

# Sportswear Textiles

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## Keywords

Sportswear, Sporttech, Leisurewear, Recreation Textiles

## How to cite this article:

Rukhaya, S., Rose, N. M., Yadav, S. and Poonia, N. 2023. Sportswear Textiles. *Vigyan Varta* 4(5): 42-45

## ABSTRACT

In recent years, development in active sportswear fabrics have been progressing to perform high functions and to achieve comfort. The sportswear manufacturing textile industries not only keep their eyes on market diversification for fibrous materials but also on textile science and technology. The use of innovative textile science and technology in the manufacturing of sports and leisurewear fabrics is continuously enhancing day by day to fulfill the requirements for athletics and leisure activities for their better performance in the sports.

## INTRODUCTION

In twenty first century, clothing is an important issue for general consumer, active athletes and for those who practice sports just for fitness in their leisure time. The sports fabrics are generally ultra-breathable and have high heat and moisture management properties, light weight, fast drying and feature elasticity properties. These fabrics also have superior strength and durability. The latest sports textile materials are much more function for fulfilling specific needs in different sports activities. People are paying more attention to sports activity and seem to be prepared to spend considerable amounts of money on sportswear.

Participation in sports activities has also increased remarkably owing to health and physical fitness, due to which the market for sportswear continues to expand (Bardhan and Sule, 2014).

Textile materials are used in all sports as sportswear, and in many games as sports equipment and sports footwear. Selection of fibres or fabrics for manufacturing active sportswear is one big factor influencing performance, efficiency, ensuring protection, and physical comfort. Technological developments have led sportswear to a state of virtual insanity.

The sports textiles sector includes specialist apparel for specific sports each with its own particular functions. The performance fibres, yarns, fabrics and finishes developed for this specialist sector are increasingly transferring to the mass market in the high street. The performance requirements of many sports goods often demand widely different properties from their constituent fibres and fabrics, such as barrier to rain, snow, cold, heat and strength and at the same time these textiles must fulfill the consumer requirements of drape, comfort, fit and ease of movement (Uttam, 2012; Umbach, 2016).

## **I. PROPERTIES AND FUNCTIONS OF SPORTSWEAR TEXTILES**

1. Sportswear textiles have comfortability, easy to wear and easy handling.
2. Garments manufactured from sports textiles fabrics, keeps the normal stability of body comfort, because these fabrics are ultra-breathable. These garments are also very light in weight and feature elasticity properties, which provides immense comfort and independence of movement (Yonenaga, 2015).
3. Heat transport performances: The sports fabrics require maintaining body temperature during various sports activities. The heat transport properties of fabric make it possible for the sportsman to feel cooler in summer and warmer in winter. The fibrous material, bulk entrapped air within the fabric affects the heat transport properties of the sportswear.
4. Moisture transport performance: By changing the cross sections of the fibre and by using special chemicals; fabrics are made which have high moisture transport

properties. Such fabric keeps the body dry by keeping moisture away from body surface in vapour and/or liquid form.

5. Anti-static performances: Sportswear fabrics have a very high electrical conductivity, so they can dissipate electrical charge.
6. Antimicrobial performances: Sports fabrics keep a normal level of bacteria on the skin that offers a high level of comfort and personal hygiene, especially during athletic activities.
7. Ultraviolet protection: Sports fabrics can remove UV-A and UV-B rays that are dangerous to the skin, and guarantees an improved level of defense compared to the majority generally natural and man-made fibres (Deora, 2013; Sawhney et al., 2018).

## **II. TEXTILE MATERIAL AND FABRIC STRUCTURE FOR SPORTSWEAR**

It is not possible to achieve all required properties for sportswear in a simple structure of any single fibre. The right type of fibre should be in the right place as the behaviour of the fabric is mainly depending on its base fibres properties. The most important parameters for making a good sportswear are fibre type, weave construction, weight or thickness of the material and presence of chemical treatments (Bartels, 2019).

- **Development in polymers:** Developments in polymer introduce some special functional properties in sportswear. Phase change materials are being developed for sportswear. They contain a chemical that changes from being a liquid to a gel at around body temperature. This alters the fabric's insulation properties so that one can design clothes that keep the body at a

constant temperature no matter what happens to the air temperature. These are used in cold weather protective clothing like gloves, boots and hats. Shape memory polymers material can remember and retain its shape or return to a previous form (Kothari, 2020). A garment made from these shape memory polymers is able to sense changes in the surroundings environment and can evaluate intelligently and control its response to ensure the highest level of comfort.

- **Development in fibres:** Natural fibres were previously considered unsuitable for high performance, synthetics were the top choice. However, natural fibres are now being combined with synthetics and are given sophisticated finishing treatments to improve their performance. Some of the conventional fibres used are cotton, viscose rayon, tencel, wool polyester, polypropylene and nylon (Suleet al., 2021). Special fibres which are being used for manufacturing of sportswear textiles are Hygra, Dryarn, Killat N, Triactor, Lycra etc.
- **Developments in fabric structures:** The fabric structure is an important factor in the design of sportswear garments. Knitted fabrics are preferred for sportswear over woven fabrics as it provide unrestricted freedom of movement. For warmth and comfort in adverse conditions, textile fabrics may be brushed, bonded, padded, quilted or wadded to give lightweight volume with little excess bulk. Dense pile fabrics play a big part in sports clothing as cloths with a high pile traps air for insulation and are very absorbent (Anand, 2014). Some of the fabrics preferred for the production of sportswear textiles are multi-layer fabrics, soft-shells, naiva, field sensor etc.
- **Nanotechnology in sportswear textiles:** Multifunctional properties such as protective

properties against water, hot, cold, bacteria and unpleasant odors can be incorporated in sportswear by nanofinishing, and they are light-weight and flexible with high-impact strength. The wear comfort of sportswear is also positively affected by nanotechnology, enhancing the wearer's performance and efficiency. The athletes withstand high activity levels for a longer period of time due to the breathability of nano-sportswear. Sportswear has emerged as a fast-growing textile sector with innovative materials and the latest technologies. Sportswear is a niche market, where price is not usually a considerable factor, because the strong emphasis is on performance enhancement. With special functionality and smart technologies, sportswear is considered as power skin instead of second skin. It may reduce the muscle fatigue and improve the physical endurance while maintaining the athlete's wellbeing in the toughest climatic conditions (Yonenaga, 2015; Sawhney et al., 2018).

## CONCLUSIONS

Modern peoples are paying more attention to sports activity. The use of sports fabric is increasing day by day in various sports and leisure activities. The consumers seem to be prepared to spend considerable amounts of money on sportswear and other functional fabrics. During designing the sportswear fabrics, the aspects which are considered: protection/safety functions to protect wearers from adverse weather, comfort functions which gives wear comfort (thermal, sensorial and body movement comfort), exercise function to enhance performance of athlete, and aesthetic appeal and high fashion ability. The required functions of sportswear fabrics differ in different situations such as type of sports, environmental conditions and level of activity etc. Sportswear

can be developed by using special type of polymer, fibrous material, modifying the fibre/yarn/fabric structure, lamination, finishing technology and manufacturing technology etc. The introduction of high functionality and comfort in the sportswear fabrics provide unlimited scope for sportswear fabrics.

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