STUDY OF COMFORT PROPERTIES OF SOME TEXTILE PRODUCTS USED AS LADIES WRAPPER MATERIALS

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Abstract
The physical and mechanical properties of five fabric samples were studied to evaluate their comfort properties. Properties that include: fabric thickness, air permeability, abrasion resistance, tear strength, tensile, crease recovery and bending length were studied. The obtained results show that the fabrics have medium thickness and good air permeability values. The values for abrasion resistance, tear strength and tensile properties tests show that the fabrics have average to good strength values which suggest that the fabrics can be used for applications where medium to good strength is needed. The bending length of the fabrics was good and suggests that apparels from the fabrics will drape well. The crease recovery of the fabrics was poor; this implies that apparels made from them will crease badly.

Keywords: fabric comfort, air permeability, abrasion resistance, tear- strength, crease recovery and bending length.

Introduction and Literature Review
In Nigeria and some African countries, printed materials popularly known as African prints are used by ladies (and in some cases men) as apparels. These print materials popularly referred to as wrappers are produced with varying properties and prices.

The most important property of any apparel is comfort. Das *et al* (2003) described comfort as an experience caused by integration of impulses passed up the nerves from a variety of peripheral receptors like smell, smoothness, consistency and color etc in the brain. The tactile comfort is related to fabric surface and mechanical properties and determines how comfortable one feels in the apparel at different seasons of the year. Tactile comfort properties are determined by fibre type, yarn count, fabric weave, cover factor, fabric thickness among others.

The study of textile materials entails the examination of the structure and properties of the materials and their inter relations. Booth (1982) reports that textile fabrics have exceptional combination of properties covering flow of heat, moisture, durability and easy care etc which make them suitable for clothing. Clayton (1935) had reported that customers judge garments based on their comfort, physical and mechanical properties, past experience, prejudice and life style of the individual. Lord and Muhammad (1975) explained that a fabric of good quality has good crease shedding properties, comfortable and soft feel, and will conform to the body lines and will not restrain movements. Ibrahim (1988) while comparing the properties of fabrics produced from rotor and ring spun yarns observed that the tensile strength of yarns affect the durability of fabrics. Booth (1982) explained that the abrasion resistance of textile fabrics usually provides useful information as to the ability of the fabric to resist wear. It is however comparative and therefore useful for merit rating of tested samples.

The aim of this paper is to study some physical and mechanical properties of some fabric materials and relate them to tactile comfort properties

MATERIALS AND METHODS

Raw MaterialsThe following African print materials were obtained from Sabon Gari market in Zaria, Kaduna state. Nigeria:

(1) Togo Tex. (2) London Wax. 3) Cote de Voir. 4) Real Wax and 5) Super Print.
These were labeled as samples A, B, C, D and E respectively.
The equipments used include:

(1) Esdiel Thickness -Gauge. (Model H-J 024)
(2) Shirley Air-permeability Tester. (Model No X 107T)
(3) Instron Tensile Strength Tester (Model 1026)
(4) Ballistic Tensile Strength Tester (Model SY)
(5) Martindale Wear Abrasion Tester (Model 20/T/ XI)
(6) Shirley Crease Recovery Instrument (Model QT 088)
(7) Shirley stiffness Tester (Model V10)

Testing Procedure

All the tests carried out were done according to the procedure in BS Hand Book of Textiles 11: 1995. The fabric thickness was measured at $20g/cm^3$ Pressure on Esdiel thickness gauge. The Shirley Air Permeability tester was used for measuring the air permeability of the fabrics. The volume of air in cm^3 that pass per second through $1cm^2$ of fabric under head of 1cm water column is the measure of air permeability. The Martindale wear abrasion tester was used to abrade the fabrics to rupture and the percentage loss in weight determined. The tearing strength of the samples was determined on the ballistic tearing strength tester. Tensile properties of the samples were determined by cutting strips of 15cmx5cm dimension and clamping them between the jaws of the Instron and extended axially to breakage. From the plot of load-extension obtained, the stress- strain curves were constructed and the values of properties like breaking load, elongation, initial modulus, and tenacity were obtained.

The crease recovery angles in warp and weft directions were determined on the Shirley crease recovery Instrument. Strips of 5 cm x 2 cm were tested by loading with 20 Nton for 60 seconds and the time of recovery from creasing measured in seconds.

The Shirley stiffness tester was used to measure the bending length of the samples of 2.5 cm x 20 cm dimensions. The bending length was read when the angle to the horizontal was fixed at 0^0

Results

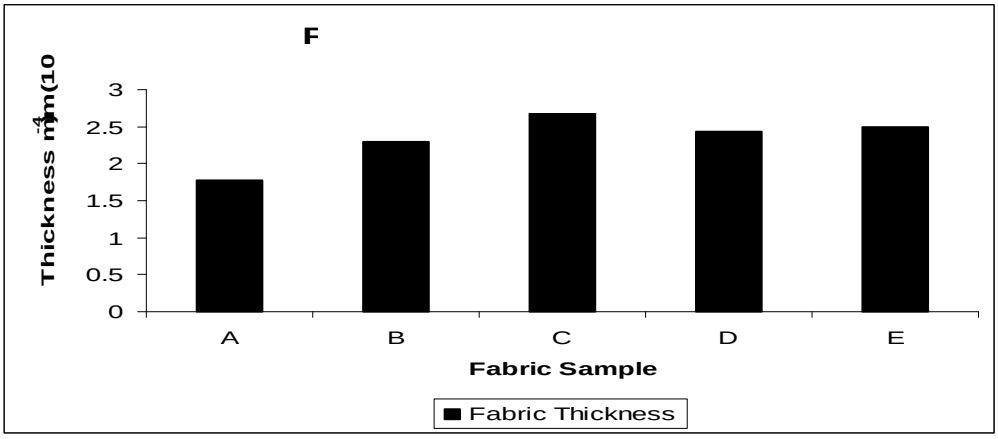

Fig.1: Fabric thickness

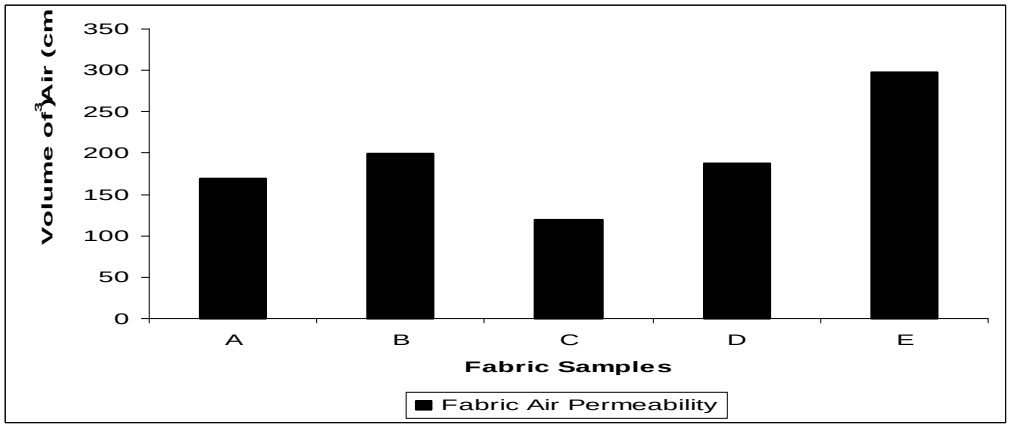

Fig. 2: Fabric air permeability

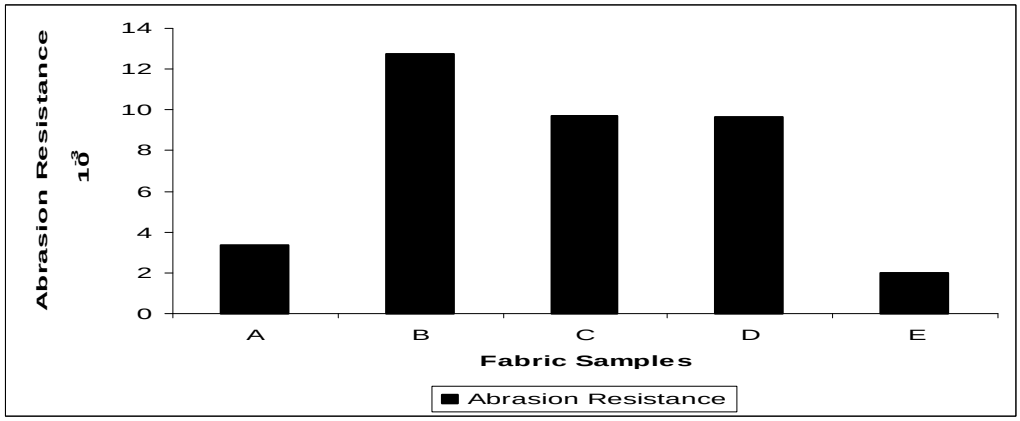

Fig. 3: Abrasion resistance

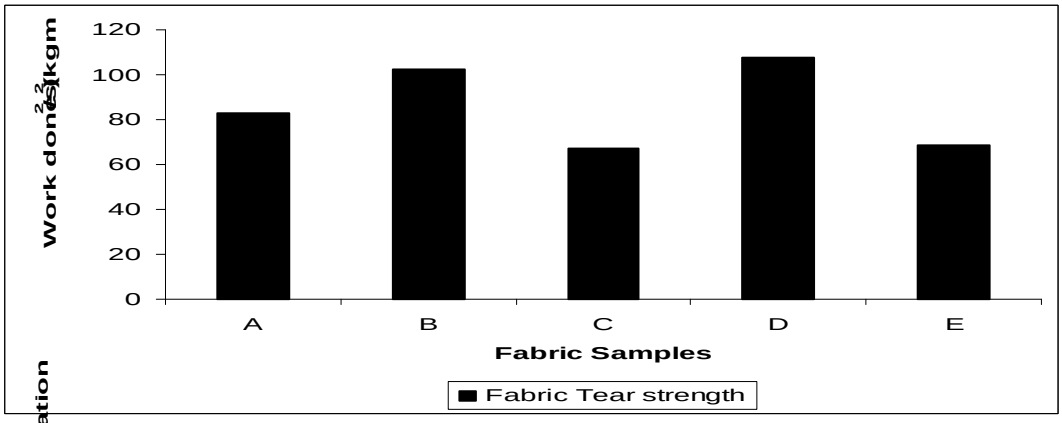

Fig. 4: Fabric tear strength

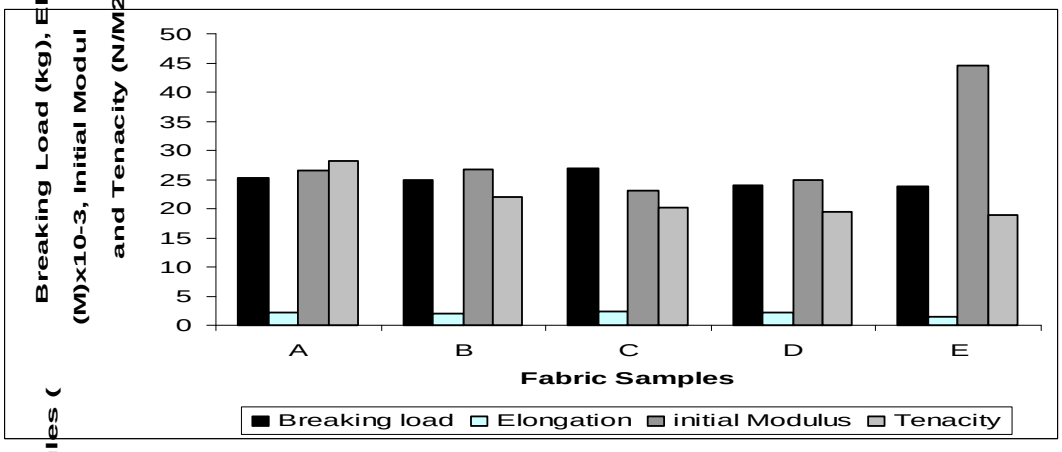

Fig. 5: Fabric tensile properties

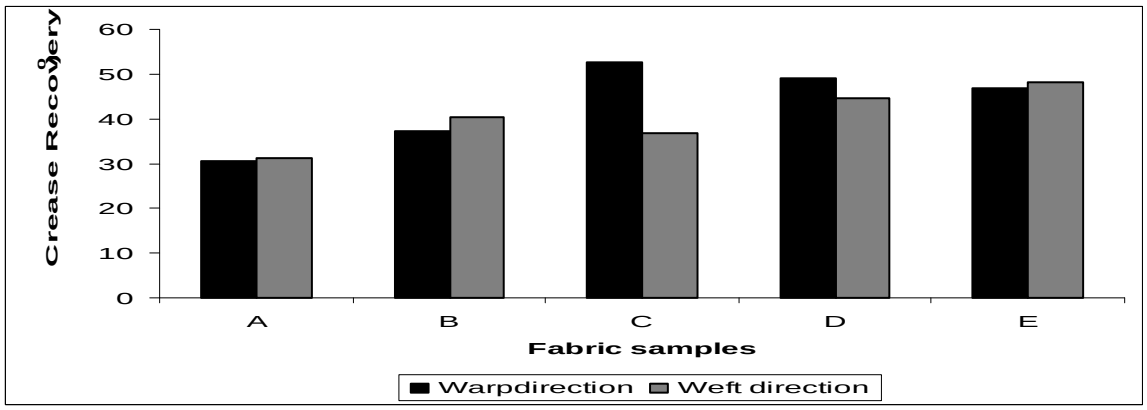

Fig. 6: Fabric crease recovery values

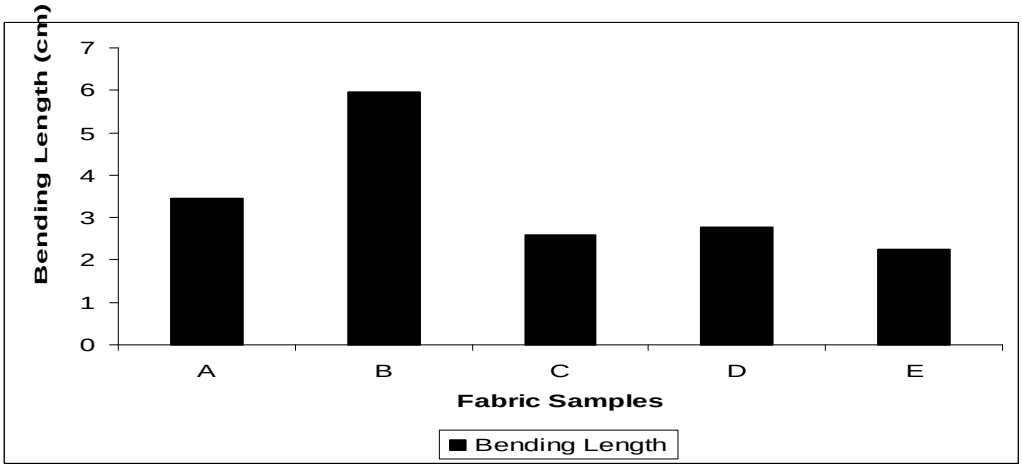

Fig. 7: Fabric bending length

Discussion

Results in Fig.1 show that Cote˙de Voir has the highest thickness value. Similarly it can be seen that the fabrics are in about the same thickness range. Fabric thickness depends on yarn count and fabric structure. The obtained values showed that the fabrics have medium thickness, which make them convenient for use in the tropics especially during the hot season because they are cotton materials.

Fig.2 shows the results of air permeability of the fabrics. Cote˙de Voir appears to have the least air permeability, while Super print has the highest value. Air permeability of fabric is influenced by yarn count, fabric structure and the type of fibre and finish. Cote˙de Voir had the highest thickness value in fig.1 showed the least value for air permeability in fig.2. This means that this fabric can be used in making apparels for fabrics during the cold season because it will provide warmth due to its high thickness and low air permeability.

Fig.3 shows that London Wax has the lowest abrasion resistance because it lost the highest amount of grams when the fabrics were abraded. Cote˙de Voir and Real Wax followed next while Togo Tex and Super print showed highest resistance to abrasion.

Fabrics London Wax and Real Wax showed highest tear strength values as shown in Fig 4. The values of the work done in tearing the fabrics can be seen to be generally good. This means the fabrics can be used for making apparels of good strength values.

The breaking loads and elongation of the fabrics is seen to be about the same as shown in Fig. 5. The initial modulus of the tested fabrics is also seen to be about the same except in the case of Super print. This can be attributed to the fabric set. The tenacity values and other tensile properties suggest that the fabrics have adequate strength values and can be used for applications where strength of moderate value is needed.

Fig.6 show high values of crease recovery angles for all the fabrics in both warp and weft directions. This is an inherent property of typical cotton fabrics and can only be overcome by crease resist finishing of the fabrics.

Fig. 7 shows the bending length of the fabrics. London Wax showed the highest value for the bending length. The values for the remaining fabrics suggest that the fabrics will bend easily, thus making them convenient for apparel manufacture because they will bend round the body curves, a property essential

Conclusion

The study of some tactile comfort properties of some fabrics used as apparels conducted showed that the fabrics have good thickness and air permeability. These properties make them comfortable because the body can breathe through and the body perspiration can be absorbed by the fabric and lost to the external environment. The abrasion resistance, tear strength and tensile properties of the fabrics showed that they can be used conveniently for apparel applications where the demand for strength is moderate. The fabrics can be seen to bend easily thus making them convenient for use as apparels because they drape easily and will feel comfortable to the body. The crease recovery of the fabrics is seen to be poor. This suggests that apparel produced from them will crease badly. The problem can however be overcome by imparting crease resist finishing on the fabrics.

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