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# Examining the Relation between the Bursting Strength Properties of the Fleece Lycra and Bamboo Lycra Knitted Fabrication.

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## ABSTRACT

The purpose of this study is to test the bursting strength of two different types of knit fabric namely fleece Lycra knit fabric and bamboo Lycra knit fabric with the help of a bursting strength and find out the mean, Arithmetic mean, standard deviation and coefficient of variation through calculation. Then the purpose of my study is to demonstrate graphically how fleece Lycra knit fabric and bamboo Lycra knit fabric differ. Lycra is entirely made of synthetic materials, which implies that every one of its parts was produced in a lab. Although a lot of the raw materials used to make the chemical in Lycra fabrics have organic beginnings by they are transformed into Lycra fabrics. Fabric that is partially synthetic is bamboo Lycra. It is made from Bamboo fibers longevity is increased by the use of Lycra, Which improves the fabric's strength. The Fleece Lycra used in this testing is a synthetic material and the Bamboo Lycra is semi-synthetic material. After providing the difference between these two fabrics through testing, the readings obtained are explained through statistical calculation and explained through a graphical presentation.

***Keywords:*** *Fleece Lycra Fabric, Bamboo Lycra Fabric, Knitted Fabrication, Bursting Strength*

## INTRODUCTION

Knitting, a method of creating knitted fabric, is the weaving together of numerous loops of yarn. Because of its unique qualities, it differs from woven fabric in that it can be constructed into smaller sections with greater flexibility, which makes it ideal for socks and caps. Customers frequently use knitted materials because of their comfort and improved strength and elasticity. Because of this, knitted fabrics are favored by people everywhere. Knitted materials aid with a variety of fitting issues in clothing because of their

stretch capacity. According to the makers, the fabric the manufacturers choose to construct clothing must also have the desired level of user comfort. There are numerous factors that affect the materials' elasticity. To guarantee the best stretchability, the elasticity of the materials must be tested for each element that could affect it.[12]

Other names for Lycra fabric are spandex and elastase. Copolymers of polyether and polyuria make up the cloth. The fabric is highly breathable and has excellent moisture-wrinkling resistance. Low heat retention capacity. The Lycra fabric is exceptionally strong and stretchable. The country in the United States where the fabric was first made. China is currently the largest exporting and producing nation. Washing was done with either warm or cold water. Underwear, socks, bras, sports bras, biking shorts, yoga trousers, hiking equipment, and motion capture suits are all frequent uses for the material. [1]

Semi-synthetic bamboo Lycra (Dr R Divya *et al.*, 2021) is a type of fabric. Natural cellulose obtained from bamboo fibers is used in its processing. Lycra offers bamboo fibers a stronger stretch strength, enhancing the fabric's longevity. Bamboo Lycra is a supple, permeable fabric created by power-looming, closed-loop viscose processing. This fabric is incredibly stretchy and strong, making it the perfect material to use for creating knitted clothing alternatives including sweatshirts, dresses, Skirts, round T-shirts, men's clothing, casual/sportswear, loungewear, and active-wear clothes. Bamboo Lycra may be used to manufacture robes and winter clothing since it is densely packed and gentle to the touch. Additionally, it mixes well with hemp and cotton. Bamboo fabric, if properly cared for, may last at least a. [2]

Bursting strength is a prominent factor that can affect a fabric's elasticity and general strength. The manufacturers need to understand that in order to provide the best quality products to the customers, they need to analyze the bursting strength of the fabrics they are using for their products. The bursting strength of knitted fabrics is the minimum force required to break the fabric. Whenever a fabric is subjected to an extreme force or pressure from the vertical direction it is called bursting strength. The force that is required to rupture the fabric in this scenario is called bursting strength. The producers can assess the fabric's ability to extend under bursting pressure by measuring the bursting strength.[3]

## MATERIALS AND METHODS

### Bursting Strength Tester

Figure - 1

The sample fabric is laid flat on the bursting tester plate and it is fixed tightly by the wheel on top. The machine is switched on and when the fabric bursts the machine is switched off and the reading is noted. Subtract the tare pressure needed to inflate the diaphragm from the total pressure needed to rupture each specimen to determine its bursting pressure. Report the average pressure reading for each laboratory sampling unit, the lot, and each individual specimen.

### GSM balance/GSM tester

This apparatus is used to calculate the grams per square meter (gsm) of paper and paperboard. Grams per Square Meter, or GSM, is one of the most fundamental tests. The weight of a sample measuring 1 square meter is referred to as the "grammage" as well [11].

## RESULT AND DISCUSSION

The materials used in this study are one bursting strength tester, the second fabrics samples and the third digital GSM balance/GSM tester these three are the equipment needed to test the bursting strength of the fabrics. Knitted fabrication is used in this study. Two types of knit fabrics are used here: fleece Lycra knit fabric and bamboo Lycra knit fabric. The study aims to find out the bursting strength of these two fabric types. A bursting strength tester is used to determine the bursting strength. Ten different readings of ten different samples of two types of fabric were recorded and then the mean value (x) was calculated by adding up the ten sample readings obtained from the ten samples to find out the mean value (x). The arithmetic mean is found by dividing $\bar{x}$ by ten using the formula $\frac{x}{n}$. To find the arithmetic mean ($\bar{x}$). To find the $(x-\bar{x})^2$ the sample value is taken as the arithmetic mean of $\bar{x}$ as $(x-\bar{x})$. After that find the squares of $(x-\bar{x})$ and ten summaries to see $(x-\bar{x})^2$. In order to see the standard deviations, the value obtained by adding ten sums of squares i.e.; $(x-\bar{x})^2$ is found using the formula $\sigma = \frac{\sqrt{\sum(x-\bar{x})2}}{n-1}$. The coefficient of variation is also

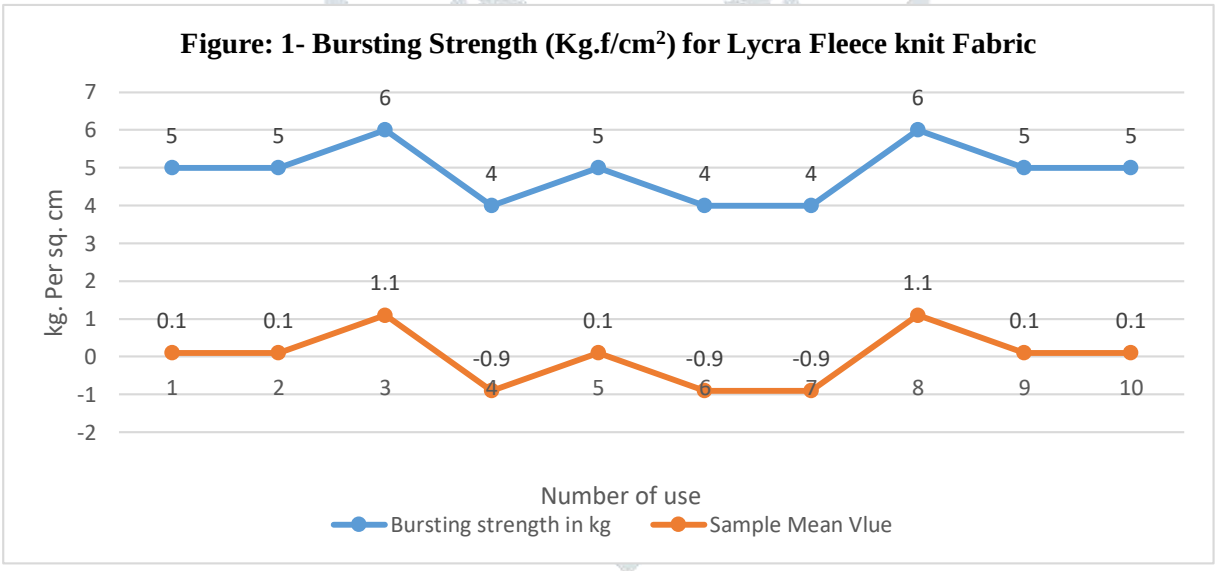
found using the formula $\frac{S.D}{\bar{x}} \times 100$ to find the coefficient of variation. The bursting strength percentage of the fabric is specified in the pie chart (Dong Kyu Lee *et at.*, 2015).

## BURSTING STRENGTH TESTING

**Table – 1** analyzes the bursting strength of the given Fleece Lycra Knitted Fabrics

| Sl. No | Fleece Lycra Fabric in Kg | $(x-\bar{x})$ | $(x-\bar{x})^2$ |
|---|---|---|---|
| 1 | 5 Kg | 0.1 | 0.01 |
| 2 | 5 Kg | 0.1 | 0.01 |
| 3 | 6 Kg | 1.1 | 1.21 |
| 4 | 4 Kg | -0.9 | -0.81 |
| 5 | 5 Kg | 0.1 | 0.01 |
| 6 | 4 Kg | -0.9 | -0.81 |
| 7 | 4 Kg | -0.9 | -0.81 |
| 8 | 6 Kg | 1.1 | 1.21 |
| 9 | 5 Kg | 0.1 | 0.01 |
| 10 | 5 Kg | 0.1 | 0.01 |

**Figure: 1- Bursting Strength (Kg.f/cm$^2$) for Lycra Fleece knit Fabric**




## Calculation

x = 125

$\bar{x} = \frac{125}{10} = 12.5$

$\sigma = \frac{\sqrt{\sum(x-\bar{x})2}}{n-1} = \frac{3}{9} = 0.192$

$C\,V = \frac{S.D}{\bar{x}} \times 100 = \frac{0.192}{12.5} \times 100 = 1.536$

Thus, the mean value (x) of Fleece Lycra Knit Fabric is 125. The average value ($\bar{x}$) is 12.5. The standard deviation was calculated to be 0.192. The coefficient of variation is 1.536.

**Table – 2** analyzes the bursting strength of the given Bamboo Lycra Knitted Fabrics.

| Sl. No | Bamboo Lycra Fabric in Kg | $(x-\bar{x})$ | $(x-\bar{x})^2$ |
|---|---|---|---|
| 1 | 9 Kg | 1.11 | 1.2321 |
| 2 | 8 Kg | 0.98 | 0.9604 |
| 3 | 8 Kg | 0.98 | 0.9604 |
| 4 | 9 Kg | 1.11 | 1.2321 |
| 5 | 9 Kg | 1.11 | 1.2321 |
| 6 | 8 Kg | 0.98 | 0.9604 |
| 7 | 7 Kg | 0.86 | 0.7396 |
| 8 | 7 Kg | 0.86 | 0.7396 |
| 9 | 8 Kg | 0.98 | 0.9604 |
| 10 | 8 Kg | 0.98 | 0.9604 |

**Calculation**

x = 81

$\bar{x} = \frac{81}{10} = 8.1$

$\sigma = \frac{\sqrt{\sum(x-\bar{x})2}}{n-1} = \frac{9.9775}{9} = 1.108$

$C\,V = \frac{S.D}{\bar{X}} \times 100 = \frac{1.108}{8.1} \times 100 = 13.679$

Thus, the mean value (x) of Bamboo Lycra Knit Fabric is 81. The average value ($\bar{x}$) is 8.1. The standard deviation was calculated to be 1.108. The coefficient of variation is 13.679.

**Figure: 2- Bursting Strength (Kg.f/cm$^2$) for Bamboo Lycra Knit Fabric**

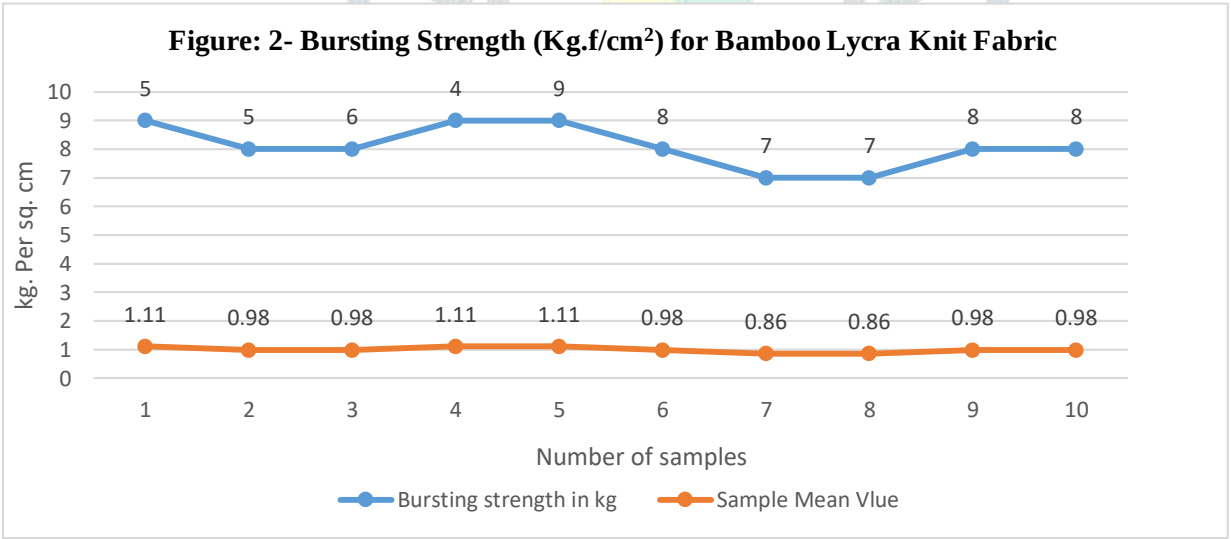


**Table -3** The Fleece Lycra knit fabric bursting strength percentage is 88%.

| S. No | Calculation Chart | Calculation Values |
|---|---|---|
| 1 | Busting Strength | 12.5 |
| 3 | Standard deviation | 0.192 |
| 4 | Coefficient of variation | 1.536 |

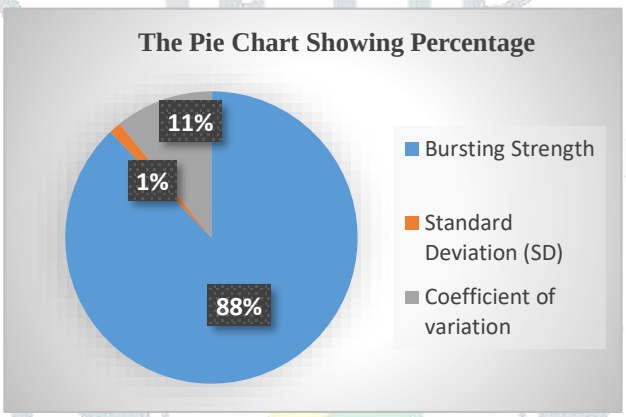



Figure-3

Thus, the coefficient of variation of the fleece Lycra knit fabric was calculated at 11% and the standard deviation was 1%, so the bursting strength of the fleece Lycra knit fabric was determined to be 88% out of 100%.

**Table-4** The Bamboo Lycra knit fabric busting strength Percentage is 60%.

| S. No | Calculation Chart | Calculation Values |
|---|---|---|
| 1 | Busting Strength | 8.1 |
| 2 | Standard deviation | 1.108 |
| 3 | Coefficient of variation | 13.679 |

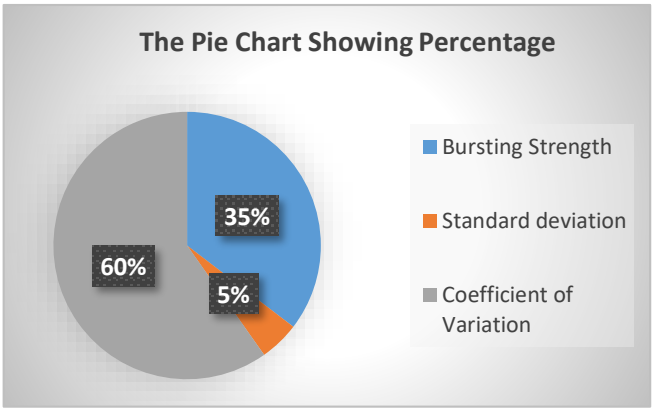



Figure-4

Thus, the coefficient of variation of bamboo Lycra knit fabric is 60% and the standard deviation is 5%, while the bursting strength of Bamboo Lycra knit fabric is 35%.

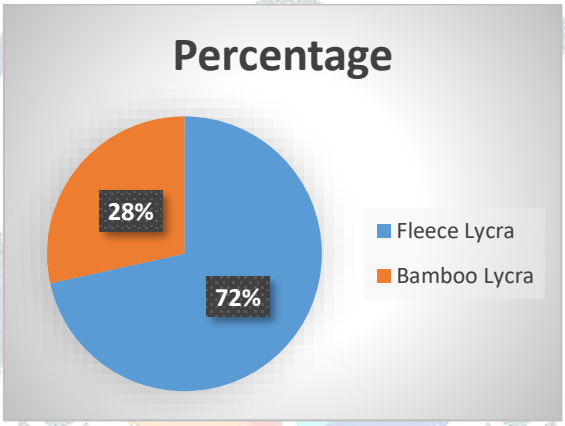



Figure-5

Thus, the Busting strength of fleece Lycra knit fabric percentage is 88% and the bamboo Lycra knit fabric percentage is 35%.

## CONCLUSION

The coefficient of variation of the fleece Lycra knit fabric was calculated at 11% and the standard deviation was 1%, so the bursting strength of the fleece Lycra knit fabric was determined to be 88% out of 100%, And the coefficient of variation of bamboo Lycra knit fabric is 60% and the standard deviation is 5%, while the bursting strength of Bamboo Lycra knit fabric is 35%. Lycra knit fabric has more bursting strength in this fleece than bamboo Lycra Knit Fabric. In a comparative study bamboo Lycra knit fabric has higher mortality and fleece Lycra knit fabric has higher bursting strength.

Thus, the bursting strength test, fleece Lycra knit fabric has more bursting properties and it has been clarified through calculation and also explained through rating. Fleece Lycra knit fabric is more difficult to burst than bamboo Lycra knit fabric.

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