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Analysis of Requirements for Modern Sport Cloths

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ABSTRACT: Hygienically optimal, taking into account the specifics of the sport, sportswear is necessary for effective and safe training and competitive activities. The hygienic purpose of sportswear and footwear is the creation and maintenance of an optimal thermal balance in the "organism-environment" system, in the process of physical exercises of various intensity and orientation. The temperature regime of the body has a direct effect on the dynamics and intensity of the main metabolic processes.

KEY WORDS:: Heat-shielding properties, hygienic properties, breathability, vapor permeability, evaporation.

I. INTRODUCTION

Athletes who perform a great deal of physical work in sportswear, accompanied by a significant release of energy, impede heat transfer through the skin. The average skin temperature rises rapidly, especially at high ambient temperatures and relative air humidity. Sportswear should provide an optimal microclimate. It is influenced by the thermal state of the athlete's body, the meteorological conditions of the external environment and the properties of sportswear.

Sportswear means special clothing for sports. They are part of individual equipment. The creation of modern sports equipment, clothing and footwear - rational, beautiful, comfortable - depends on the close cooperation of industrial production specialists: sewing workers, textile workers, shoemakers, technologists, fashion designers, chemists and hygienists.

Fulfillment of hygienic norms, requirements for their creation and operation causes a comfortable state of an athlete and an athlete, optimum thermal well-being, ease of wearing, no skin irritation, electrostatic phenomena, abrasions. The hygienic assessment of sports equipment is all the more important, since it is increasingly used artificially and synthetic materials that can be used to make it. Chemically unstable and release toxic substances into the environment. They are also characterized by light pollution, high electrified. Design features of sportswear, shoes must comply with the rules of hygiene, Anna only take into account the sports and technical requirements [1].

Athlete's clothing, as a rule, consists of three layers:

• lower - underwear, in pita howling and from leading moisture;
• medium - clothes that take moisture out;
• top — protection from adverse weather conditions
(while staying in unopened sports facilities).

The high level of hygienic requirements for sportswear is due to the preservation of favorable conditions for the functioning of internal organs and all physiological systems during intensive physical exercises of the embedded meteorological conditions (academician A. Minh, 1976).

Relief of sportswear should not go by reducing the heat-shielding properties in order to avoid colds. Another hygienic requirement is free cut, sometimes in conflict with sports and technical standards. Sportswear should maintain the thermal equilibrium of the Body during physical exercise and exercise and sports, meet a number of other hygienic and sports technical requirements ensure the convenience of sports activities, protection from traumatic injuries, etc.

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Sportswear should be lightweight, cover to provide. Freedom of movement, without coarse seams to avoid scuffing. When selecting a suit, not only growth but also fullness is taken into account. Mandatory requirement for sportswear materials.Is their elasticity. Too tightly fitting pieces of clothing can cause irritation of the skin, stagnation of blood and lymph, displacement of the pelvic organs (in women), prevent the excursion of the chest and normal figure and wears the intestines. In addition, with a full tight fit under the clothes space is poorly ventilated, there is an obstacle to the evaporation of the sweat on the skin surface. Free cutting of open-type sportswear is especially necessary under heating environmental conditions.

Modern sportswear is distinguished by a high degree of fit to the body without allowances for a free fit, which is associated with the best aerodynamic and properties. Under these conditions, hygiene is largely determined by the characteristics of the materials. An indicator of the compliance of clothing with hygienic requirements is under a clothing microclimate. Thermal comfort is characterized by relative humidity between

Skin first layer of clothing, equal to 35 - 60%; however, it is slightly lower than the ambient air humidity due to the higher temperature under the clothes space.

The rate of increase of moisture under the clothes air in the process of sports activity is one of the main indicators of non-compliance of clothes with hygienic requirements. The less they are, the better the ability of clothes to transfer moisture from the body surface to the environment due to materials and design. In cold conditions, the wetting of clothes and the subsequent heat-protective properties with lower ones are associated with an increase in clothing moisture. High hygroscopicity of materials allows absorbing the evaporating sweat on the skin surface while performing sports exercises, at the same time maintaining the heat-shielding properties at a sufficient level. Wool fabrics have the highest hygroscopicity. Air permeability is needed to maintain heat balance with the environment and remove carbon dioxide, moisture and skin secretions from under the clothing space. It depends on the structure, thickness, method of weaving fabric, the number and size of pores. The higher the air permeability, the lower the heat-shielding properties of the material. It characterizes the ability to maintain heat losses to the environment at a certain level and is characterized by thermal resistance. Attitude to moisture besides hygroscopicity characterize, drag as far as indicators.

Steam permeability is the ability to pass water vapor both from the inside and outside. It depends on the thickness and porosity of the material and is aimed at ensuring the preservation of normal heat transfer and the release of gaseous waste products. Evaporation is the ability to produce water by evaporation. Thin and smooth fabrics dry up more quickly, the wool loses water more slowly than cotton fabric, so it cools the body less. This property is especially important for sports loads in heating conditions. Water intensity - the ability of a material to retain moisture when wet. When wet clothes increase thermal conductivity. At the same time, the thermal conductivity of moistened woolen fabrics increases 1, 6–2.2 times, and cotton - 3–4 times; therefore, the clothes after rain or soaking then cools the body more strongly. Soaked fabric becomes less breathable (thick underwear is almost full), knitwear in this state reduces air permeability by only 30%, which is important for sports activities.

The heat-shielding properties of materials characterize thermal conductivity, which means their ability to conduct heat. The degree is characterized by the corresponding coefficient. It depends on the structure of the fabric, the type of fibers and their weave.

For terrestrial sportswear, heat-shielding properties are of particular importance, by which is meant the ability to maintain at a certain level the heat of the body's loss to the environment. These properties are largely dependent on the cut, the number of words and the tightness of clothing. High heat-shielding properties are cut type.

"Overalls", which is the most closed construction Cuffs on the sleeves, a closed collar, a hood, bellowing off with the penetration of cold air into the clothes under the clothes.

For the hygienic evaluation of the material of clothing, the degree of its softness or hardness is of great importance. The degree of stiffness in bending is estimated by the reciprocal of flexibility, which depends on the weave and density. Knitwear has the greatest flexibility, since the threads are woven and unfixed and mutually movable.

II. APPLICATION FOR SPORTS PRODUCTS SPARSE AND OPENWORK

Towels also significantly improve their physical and hygienic properties. Such knitted fabrics have better air and vapor permeability, lower electrified.

The hygienic ideal is the softest and most flexible material of sports products. An important hygienic property is turnover, reflecting the degree of elasticity, i.e. the ability to maintain the appearance (shape) after mechanical impact. Clothes made of low-crush materials retain their original appearance for a long time. The folds not only worsen the appearance, but also accelerate wear, especially in the folds. During operation, the properties of materials deteriorate.

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Resistance to wear ie. The ability of a material to preserve its appearance, without changing its appearance, initial properties, is called wear resistance. To the main factors of wear sports textile materials include: physico-chemical actions (sweat, sun rays, washing liquids, dry cleaning, heating, etc.), mechanical (abrasion, fatigue from multiple recurring deformations — stretching, crumpled, bending, etc.). Most often, these factors act in a complex of motor combination and interaction.

III.HYGIENIC REQUIREMENTS FOR SPORTSWEAR

Sportswear should maintain optimal thermal balance of the body during exercise and sports, to ensure effective sports activities, protection from injury and mechanical damage. It should be easy, comfortable, not hamper movements, consistent in height and fullness. Modern sportswear is distinguished by a high degree of adhesion to the body, without allowances for a tight fit, which is associated with the best aerodynamic properties of tight-fitting elastic clothing.

Of great importance are the heat-shielding properties of clothing, its hygienic properties, as well as the hygienic properties of the fabrics from which it is made (air permeability, vapor permeability, evaporation, water consumption, hygroscopicity, flexibility, removability, etc.).

The heat-shielding properties of clothing depend primarily on the thermal conductivity of the fabric. It depends on porosity, fabric structure, type of fibers and their weave. In thick and fluffy tissues between the fibers, there are many pores where air, which is a poor conductor of heat, is trapped. Such fabrics possess high heat-shielding properties. For example, the porosity of wool and flannel is 92, cloth - 89, wool blanket - 88%. Furs are even more porous. Products from lavsan, nitron, polyvinyl chloride fibers have good heat-shielding properties [2]

Air permeability maintains the heat balance with the environment and removes carbon dioxide, moisture and skin secretions from the sub-area. The breathability of clothing provides the necessary ventilation of the underwear space. With inadequate ventilation, health and performance deteriorate. Porous and thick woolen, cloth, knitted fabrics have good breathability. Not bad pass air products from Dacron and chlorine. Products from dense cotton and linen fabrics, nylon and other synthetic fibers have low air permeability. Fabrics covered with various waterproof materials, as well as rubberized clothes do not have pores and, therefore, completely exclude air exchange. Such clothing protects well from wind and rain and should be used only in such cases.

A.EVAPORATION - the ability to release moisture through evaporation. Thin and smooth fabrics dry more quickly. Wool loses water more slowly than cotton fabric, therefore it cools the body less. This property is especially important to consider when sports loads in conditions of high air temperature.

B.WATER INTENSITY - the ability of a material to retain moisture. When clothes get wet, their thermal conductivity increases. The thermal conductivity of moistened woolen fabrics increases 1.6-2.2 times, and cotton ones 3-4 times, so clothes after rain or soaking then cools the body more strongly. Soaked fabric becomes less breathable. Thick underwear almost does not allow air, while knitwear has an air permeability of only 30%,

C.BIOMIMETIC TEXTILES

Biomimetics is a field which deals with development of materials which are inspired by natural phenomenon. From mimicking skin's function to enhancing skin performance, more and more materials are being developed which imitate living systems. Breathable wet suits - based on the pores of leaves, self cleaning effects based on the lotus leaf and sharkskin effect (Fig. 1) for better hydrodynamics in water are some concepts which have already been commercialized.[3]

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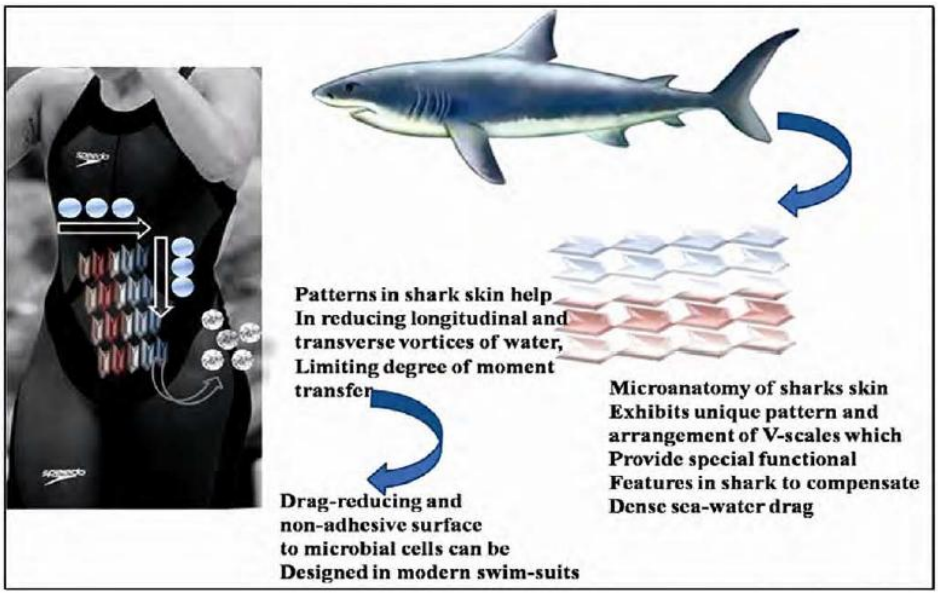

Fig. 2—Biomimetic fabric for low hydrodynamic surface drag for swimsuit inspired by shark skin[4]

Wrinkling is an important property of tissues. It reflects the degree of elasticity of the fabric, its ability to maintain the appearance after mechanical impact. Clothes made of low-crush materials retain their original appearance for a long time. The folds that form when creased not only worsen the appearance of the clothes, but also accelerate their wear, especially at the folds. During operation, the properties of materials deteriorate. This phenomenon is called wear. Resistance to wear is the ability of a material to maintain its appearance and unchanged during operation. properties, or otherwise wear resistance [5].

The main factors of wear for sports textiles include: physico-chemical action of sweat, sunlight, washing liquids, washing powders, dry cleaning, heating, etc; mechanical abrasion, fatigue from repeated deformations: sprains, collapses, bends, etc. Most often, these factors act in combination.

Currently, sportswear is widely used fabrics made of artificial fibers and synthetic materials. Synthetic fabrics are relatively cheap and have a number of valuable properties: lightness, durability, resistance to various influences. The main disadvantages of most of them are low hygroscopicity, and the ability to electrify and others.

Fabrics of lavsan, nitron in their heat-shielding properties, elasticity and appearance approach wool, but they are mildly hygroscopic. Products from nylon and nylon have high strength and elasticity. However, they poorly absorb moisture, and therefore complicate the work of sweat and sebaceous glands and can cause skin irritation. Therefore, such fabrics are not recommended for linen and other clothes that have direct contact with the body. It should be noted that the fabric of nylon, nylon and viscose well transmit ultraviolet rays.

Modern sportswear, as a rule, is made of elastic fabrics with high breathability, well absorb sweat and contribute to its rapid evaporation.

Clothing of an athlete and an athlete indoors or outdoors in the summer when the weather is warm usually consists of a tank top, underwear, and a cotton or wool knitted suit. During winter sports activities, sportswear with high heat and windproof properties is used. This is usually cotton underwear, a woolen suit or a sweater with pants, a cap. With strong wind, a windproof jacket is worn on top. Various types of sportswear made from synthetic fabrics are recommended to be used only for protection from wind, rain, snow, etc. It is unhygienic to use sportswear in everyday life.

IV. CONCLUSION

Thus, sportswear should maintain an optimal thermal balance of the body during exercise, be light, comfortable, not hamper movements, correspond in height and fullness, protect from injury and mechanical damage, and correspond to the time of year. Of great importance are the heat-shielding properties of clothing, its hygienic properties, as well as the hygienic properties of the fabrics from which it is made.

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