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An Investigation of Bursting Strength on Single Jersey Weft Knitted Fabrics

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Abstract
This paper investigates the bursting strength performance of single jersey weft knitted fabrics. The objective of the study is to find out the impact of the yarn count ,stitch length , stitch density, fabric thickness, loop shape factor, tightness factor ,GSM and porosity on the bursting strength of the single jersey weft knitted fabric. The experimental results have been statistically evaluated with Analysis ofVariance (ANOVA) test , Results show thatstitch length , stitch density, fabric thickness, loop shape factor, tightness factor ,GSM and porosity areeffective on bursting strength and individual ANOVA test results show that stitch density , fabric thickness , tightness factor , GSM and porosity are Individually effective on bursting strength .the GSM parameter of the fabric is fundamental for bursting strength , the correlation relation and R square values of GSM with bursting strength found to be in order 0.839& 0.9438.
Keywords: Bursting Strength , GSM , Porosity , Loop Shape Factor , Loop Length ,Weft Knitted Fabric.

I. 1.Introduction

In textile industry knitted fabric plays a major role for making inner wear goods which wearable next to the skin ,mainly reason behind used of the knitted fabric for inner garments due to highly comfort. For getting high performance knitted goods has been expanded by changing the raw materials , loop length ,course & wales ,GSM machine gauge &designs etc.The performance of the fabric depends on the bursting strength , tensile strength ,tearing strength , air permeability etc.Çoruh [1] studied changes in the mechanical properties of weft knits as a function of the structure and density and relationships between the hand, knit structure and density. the quality of fabric production was maintained according to specific constraints and objectives without producing the comfort properties desired. Statistical analysis indicates that are significant for the air permeability, bursting strength and water vapour permeability of the fabrics.El-Tarfawy [2] investigated the failure behaviourof different samples withdifferent percentage of polyester/ lycra single jersey knitted fabric. Tensile and bursting strength were measured , adding Lycra loaded the loop with un-balance forces and unevendistribution of stresses in the wale and course directions. Tensile, bursting strength and Young’s modulus gave highcoefficient of correlation with lycra percentage.Uyanik [3] studied the bursting strength properties of the knitted fabrics on the basis of splice types. The obtained yarns by splicing in different splicer in the knitted fabric, the tests of structural properties and bursting strength were applied for the fabric samples. The results unexpectedly indicate that splice types do not have effect on the bursting strength of the knitted fabrics in spite of the results showing splice types clearly affect yarn strength. But, fiber types are effective on the bursting strength as expected. Besides, fabric structural properties do not have effect on the bursting strength because of constant knitting parameters.Sitotaw [4]investigated the dependency of bursting strengths on knit structures.Badr et al. [5]studied four different blends of cotton and Modal yarns (100% cotton, 50/50% Cotton / Modal, 70/30% Modal / Cotton and 100% Modal) were produced on the same knitting machine with different yarn input tension ranging from 2 CN to 14 CN. All the produced fabrics were half bleached and dyed under identical dyeing conditions and two different finishing methods. The dimensional properties, physical properties, some mechanical properties and shrinkage weremeasured for the produced fabrics.Khanamet al. [6] investigated the relationship between bursting strength, pilling, extension, and residual extension with GSM. Furthermore, from grey to dyed stage, a visible change in GSM occurred and the influence of GSM in different physical properties also appeared significantly. A strong relationship of bursting strength, extension, and residual extension with GSM change of 100% cotton single jersey fabric was found.With the change of fabric condition, i.e., grey and dyed stage fabric, the physical properties shows significant changes in terms of characteristics Bursting strength, extension, and residual extension was decreased from grey to dyed stage. Kan [7] studied the effect of bursting strength of knitted fabrics in relation to ultraviolet protection. Differentknitting structures which included single jerseys such as plain, pineapple, lacoste and other combinations of different knitting stitches of knit, tuck and miss as well as double-jersey fabrics of half Milano, full Milano, half cardigan, full cardigan, 1 × 1 rib and interlock. Experimental results shown that comparing different structures, the change in bursting strength with ultraviolet protection factor found to be significant.Eltahan [8] investigated the physical, dimensional, and mechanical properties of back plaited cotton/spandex single jersey knitted fabrics , the results are compared with knitted fabrics made from 100% cotton and the effect of spandex percentage. the loop length increases, the wales density was not affected and specific fabric hand and extension increased, but bursting strength and fabric recovery decreased. The presence of Lycra in single jersey knitted fabric increases of course density, fabric thickness, and knitted fabric recovery, while fabric width, fabric porosity, and extension were decreased.El-Hady [9] Investigated the approach is to determine the structural parameters and the ratio of Elastane affecting the bursting strength property of various knitted fabrics (Jersey, Rib 2×2, Interlock, and Lock nit warp knitted) constructions. The obtained results showed that Elastane proportion inside fabric has an incidence on fabric bursting strength property. Değirmenciet al. [10] investigated the impact of the raw material, count of yarn, pattern and elastomeric yarn ratio on the performance and physical properties of theplain, pique, double-pique and fleecy patterned knitted fabrics. Used raw material varies as polyester and cotton. Elastomeric yarn ratioof the samples differ between 5-10 %. To compare the performances, air permeability, bursting strength, pilling, dimensional change andskewness of the sample knitted fabrics are measured. To compare the physical properties, fabric unit weight, thickness, porosity, loopshape factor, wale per cm and course per cm are evaluated. The experimental results have been statistically evaluated with Analysis ofVariance (ANOVA) method by using Design Expert 6.06 package programme ,the results showed that raw material and yarn count areeffective on bursting strength, yarn count is mostly effective on air permeability. Kundu et al. [11]studied the effects of yarn count, loop length, course per inch (CPI), wales per inch (WPI), and fabric counts on spirality of five single jersey knitted fabric of different yarn counts. Six hypotheses were developed to test the relations of 100% cotton and untreated fabrics.Industrial method was used to measure spirality, and loop length. All the statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS) software. Collected data were analyzed by statistical means, t-test analysis, and Analysis of Variance (ANOVA). Significant correlations were found for yarn count, course per inch (CPI), wales per inch (WPI), and fabric counts to the spirality, but no significance found between the loop length and the spirality.Hassan et al. [12] investigated the effect of various finishes on pilling, mass per unit area, bursting strength, and wicking behaviour of the polyester weft-knitted jersey fabric. 100% spun polyester weft-knitted plain jersey fabric was exposed to different finish treatments to checked physical and comfort properties of the fabric like mass per unit area, pilling behaviour, bursting strength, and wicking properties of the weft-knitted jersey fabric. Finishes are applied on fabric ,The resultant fabric was characterized by random tumble pilling tester, bursting strength tester, and wicking tester to analyse their pilling grade, bursting strength,and wicking behaviour respectively. Asignificant increase has been found in wicking behaviour, mass per unit area, and bursting strength of the fabric after finishing treatments. Moreover, the wicking finish shows the highestreduction in pilling grade from 3.5 to 2.5. Significant improvement has been observed in bursting strength by all finish's treatment. However, wicking finish treatment results in the highest increase in bursting strength of 4.2%.Khatun et al. [13] investigated different rib fabric structures effect on the fabricproperties such as Stitch length, Stitch density, GSM, Bursting strength, Tightness factor and Spirality. The result of the tests are tabulated & graphically represented with respect to particular fabric properties. Wales per inch, Course per inch, Loop length, GSM, Spirality,Tightness factor, Burstingstrength of fabric were tested. According to test result, Wales per inch, Course per inch, GSM of 2×2Rib were higher than the 1×1 Rib and 2×1 Rib for both 30/2 Ne and 34/2 Ne. In addition WPI, CPI i.e. stitch density of 34/2 Ne is higher than 30/2 Ne but GSM of 34/2 Ne is lower than 30/2 Ne for different fabric structures.Islam [14] studied on the burstingstrength of various derivatives of single jersey knit fabric in both grey and finished state. Derivatives of single jersey knit fabrics are found by using tuck and miss loops in corporate with knit loops in wales direction. Higher presence of tuck and miss loops in wales direction affect the bursting strength. it was observed that bursting strength decreases with the increasing of tuck (single pique, double pique, single lacoste, double lacoste) and miss loops (Single cross miss, double cross miss) than all knitloop containing fabric (plain single jersey). It is also observed that the bursting strength decrement of tuck loop containing fabric is higher than miss loop containing fabric as well as the lacoste&locknit fabrics have higher bursting strength than the pique & cross miss fabric.El-Tarfawy [15] studied the effect of the loop length, yarn count, and raw material on yarn pulling force and specific fabric bursting strength are studied. It is concluded that yarn pulling force has a significant relation with specific fabric bursting strength.Hossain et al. [16] studied the different parameters of the weft knitted fabrics like stitch length, yarn count, course and wales per unit length, GSM and porosity are considered to know their influence on the bursting strength. As, bursting strength is important for weft knitted fabrics due to its dimensional properties, shrinkage percentage is also drawn in attention. eliminate the less important parameters which have no significant relation to the bursting strength of the weft knitted fabrics. The results supports that, the bursting strength of the fabric is dependent on stitch density, stitch length and shrinkage percentage of the weft knitted fabrics. It also supports that it depends on all of these three parameters more than that of their separate impact. Ciobanu et al. [17] studied the mechanical properties of weft knitted sandwich fabrics (bursting strength) and the effect of the raw materials used. Two types of fabrics, with and without reinforcing yarns, were analysed. the influence of the raw material type, a combination of three structure variants were obtained by changing the position in the structure architecture of two types of raw material: Kevlar® and linen yarns. Each of these variants was studied at three levels of density, given by the position of the quality cam, in order to determine the influence of this parameter. Tests were organised in two stages: the first concerned the bursting behaviour of single layer fabrics, and the second considered the study of more layers of sandwich fabrics with different orientation. Akter et al. [18] reported the effects of stitch length on different properties of plain single jersey fabric. Fabric properties can be changed due to use of various counts of yarn, type (ring, rotor, and compact), quality, stitch length, structural geometry, fiber composition, etc. With an increase in stitch length, the properties like Courses Per Inch (CPI), Wales Per Inch (WPI), GSM and stitch density will be decreased when the remaining other parameters are constant. Again shrinkage and spirality will be increased and bursting strength decreased with the increased stitch length. Pilling and abrasion resistance show lower grading when stitch length increases.Marsha et al. [19] studied compared two structural (fabric thickness and fabric weight) and four performance (air permeability, bursting strength, dimensional stability and horizontal wicking) attributes of cotton and cotton/polyester blend t-shirts before and after wash. Air permeability and horizontal wicking add to the comfort; bursting strength relates to durability and dimensional stability to care. The blended t-shirt had significantly higher air permeability and bursting strength than the cotton t-shirt in unwashed form. For dimensional stability the only difference was detected in the neck opening. T-shirts differed significantly in their washed and unwashed forms for structural attributes and horizontal wicking. Kejkar et al. [20] reviewedbased on an investigation related to comfort properties of single layered and double layered weft knitted structures. The main objective is understand the influence of fabric parameters such as stitch length, stitch density, type of stitch, type of yarn, structure of a knitted fabric on the mechanical properties and comfort level of knitted fabric. As all these parameters act as a useful tool for active sportswear to handle the moisture.Rashed et al. [21] stuided on the bursting strength of various derivatives of single jersey knit fabric. Derivatives of single jersey knit fabrics are found by using tuck loops in corporate with knit loops in Wales and course direction. Higher presence of tuck in Wales and course direction affect the bursting strength. From the total analysis it was observed that bursting strength decreases with the increasing of tuck loops in same Wales or course than all knit loop containing fabric (plain single jersey). Bursting strength don't depend on increase or decrease percentage of tuck loops, it depend on how many loops are in same Wales or course. Bursting strength increase and decrease also depend on how many Wales or course used in any design repeat.Badr et al. [22] studied the knitted fabric samples were manufactured with eight different yarns withtwo fabric types (single jersey and single jersey with Lycra). 30/1-Ne yarns from natural and regenerated cellulosic fibers: 50% Tencel-LF/50% cotton, 67% Tencel-LF/33% cotton, 67% Tencel-STD/33% cotton, 70% bamboo/30% cotton, 100% bamboo, 100% Modal, 100% Micro-Modal and 100% cotton were employed. Then, all the produced fabrics were subjected to five cycles laundering and then flat dried. The results show that 67% Tencel-LF/33% cotton has more flexural rigidity and withdrawing handle force than 67% Tencel-STD/33% cotton fabric, while 67% Tencel-STD/33% cotton has a merit of durability during bursting test. Blending Egyptian cotton fibers with bamboo and Tencel as in 70/30% bamboo/cotton and 50/50% Tencel-LF/cotton improve UPF of the produced fabric.Sitotaw et al. [23] Investigated the tensile properties such as tensile strength which is measured as breaking force in Newton (N) and elongation percent (%) atbreak of single jersey and 1×1 rib (knitted with full needles) knitted fabrics made from 100% cotton and cotton/Lycra yarns (5% Lycra yarn content in 95% combed cotton yarn). The sample fabrics are conditioned for 24 hours at 20 ± 1∘C temperature and 65 ± 2% relative humidity before testing. Ten specimens (five for lengthwise and five for widthwise) have been taken from each of the two knitted structures, those made from 100% cotton and cotton/Lycra (at 95/5 percent ratio blend) yarns.the tensile properties of single jersey and 1×1 rib knitted fabrics made from 100% cotton and cotton/Lycra yarns are significantly different from each other and both of the knitted fabricshave high elongation percent at break with cotton/Lycra blend yarns as compared to 100% cotton yarn. Knitted fabrics made from cotton/Lycra blended yarn have low breaking force and high elongation percent at break relative to knitted fabrics made from100% cotton yarns.Ünal et al. [24] studied the effects of yarn parameters, on the bursting strength of the plain knitted fabrics were examined with the help of artificial neural networks. In order to obtain yarns having different properties such as tenacity, elongation, unevenness, the yarns were produced from six different types of cotton. In addition to cotton type, yarns were produced in four different counts having three different twist coefficients. Artificial neural network (ANN) was used to analyze the bursting strength of the plain knitted fabrics. As independent variables, yarn properties such as tenacity, elongation, unevenness, count, twists per inch together with the fabric property number of wales and courses per cm were chosen. After the best neural network for predicting the bursting strength of the plain knitted fabrics was obtained, statistical analysis of the obtained neural network was performed. Satisfactory results for the prediction of the bursting strength of the plain knitted fabrics were gained.Eltahan et al. [25] studied the estimated equations to calculate theknitted loop length for open to normal structure and for normal to compact structure are developed. By comparing the value of the loop length predicted from this work with the other mentioned models, it was found that the calculated values are very near to the L value of the case study; so thedeveloped equations are acceptable. The tightness factor and the porosity of single jersey fabrics were also calculated theoretically.Ireen et al. [26] studied the comparison of physical properties among various grey and finished single jersey weft knitted fabrics which will be helpful to know for efficient production, taking corrective actions to minimize changes of basic physical properties and produce quality knit products.Değirmenci et al. [27] studied a series of plain knitted fabrics were produced on a circular knitting machine with cotton, polyester, acrylic and viscose by Ne 30/1 yarns. Each fabric type was produced with four different stitch lengths. All the fabrics were knitted at the same machine setting in order to determine the effect of their structure on the fabric properties. Their geometrical and physical properties were experimentally investigated. The influences of the loop length and the raw material on the number of the courses per cm, number of the wales per cm, loop shape factor, thickness, fabric unit weight, tightness factor, air permeability and bursting strength are analyzed. Statistical analysis indicates that raw material and loop length significantly parameters affect the air permeability and the bursting strength properties of the fabrics.chowdhary et al. [28] studied the compared bursting strength and extension of seventeen knitted fabrics (jersey, interlock and pique) in several fiber contents. thirteen hypotheses were developed for jersey, interlock and pique knits. One-way Analysis of Variance (ANOVA), correlation coefficient, regression analysis and t-tests were executed using IBM SPSS program to test the hypotheses at 95% confidence level. Several significant differences were found by knit structure and fiber content. The results provided empirical data on bursting strength and extension for knitted fabrics and filled void using the newest standard.Megeid et al. [29] studied the effect stitch length, yarn count, and needle size on the penetration force which indicates the fabric sewability. Some physical and mechanicalproperties of these fabrics were also tested. From the results concluded that the sewability (which is indicated by penetration force) of 100% cotton single jersey fabric is inversely proportional to its stitch length. In the same time the fabric with coarser yarn count gives the higher penetration force. the fabrics with coarser yarn counts and shorter stitch length have better functional performance characteristics.

II. Materials And Methods

2.1 Materials

In this study six yarns with different specifications shown in the table-1are used to produce eighteen single jersey weft knitted fabrics with different machine gauge ,yarn count, raw material, loop length and stitch density . The fabrics investigated are knitted on a circular UNITEX weft knitting machine. The fabric fundamental characteristics are given in table-2.It is calculated the tightness factor [25] of the single jersey knitted fabric using the following 18 no. equation.

Table 1. Yarns specifications

Sample	Raw material	Count
1	100 % Cotton	40/1 s
2	100 % Cotton	34/1 s
3	100 % Cotton	32/1 s
4	100 % Cotton	50/1 s
5	50 % Cotton / 50% Bamboo	40/1 s
6	100% Lycra	20 d

Table 2. Fabrics specifications

Sample	Fibre type	Yarn count	Machine gauge	Loop length (mm)	Course /cm	Wale/cm	Fabric thickness (mm)	Loop shape factor cpcm/wpcm	Fabric tightness factor	Fabric GSM (gm/m2)
1	100% Cotton	40/1	26	2.53	20.5	12.6	0.423	1.63	1.23	100
2	100% Cotton	40/1	26	2.48	21.3	13.4	0.425	1.59	1.30	105
3	50% Cotton /50% Bamboo	40/1	26	2.53	20.1	12.8	0.393	1.57	1.22	100
4	50% Cotton /50% Bamboo	40/1	26	2.48	21.2	13.6	0.396	1.56	1.31	105
5	100% Cotton	40/1	24	2.52	19.9	15.0	0.396	1.33	1.33	105

6	100% Cotton	40/1	24	2.47	20.7	15.7	0.401	1.32	1.40	110
7	100% Cotton	40/1	28	2.48	22.1	12.6	0.445	1.75	1.29	100
8	100% Cotton	40/1	28	2.42	22.8	13.4	0.447	1.71	1.37	105
9	100% Cotton	34/1	28	2.59	18.9	12.6	0.446	1.50	1.28	115
10	100% Cotton	34/1	28	2.54	19.7	13.4	0.449	1.47	1.37	120
11	100% Cotton	34/1	26	2.61	19.7	11.8	0.455	1.67	1.27	115
12	100% Cotton	34/1	26	2.65	20.5	12.6	0.459	1.62	1.36	120
13	100% Cotton	34/1	24	2.65	22.1	11.0	0.555	2.00	1.33	120
14	100% Cotton	34/1	24	2.61	22.8	11.8	0.562	1.93	1.41	125
15	100% Cotton	32/1	28	2.61	18.1	12.6	0.461	1.44	1.30	115
16	100% Cotton	32/1	28	2.55	13.4	18.9	0.467	0.71	1.42	120
17	100% Cotton (94%)/ 20 d lycra (6%)	50/1 s , 20/1 d	28	2.41	31.5	15.8	0.569	2.00	3.55	155
18	100% Cotton (94.5%)/ 20 d lycra (5.5%)	50/1 s , 20/1 d	28	2.46	30.7	15.6	0.561	1.97	3.46	150

2.2 Methods

In this study , all experimental workhave done by ASTM standard methods. The all methods and the corresponding units are given in table -3 .

Table 3. Standard text methods used

Sl.no.	Parameters	Standard used	Unit
1	Yarn count	ASTM D2260-96	Ne
2	GSM	ASTM D3776	g /m2
3	Stitch length	-	mm
4	Fabric texture	ASTM D8007-15	per cm
5	Stitch density	ASTM D3887-2008	per cm2
6	Fabric thickness	ASTM D1777-2011	mm
7	Bursting strength	ASTM D 3786-01	Kpa

III. Results and Discussion

3.1 Experimental Results

The experimental results have been statistically evaluated by using Analysis of Variance (ANOVA) with F values of the significance level of = 0.05,We evaluated the results based on the F ratio and the probability of the F-ratio (prob>F).The lower the probability of the F-ratio, it is the stronger the contribution of the variation and the more significant the variable.

The experimental results in this experiment are tabulated in table-4. It is calculated the porosity % [25] of the single jersey knitted fabric using the following 20 no. equation.Table-5 summarizes the statistical significance analysis for all the data obtained and In this ANOVA analyses the dependent variable is Bursting strength and the Independent variables are Stitch length, stitch density, fabric thickness, loop shape factor, fabric tightness factor ,GSM and porosity. the correlation co-efficient among the variables are shown in the table-6.

Table-7 summarizes the individual statistical significance analysis for all the data obtained and In this ANOVA analyses the dependent variable is Bursting strength and the individual Independent variables are Stitch length, stitch density, fabric thickness, loop shape factor, fabric tightness factor ,GSM and porosity.

Table 4. Structural properties of weftknitted fabrics

Sl. No	Stitch length (mm)	Stitch density (per cm2)	Fabric thickness (mm)	Loop shape factor cpcm/wpcm	Fabric tightness factor	GSM	Porosity %	Bursting strength (Kpa)	
								Mean	Sd
1	2.53	258.3	0.423	1.63	1.23	100	65.34	705	41
2	2.48	285.4	0.425	1.59	1.30	105	62.63	720	38
3	2.53	257.3	0.393	1.57	1.22	100	62.84	526	23
4	2.48	288.3	0.396	1.56	1.31	105	59.49	548	26
5	2.52	298.5	0.396	1.33	1.33	105	57.38	632	35
6	2.47	325.0	0.401	1.32	1.40	110	55.09	667	38
7	2.48	277.8	0.445	1.75	1.29	100	65.26	677	40
8	2.42	305.7	0.447	1.71	1.37	105	62.87	696	36
9	2.59	238.1	0.446	1.50	1.28	115	63.50	780	35
10	2.54	263.6	0.449	1.47	1.37	120	60.63	804	29
11	2.61	232.5	0.455	1.67	1.27	115	64.79	633	54
12	2.65	257.9	0.459	1.62	1.36	120	60.70	667	40
13	2.65	243.0	0.555	2.00	1.33	120	69.38	657	34
14	2.61	269.6	0.562	1.93	1.41	125	66.95	677	33
15	2.61	228.2	0.461	1.44	1.30	115	63.77	775	44
16	2.55	253.1	0.467	0.71	1.42	120	61.25	799	38
17	2.41	496.1	0.569	2.00	3.55	155	77.80	1065	52
18	2.46	479.1	0.561	1.97	3.46	150	77.81	987	64

Table 5. Statistical analysis of test results

Fabric properties		Stitch length (mm)	Stitch density (per cm2)	Fabric thickness (mm)	Loop shape factor cpcm/wpcm	Fabric tightness factor	GSM	Porosity %
Bursting strength (Kpa)	F-VALUE	7.88						
	P-VALUE	0.0021						
	R SQUARE	0.8465						

From table-5 the results implies that the values of "prob> F" less than 0.0500 indicate the bursting strength termissignificant. The exact per cent chance that here is a true relationship between dependent variable (Bursting strength) and Independent variables (Stitch length, stitch density, fabric thickness, loop shape factor, fabric tightness factor ,GSM and porosity)are 99.79 %.

Table 6. Correlation co-efficient among variables

	Stitch length (mm)	Stitch density (per cm2)	Fabric thickness (mm)	Loop shape factor cpcm/wpcm	Fabric tightness factor	GSM	Porosity %	Bursting strength (Kpa)
Stitch length (mm)	1	-0.686	0.124	-0.066	-0.479	-0.096	-0.169	-0.334
Stitch density (per cm2)	-0.686	1	0.480	0.407	0.947	0.735	0.658	0.724
Fabric thickness (mm)	0.124	0.480	1	0.585	0.650	0.832	0.833	0.641
Loop shape factor cpcm/wpcm	-0.066	0.407	0.585	1	0.435	0.377	0.688	0.193
Fabric tightness factor	-0.479	0.947	0.650	0.435	1	0.881	0.811	0.836
GSM	-0.096	0.735	0.832	0.377	0.881	1	0.764	0.839
Porosity %	-0.169	0.658	0.833	0.688	0.811	0.764	1	0.704

Bursting strength (Kpa)	-0.334	0.724	0.641	0.193	0.836	0.839	0.704	1

According to the table-6 found there are positive correlation between stitch density: bursting strength, fabric thickness : bursting strength, loop shape factor : bursting strength ,tightness factor : bursting strength ,GSM : bursting strength and porosity: bursting strength except only loop length : bursting strength.

Thus, as the value stitch density of the fabric increases, bursting strength of the fabric increases 72 percent. As the value fabric thickness increases, bursting strength of the fabric increases 64 percent. As the value of loop shape factor increases, bursting strength of the fabric increases 19 percent. As the value of tightness factor increases, bursting strength of the fabric increases 84percent. As the value of weight of the fabric increases, bursting strength of the fabric increases 84 percent. As the value of porosity rises, bursting strength of the fabric rises 70 percent. . Finally, there as the value of stitch length increases , bursting strength of the fabric 33 percent decreases. Therefore, changes in tightness factor and GSM gave the highest effect on bursting strength of the fabrics.

Fabric properties		Stitch length (mm)	Stitch density (per cm2)	Fabric thickness (mm)	Loop shape factor cpcm/wpcm	Fabric tightness factor	GSM	Porosity %
Bursting strength (Kpa)	F-VALUE	2.01	17.58	11.16	0.62	37.25	268.57	15.69
	P-VALUE	0.1759	0.0007	0.0042	0.4424	0	0	0.0011
	R SQUARE	0.1114	0.5235	0.4109	0.0373	0.6995	0.9438	0.4951

Table 7. Individual statistical analysis of test results

From table-7 the results implies that the bursting strength values of "prob> F" less than 0.0500 found are some cases ; bursting strength : stitch density , bursting strength : fabric thickness , bursting strength : tightness factor , bursting strength : GSM and bursting strength : porosity.

Only bursting strength values of "F>prob " greater than 0.0500 found bursting strength : stitch length case which is not significant.

The exact percent chance that here is a true relationship between Bursting strength and GSM are 100 % and found maximum R square value 0.9438 among the results.

3.2 Graphical Representation

3.2.1 Stitch Length vs Bursting Strength

From figure -1 the increasing loop length of the weft knitted fabric shown decreased the bursting strength of the fabric.this is because the lower the occupied area by the yarn , higher the resistance by the fabric.

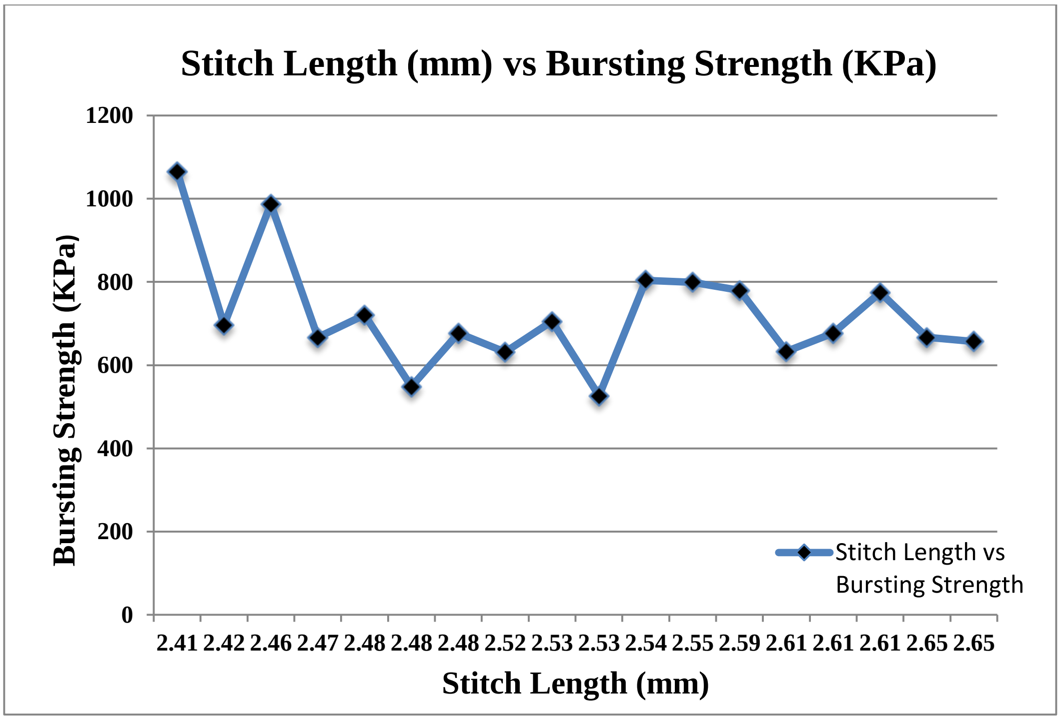

Figure -1 : Effect of bursting strength with stitch length

3.2.2 Stitch Density vs Bursting Strength

From figure -2 the increasing stitch density of the weft knitted fabric shown increased the bursting strength of the fabric.this is because the higher the occupied by loop (i.e courses and wales per unit area)that increased the area space which increased resistance of the fabric .

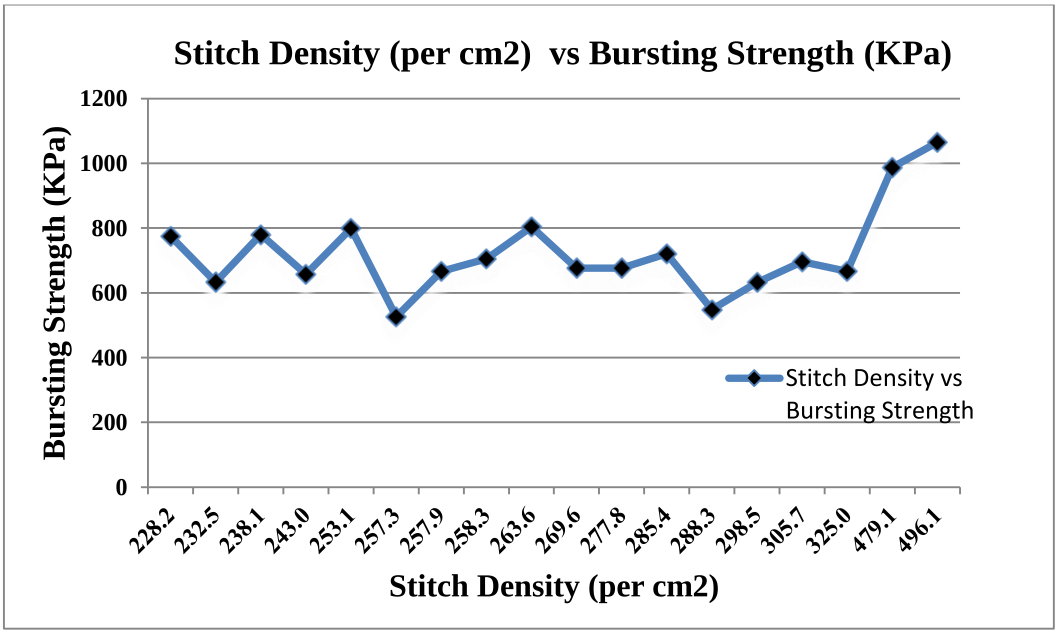

Figure -2 : Effect of bursting strength with stitch density

3.2.3Fabric Thickness vsBursting Strength

From figure -3 the increasing fabric thickness of the weft knitted fabric shown increased the bursting strength of the fabric.this is because the higher the thickness of the fabric that increased the capacity resistance of the fabric .

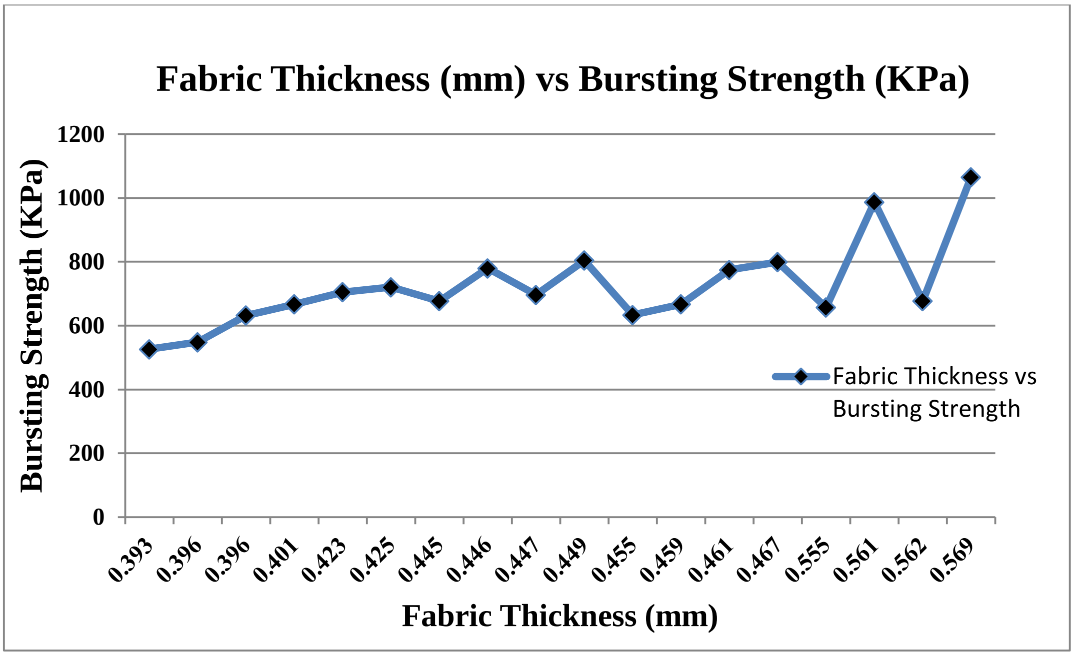

Figure -3 : Effect of bursting strength with fabric thickness

3.2.4 Fabric Loop Shape Factor vs Bursting Strength

From figure -4 the increasing fabric loop shape factor of the weft knitted fabric represents the uncertainty bursting strength value of the fabric.this is because the loop shape factor is just a ratio of cpcm and wpcm which determinethe skewness of the fabric over mechanical properties.

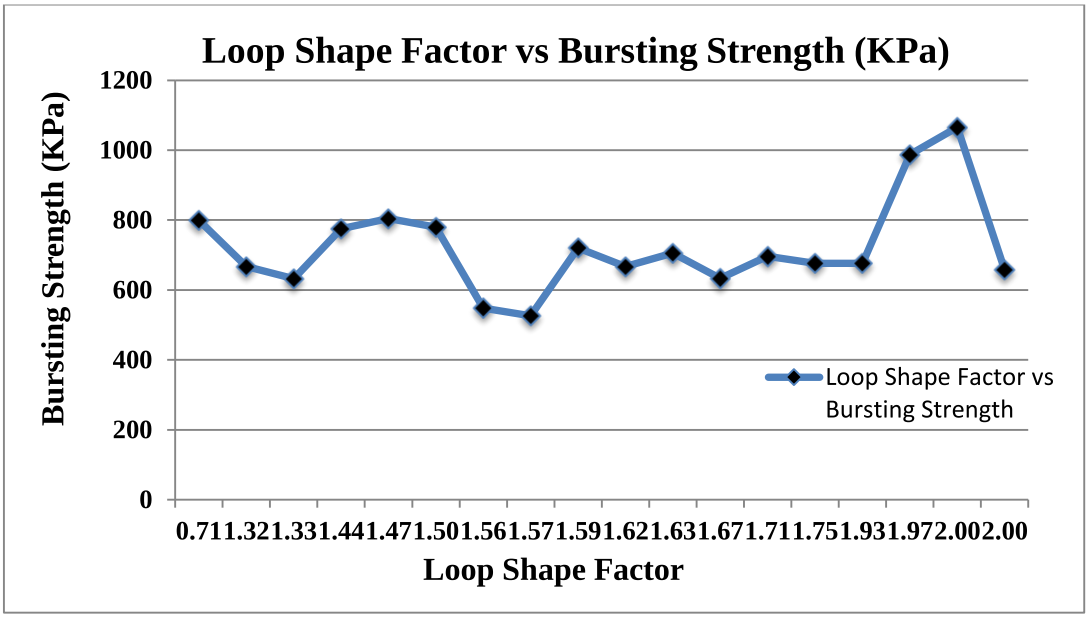

Figure -4 : Effect of bursting strength with fabric loop shape factor

3.2.5 FabricTightness Factor vs Bursting Strength

From figure -5 the increasing fabric tightness factor of the weft knitted fabric represents the increased bursting strength value of the fabric.this is because the more tightness the loops are could be resistance the bursting force over looseness loops of the fabric.

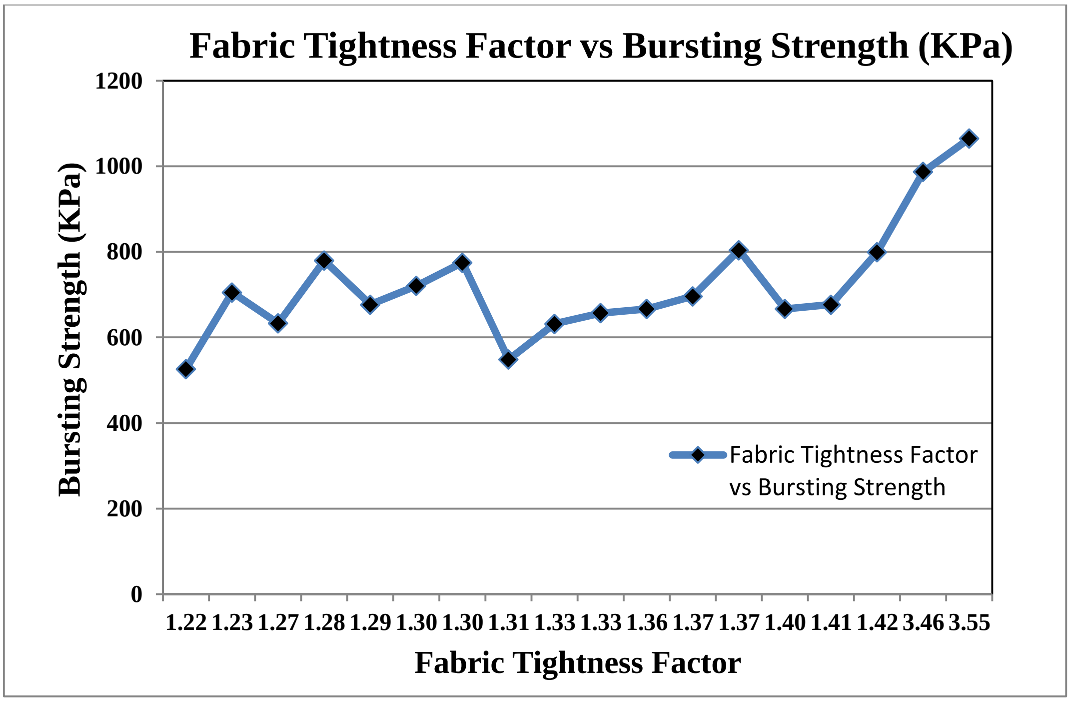

Figure -5 : Effect of bursting strength with fabric tightness factor

3.2.6 FabricGSMvsBursting Strength

From figure -6 the increasing fabric GSM of the weft knitted fabric represents the increased bursting strength value of the fabric.this is because the higher the areal density resistance morebursting force.

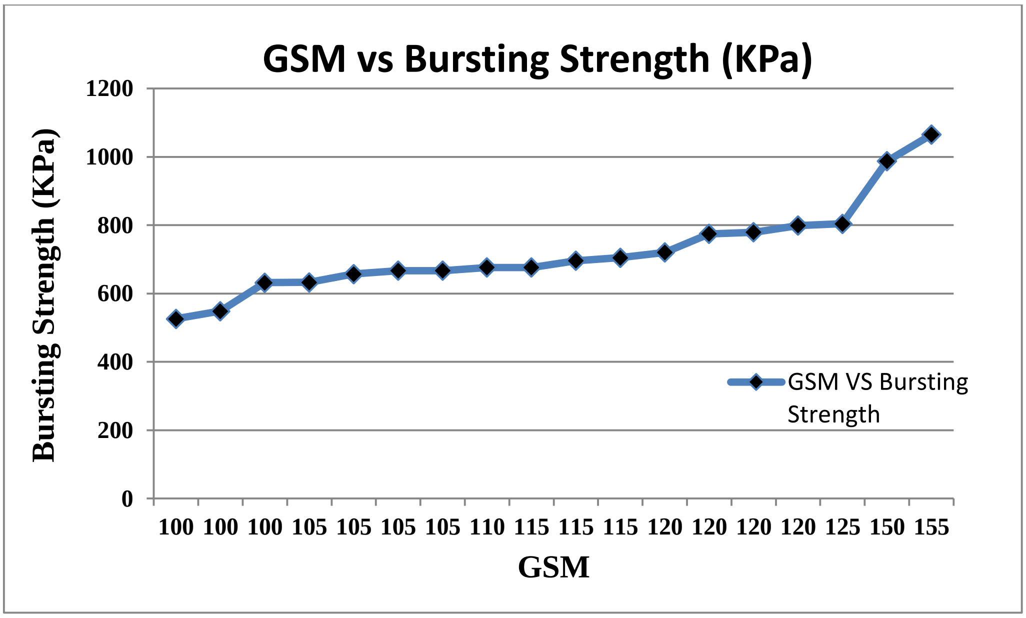

Figure -6 : Effect of bursting strength with fabric GSM

3.2.7 Fabric Porosity % vsBursting Strength

From figure -7 the increasing fabric porosity % of the weft knitted fabric represents the no significant change of bursting strength value but abruptlyincreased bursting strength of the fabric.this is because the higher the pore size lower the resistance of bursting force.

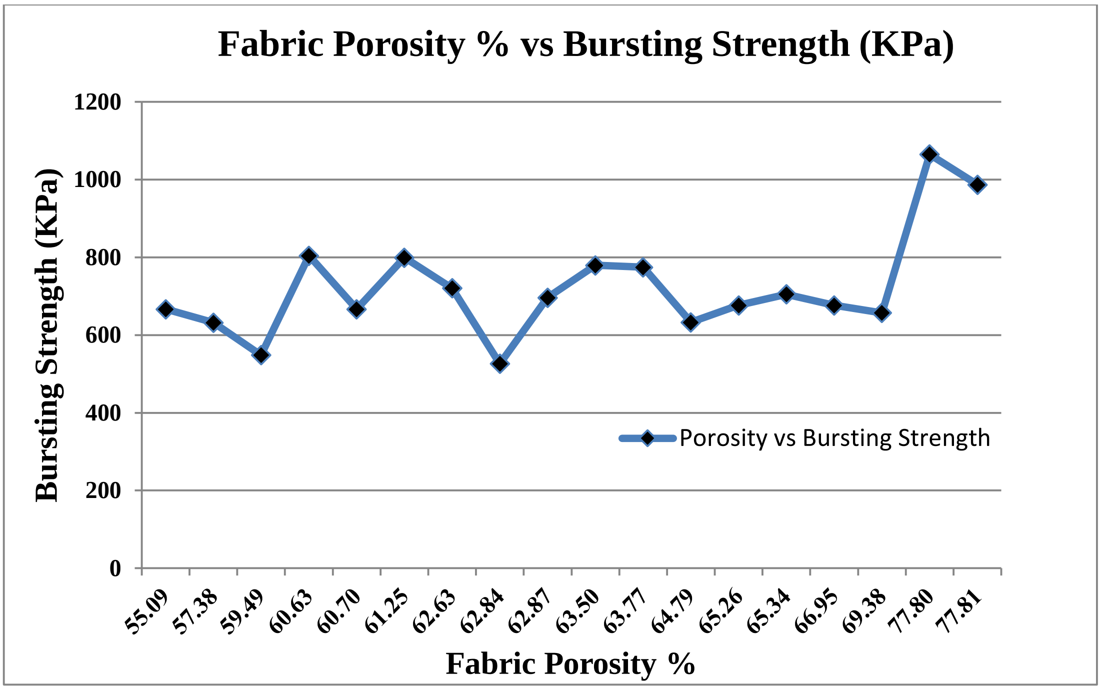

Figure -7 : Effect of bursting strength with fabric porosity %

IV. Conclusion

From the results and discussion , the following can be conducted :

(1) For the same GSM , machine gauge ,yarn count and loop length of 100% cotton and 50% cotton+50% bamboo weft knitted fabric shown great difference effect on bursting strength.
(2) Produced of 100% cotton weft knitted fabric is more stiffer than 50% cotton+50% bamboo weft knitted fabric.
(3) 94 % cotton + 6% lycra & 94.5% cotton + 5.5% lycra weft knitted fabric given great effect on bursting strength.
(4) The ANOVA test shown thatsignificant value and true relationship between Bursting strength with other variables are 99.79 %.
(5) The correlation indicated a strong relationship between bursting strength of weft knitted fabric and fabric GSM.higher the GSM of the fabric higher the tightness of the fabric simultaneously higher the resistance of that fabric.
(6) The negative correlation indicated between bursting strength of weft knitted fabric and loop length of the fabric .higher the loop length of the fabric lower the bursting strength of the fabric. If the loop length increases results the number of loops are decreases per unit area , that's why the resultant bursting strength decreases.
(7) The individual ANOVA test are shown significant value with bursting strength :GSM ,Bursting strength : tightness factor , Bursting strength : stitch density , Bursting strength : fabric thickness and Bursting strength : porosity %.
(8) Graph indicated that the increasing loop length resulted decreased the bursting strength of the weft knitted fabric, other hand the increasing stitch density, fabricthickness and GSM resulted simultaneously increased the bursting strength of the weft knitted fabric.
(9) after a certain value archived the tightness factor resulted the abrupt changed of bursting strength of the weft knitted fabric.
(10) the increasing porosity % resulted not a significant change of the bursting strength of weft knitted fabric.

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