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A Comparative Study on Comfort Properties of Global & Domestic Sportswear

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ABSTRACT: *Sportswear is nowadays getting more emphasis in these days due to people consciousness towards their health and sports activities due to these Sportswear markets has grown tremendously. In global sportswear market many of key player have come with their various sportswear product & items with several comfort and application on domestic and global level. This study has been an attempt to make a comparative analysis between global and domestic sportswear brand product's comfort properties. In order to find out the reason behind global brands gaining more prestige in comparison to domestic brands. Comfort is most important factor for sportswear apparel. Comfort properties such as air permeability, water vapor permeability and wicking test has been performed to measure the comfort properties. Results reveal that international reputed sportswear have better comfort properties in comparison to domestic sportswear but domestic sportswear also have potential to compete some international sportswear in terms of comfort properties.*

KEYWORDS: Comfort properties, sportswear brand, Air permeability, Water vapor permeability, wicking test

1. INTRODUCTION:

Sportswear is a significant part of the everyday life of people. Special consideration should be given to the comfort provided by clothing when designing or purchasing sportswear. The three main reasons why people need to acquire sportswear are: to actively participate in sports; to wear sportswear as a fashion item; and to wear them in their free time and feel comfortable. Modern sportswear frequently aims to meet the demands of all three groups: it should be functional and supportive during athletic endeavors while also being stylish and adaptable for use during other leisure activities (Ziemele et. al, 2018).

As per the market demand sportswear has categorized in four groups, namely performance sportswear, basic sportswear, sports leisurewear and sports-fashion clothing. Performance sportswear is highly technical clothing with unique features that enhances performance, produced in lowest volume & topmost price, while basic sportswear is more affordable and stylish while preserving as many of the material's properties as feasible. Sports leisurewear is a replication of performance sportswear that is worn at home and offered in greater volume at fewer prices. Sportswear's wear comfort may be broken down into four primary categories: thermo-physiological comfort, skin sensory comfort, ergonomics wear comfort, and psychological comfort (Manshahia & Das, 2014).

There are several sportswear brands competing in the extremely competitive global market with various product categories with several applications viz. Nike, Adidas, Puma, Under armour, HRX Proline and Shiv-Naresh etc. For all manufacturers and consumers, especially for the sports apparel industry, comfort is one of the most important aspects (A. Havelka & Z.Kus, 2011).

Global & domestic sportswear brands

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Some of the international sportswear brands which have shown dominance at global level in terms of market capture due to their market strategies and quality competency are briefed below along with popular domestic sportswear brands.

Nike is an American multinational company that designs, develops, produces, markets, and sells footwear, apparel, equipment, accessories, and services on a global level. It was formed by Bill Bowerman and Phil Knight on January 25, 1964 (Mahdi et al., 2015).

Adidas is a renowned sportswear company that provides a broad selection of sportswear, footwear, and accessories. The brand emphasizes both style and performance, catering to various sports and activities(Mahila et al., 2021.

Puma is one of the world's largest multinational carriers of sportswear, founded in Herzogenaurach, Germany, in 1948 by Rudolf Dassler. It is dedicated to acting in a way that advances the industry by fostering innovation, sustainability, and peace and upholding the principles of being honest, fair, and creative in all choices and deeds. The four pillars of Puma's authenticity over time have been heritage, game, technological innovation, and design (Salam, n.d.).

Under Armour: The American company Under Armour is well-known for its cutting-edge sportswear and footwear, such as compression clothing and high-performance sneakers.

HRX: HRX is an Indian sportswear brand co-owned by Bollywood actor Hrithik Roshan. It offers a range of sportswear, activewear, and accessories with a focus on style, performance, and affordability.

Proline is an Indian sportswear brand that provides a selection of activewear for adults, adolescents, and kids. T-shirts, track pants, shorts, and other goods are among the many things they offer.

Shiv-Naresh Sports is one of the leading manufacturer and supplier of sportswear like tracksuits, track pants, t-shirts lowers & Sports equipment. The business is headquartered in Delhi metropolitan area in India.

Sport clothing, which is worn next to the skin, is essential for athletes' physiological comfort since it directly affects how well they perform. Physiological, skin-sensorial, and psychological comfort can all contribute to the comfort of sportswear. The functional comfort of sportswear is greatly influenced by the fabric's ability to transport moisture and dry quickly (Aduna&Santhanem, 2021). Air permeability, water vapor permeability, moisture absorbency, drying behaviour, thermal resistance and wicking ability, these all are essential properties for thermo-physiological comfort in sportswear (T Suganthi& P Senthilkuma, 2016).

Hence an attempt has been made been made to analyses and compare comfort properties among global and domestic sportswear brand product. The identity of the brand has not been disclosed in this research publication, as research is still under investigation for other properties and will be reported with due course of time.

2. RESEARCH OBJECTIVES

To compare comfort properties of global & domestic sportswear in terms of air permeability, water vapor permeability, wicking test & moisture absorbency.

3. RESEARCH METHODOLOGY

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Five sportswear including global and domestic brand have been selected for comparative study of comfort properties. In this study GSM, fabric thickness, air permeability, water vapor permeability, wicking test & moisture absorbency test have been measured and analyzed.

4. MATERIAL AND METHODS

4.1. The material specifications of five sportswear including domestic and global brands have been mentioned below:

Table 1. Specification of material:

Sample ID	Sample	Material description	Knit structure	GSM	Fabric thickness
S1	Front & back panel	100% polyester	Bird's eye knit	169.5	0.46
S2	Front panel	92% polyester/8% elastane	Mesh knit	139.8	0.38
	Back panel	100% polyester	Mesh knit	136.6	0.42
S3	Front panel	92% polyester/8% elastane	Plain jersey knit	162.6	0.44
	Back panel	100% polyester	Mesh knit	139.2	0.35
S4	Front & back panel	100% polyester	Pique knit	155.2	0.45
S5	Front & back panel	100% polyester	Bird's eye knit	183.8	0.56

4.2. Fabric properties measurement

GSM

Fabric GSM was carried out as per BS 2471:1978. Samples were laid on a flat surface for removing wrinkles without stretching. Test specimens were cut by using the GSM cutter for each sample. The specimens were weighed by electronic balance machine. Five readings were taken for all samples and average reading has been reported.

Fabric thickness

Thickness is an important parameter for comfort properties. It was carried out by fabric thickness tester as per ASTM D1777. Ten reading were taken for each sample and average reading has been reported.

Air permeability:

The air permeability of the fabric is the ability of the fabric to flow air through the fabric (Suganthi & Senthilkumar, 2017). The air permeability was measured using Prolific Inclined Tube Manometer tester as per ASTM D 737-75. Five readings were taken for all samples and average reading has been reported.

Water vapor permeability:

The water vapor permeability (WVP) was carried out by with desiccant method according to the ASTM E96. Five readings were taken for all samples and average reading has been reported.

Vertical Wicking test

Vertical wicking test was measured in accordance with BS 3424 standard. Five reading were recorded for all samples. Five readings were taken for all samples and average reading has been reported.

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Moisture absorbency (drop test)

Moisture absorbency test was measured as per standard AATCC TM79. Twenty reading were taken for all samples and average reading has been reported.

5. RESULTS AND DISCUSSION

Table 2. Comfort Properties of Sample

Sample Id	Air Permeability (m^3/m^2/min.)	WVP(g/m^2/24h)	Vertical Wicking (cm.)	Drop test (Second)
S1	790.16	885.59	10.3	1
S2 Front	876.84	788.37	6.8	7.1
S2 Back	723.48	763.62	9.6	7.5
S3 Front	900.18	728.27	1.1	>60 sec.
S3 Back	863.51	1018.17	2.5	11.1
S4	870.17	788.37	8	1.6
S5	1123.59	1000.48	1.6	17.8

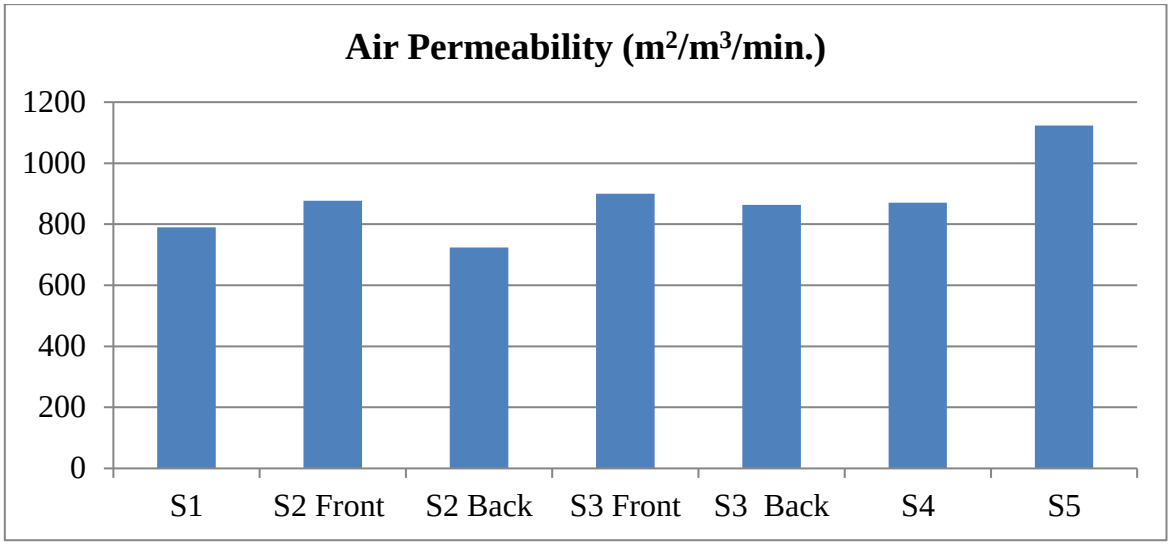

Figure 1: Air Permeability

Air permeability is most important properties for sportswear knitted fabrics. The yarn, fabric knit structure, thickness, areal density, and porosity are the key factors influencing the air permeability of knitted materials. The amount of spacing between the yarns in a fabric's structure affects how air passes through inter-yarn pores (Suganthi & Senthilkuma, 2018). Figure 1 shows that S5 have higher air permeability in comparison to all samples that is may be due to their large bird's eye size. S2 Back has lower air permeability in comparison to all samples that may be due to blend ratio in material composition.

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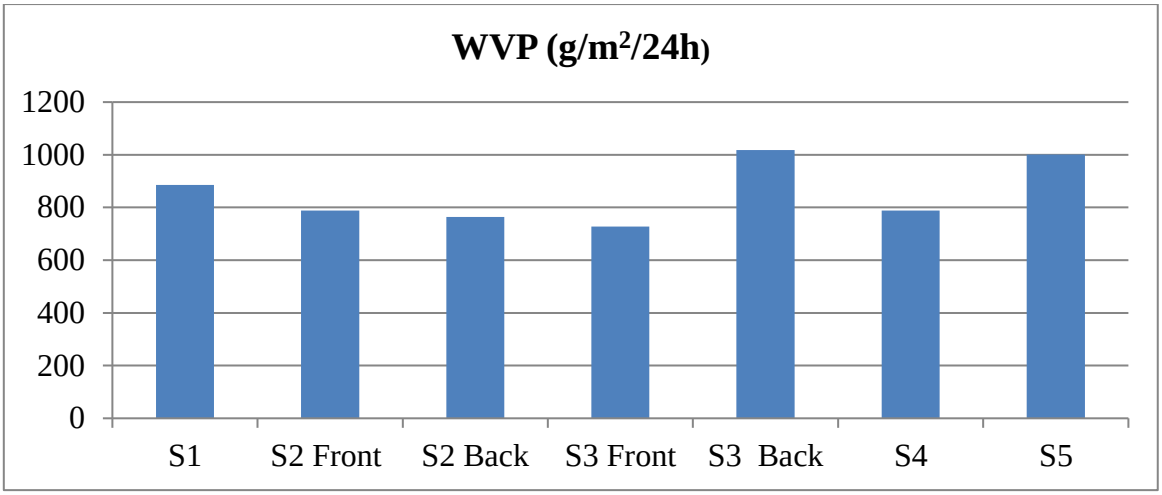

Figure 2: Water Vapor Permeability

Water vapor permeability (WVP) is ability of fabrics to transmit water vapor from one side to another side, it is affecting with degree of openness in the fabric knit structure (Tesinova and Atalie, 2022). As shown in figure 2, S3 Back have higher WVP in comparison to all other sample may be due to their mesh knit structure with more openness in comparison to all sample and S3 Front have lower WVP in comparison to all sample may be due to their single plain knit structure. S5 also exhibit higher WVP which may be due to their large bird's eye in knit structure.

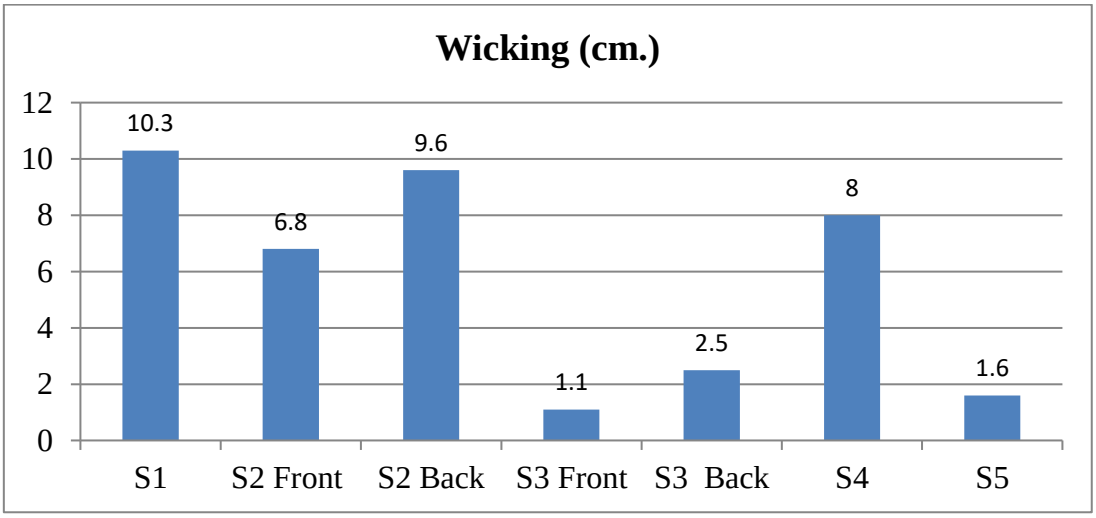

Figure 3: Wicking Test

Moisture wicking ability of fabrics depends upon diameter of yarn and surface energy of fiber. Wicking ability will rises as per space will be decreased among the yarn. A number of factor influence moisture transport in fabric including fiber type, knit structure, GSM and the presence of chemical coating (Arjun & Hayavadana, 2019). As shown in figure 3, S1 have higher wicking height in comparison to all six samples that that is may be due to their micro denier fiber in their yarn or may be due also have some moisture management treatment like quick- wicking and drying that will be increase wearer's comfort level. In S2 Front & Back, S2 Front have higher wicking height may be due to their different blend ratio. In, S3 Front & Back, S3 Back have higher wicking height in comparison to S4 that is may be due to their different blend ratio and knit structure also, because S3 Front have

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single plain knit and S3 Back have mesh knit. S4 have higher wicking height in comparison to S2 Back, S3 Front & Back and S5 may be due to their knit structure. And, S5 have low wicking height in comparison to all except S4, which may be due to less micro denier available in single yarn and also that they have not applied any moisture management treatment but higher wicking height may be that is due to knit structure.

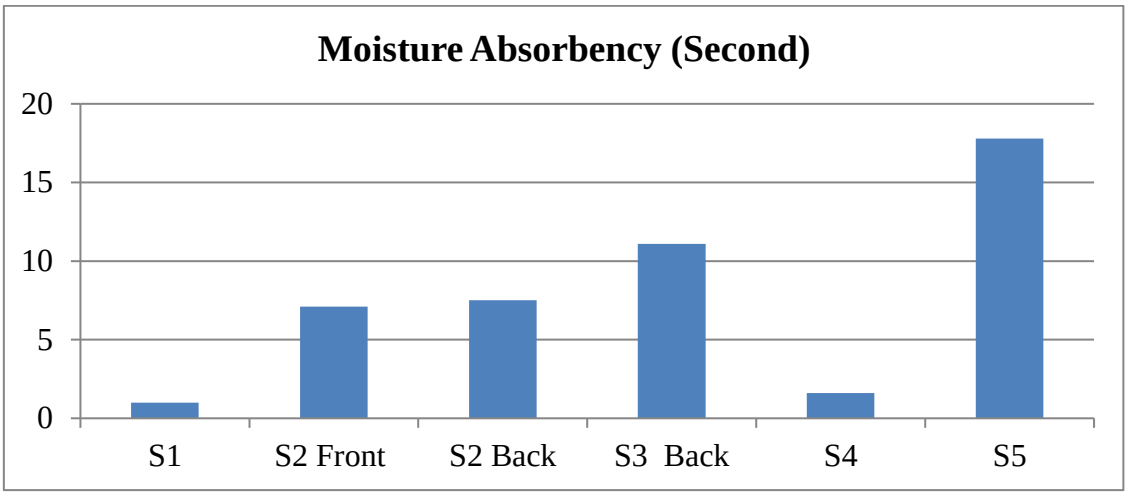

Figure 4: Moisture Absorbency

Water absorbency depends upon knit structure and type of material used in fabric. It can be also influenced by no. of micro denier used in the single yarn and chemical treatment used for finishing purpose or improving the wearer comfort (Arjun & Hayavadana, 2019). From figure 4, S1 have higher absorbency in comparison to all sample may be that is due to higher micro denier used in single yarn and also due to any finishing treatment. And after that S4 have higher moisture absorbency rate may be that is due to their knit structure. S3 Front & Back have lower moisture absorbency in comparison to S1 and S4 may be that is due to their blend ratio in material composition and also knit structure. In S3 Front & Back, S3 Front have lower moisture absorbency in comparison to all sample may be due to their knit structure; S3 Back have higher moisture absorbency in comparison to S3 Front that is may due to their knit structure. And S5 have lesser absorbency in comparison to all except S3 Front which may be due to hydrophobicity & course filament. In figure 4, S3 Front has been not mentioned because it has taken more than 60 second times in moisture absorbency test.

CONCLUSION

Sportswear must require comfort properties so that wearer feel comfortable and they able to give best performance in their career. Sportswear market is very demanding and competitive with no. of key manufacture. In this study, an attempt has been made to analyze the comfort properties of domestic and global sportswear brand in terms of comparative assessment. Results indicate that comfort properties of reputed international sportswear have better quality in comparison to domestic sportswear in terms of air permeability, wicking & moisture absorbency. However, domestic sportswear also has potential to compete other international sportswear in terms of wicking ability and moisture absorbency.

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