of movements. Specific endurance depends on the capabilities of the

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neuromuscular system, the rapid consumption of intramuscular energy sources, the technique of movement execution, and the development of other movement qualities [4].

Thus, it can be confidently stated that endurance is a multi-component concept, and its level of development depends on many factors:

General endurance;

Speed capabilities (the speed and flexibility of working muscles);

Strength qualities

Technical-tactical skill and freedom of movement [5].

Now let us define the main types of endurance. While distinguishing several types of endurance, the following can be included: strength exercises, speed-focused exercises, aerobic exercises combining speed and strength, and exercises performed at small to moderate speeds. Static endurance develops as a result of performing variable-intensity strength exercises as well as exercises under conditions of oxygen deficiency [6]. Specific endurance can be classified as follows:

Based on types of movements and the conditions of solving clearly defined goals and tasks (these may include sports games).

Based on movement-related tasks, such as jumps.

Through a combination of exercises, performing complex exercises together with strength-oriented and coordination exercises.

Speed endurance is determined by performing exercises that do not exceed 15–20 seconds. Based on the methodology for assessing endurance, a number of exercises have been identified specifically for evaluating speed endurance. This type of endurance requires high demands on speed parameters.

To develop strength-based endurance, it is important to perform exercises without reducing their effectiveness. In this case, the movement activity may be acyclic, cyclic, or mixed. Increasing strength-based endurance requires performing complex exercises. Various methods are applied to enhance strength development:

Maximum effort method – performing exercises up to or at the limit of fatigue.

Dynamic strength method – generating high force under high-speed conditions.

Repetition-to-fatigue method – performing repeated exercises to reach the limit of fatigue, continuing until endurance is achieved [7].

Coordination endurance is improved through performing complex technical-tactical movements, which is one of its key characteristics. For example, this applies in volleyball and other sports [8].

Methodology:

The research employed a comprehensive approach to studying endurance, focusing on both theoretical analysis and practical application. To examine the types and factors influencing endurance, a literature review was conducted, analyzing relevant studies and training programs specific to rescuers and athletes. Key endurance categories—general and specific—were explored through existing research, with a particular focus on speed, strength, and coordination endurance.

Practical data were collected through interviews with rescue workers and trainers, assessing current training methods and endurance levels. Additionally, physical training protocols commonly used for improving endurance were evaluated. These protocols included aerobic exercises for general endurance and tailored strength, speed, and coordination exercises for specific endurance.

To determine the effectiveness of these methods, performance metrics such as reaction time, strength, and overall endurance were measured before and after training

sessions. Surveys were conducted to gather subjective feedback from rescue workers regarding their physical and psychological preparedness.

Finally, based on the data collected, recommendations were developed to optimize endurance training for rescue personnel. This included strategies to improve physical readiness, enhance resilience under stress, and address the unique demands faced by rescuers during emergencies.

Improving the Physical Endurance of Rescuers

It is known that in our country there are two categories of rescuers: military rescuers and professional rescue service personnel. For military rescuers, specific requirements and regimes have been developed, and by adhering to these regimes and requirements, they can improve their physical condition and gradually increase their endurance.

Professional rescue service personnel, however, cannot always follow such strict regimes, which can lead to challenges in improving their endurance. High demands are placed on the endurance of rescuers. To meet these demands, it is first necessary to achieve a high level of physical preparedness, including both individual and group training. Professional rescue personnel may not be able to fully participate in all training processes. Additionally, the professional activity of rescuers involves physical and psychological stress, intense functional workload, and a high probability of unforeseen situations that require endurance. The intensity of physical exertion, the complexity of movements while overcoming various obstacles, the application of specialized methods, the constant influence of factors leading to hazardous situations, and the need for sufficiently high endurance of rescuers are all objective conditions that necessitate high endurance.

Conducting physical training sessions is one of the most important factors for optimizing the physical capacity of rescuers. These sessions aim to maintain health, prevent psychological stress, increase speed-based strength indicators, and develop new skills and knowledge. All of these are critical for their future professional activities.

In today's era of technological development, attention must be focused on organizing and conducting activities aimed at enhancing the professional and physical preparedness of rescuers. Any professional activity requires individuals to possess certain qualities and leave a lasting impact throughout their lives. Physical preparedness is part of overall physical culture, ensuring the development of both mental and physical strength, forming universal values, and promoting health, physical, and psychophysical maturity [9]. Physical training is necessary for the development of physical qualities and for forming certain knowledge, skills, and experience required for a particular profession. The physical preparedness of rescuers differs from that of specialists in other professions. This is related to their specific duties, as they must ensure the safety of citizens under emergency conditions [2]. Therefore, any activities aimed at improving the physical preparedness of rescuers play a crucial role in preparing professional personnel, effectively completing assigned tasks, and developing the psychophysical readiness of rescuers.

Physical preparedness addresses the following service tasks:

It increases the personal background of movement skills and enhances knowledge required for performing service and professional duties;

It ensures stability when performing complex service tasks, improving and perfecting abilities that are professionally significant and directly related to the duties;

It enhances functional readiness under psychophysical and psycho-emotional stress in various environmental conditions;

It develops personal, mental, and freedom-related qualities necessary for performing service duties.

To achieve these objectives, it is recommended to include athletics, gymnastics, and individual combat sports in the training program for each department. This approach models the characteristic components needed for performing service duties, namely:

Physical stresses (strength-based, speed-strength, endurance);

Sensory stresses (rapid reaction in time-constrained areas, quick attention shift to a new situation, execution of movement effects, etc.) [10].

One of the decisive criteria for achieving high efficiency in service is the preservation of high work capacity under the condition of rescuers' physical development and health. In this regard, high physical fitness, which determines primary physical development, forms the foundation of work capacity across all activities, including training, labor, and sports.

One of the main criteria ensuring high work capacity is endurance, which is a key physical quality reflected in the professional activity of rescuers. Endurance serves as the basis for readiness to act in complex situations and increases the ability to perform movements under various circumstances during service duties.

Since professional rescue personnel cannot always serve under the fixed regime like military rescuers or train according to a specific program, it is necessary to identify and study mechanisms affecting their endurance. These include:

Bioenergetic factors;

Mechanical and physiological-biochemical economization;

Functional stability factors;

Personal-psychic factors;

Heredity factors.

Research in these areas is essential to ensure the endurance of professional rescue personnel.

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