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Analysis the Effect of Cool Pigment Colorant on Different Knitted Fabric

Israt Zebin Ansari
Department Of Textile Engineering, Southeast University, Bangladesh
Corresponding Author: Israt Zebin Ansari

Abstract: *Now-a-days garments dyeing is not new but a very popular concept and that the reason I conduct the research. Many dyes and colors are used to dye garments and cool pigment dye is one of them. In this research work three different types of knitted fabrics (fleece, terry & single jersey) are used of different GSM, cool pigment color applied within a very short time and after that different tests are carried out to find out the effects of cool pigment color on chemical and physical properties of mentioned knitted fabrics sample. Overall results I found is within the limit and satisfactory. So, I must say Cool pigment dye/color can be applied on the garment or fabric surface to get an uneven pale shade fancy look.*

Keywords- *Dyeing, Cool pigment dye, Fleece, Terry, Single jersey, Knitted fabric.*

I. INTRODUCTION

Dyeing is a process of coloration of textile fabric by using some required dyes & chemical according to the specified shade, color & order. Dyeing is the aqueous application of dyes on textile substrate [1]. Dyes can be absorbed or adhere on to the substrate in solution form through covalent bond or complexes with salts or metals by chemical retention or physical adsorption. Dyes are of different types & applied to different fabrics like natural or synthetic in different methods [2]. Garment dyeing procedure has seemingly proliferated itself in dyeing and finishing in recent years. Necessities of quicker fashion changes, reduction in final cost of production and a better aesthetic of dyed garment have enhanced the need for garment dyeing. Benefits of processing articles by garment dyeing procedure revolve around quick response and inventory control [3, 4]. Pigment dyeing is not really "dyeing" in its truest form because the pigments stick on the fabric with the help of binders [5]. Pigments are small insoluble particles which have little or no affinity for fibres and thus for direct penetration it has to be bonded to fabric by special treatments. There are synthetic organic and some inorganic pigments which are used for coloration of textile products, usually in the form of pigment dispersions [6].

Now-a-days, faded textile products have become very popular among the young customers all over the world [7]. For this reason, textile manufacturers are trying to develop numerous techniques to improve the visual out look of the sewn garments [8]. The aim of the research work is to find out the tremendous effect of cool pigment dye (which is very fastest way to dye any fabric in medium and pale shades) in different kinds of knitted fabric.

II. Material And Methodology

2.1 Fabric: In this research three types of fabric samples are used;

Fabric type	Fabric construction	GSM
Fleece	80% cotton, 20% lycra	330
Terry	70% cotton, 30% spandex	290
Single jersey	100% cotton	170

2.2 Chemicals: Pigment colorant, binder.

2.3 Machine: a. Dyeing machine (Capacity: 150 kg, RPM: 34-35 rpm, Company: Tonello, Made in Italy)
b. Tumble dryer (Company: HAS group, Made in Italy)
c. Hydroextractor (Company: Aziz metal, made in Bangladesh)

2.4 Methodology:

- Fill water –MLR-1:5 at room temperature
- Add pigment color
- Add binder and run for 2 min
- Load garments and run for 10 min
- Hydro extract for 1 min
- Unload and tumble without temp for 5 min
- Tumble dry at 120’C for 60 min or till dry

- Tumble without temp for 5 min
- Unload
- Inspection

2.5 Testing methods:

The following tests are done to know the effect of cool Pigment dye on the chemical and physical properties of fleece, terry and single jersey-

1. Changes in GSM (EN ISO 536)
2. Color fastness to washing (EN ISO 105 C06 A2S/C2S): 1994
3. Color fastness to Perspiration (EN ISO 105 E04 2013)
4. Color fastness to saliva (Chinese Standard GB/T-18886)
5. Color fastness to water (EN ISO 105 E01-2013)
6. Color Fastness to rubbing (EN ISO 105X 12)
7. Dimensional stability to wash {EN ISO 3759 (6330)-2011}

III. Results And Discussion

3.1 Changes in GSM

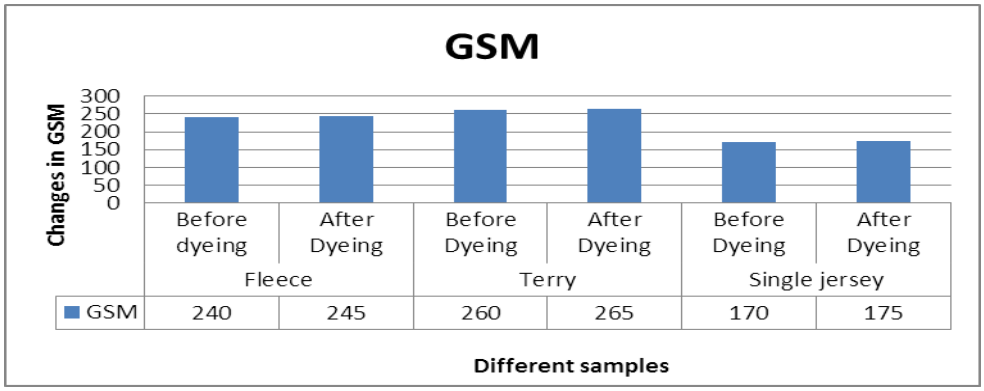

Fig.1 Changes in GSM on different samples

Fig.1 shows that GSM (Gram per Square meter) is increased after dyeing in all samples. Dyeing with cool pigment is a wet treatment and because of it, shrinkage occurs and GSM increases. All the samples (fleece, terry, single jersey) show the same manner in this respect.

3.2 Color fastness to washing

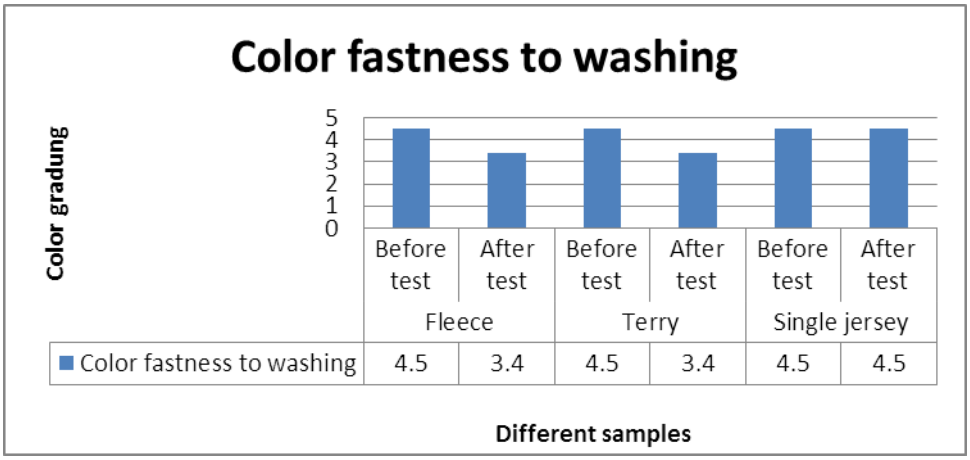

Fig.2 Changes in color fastness to washing of different samples

Fig.2 indicates the changes in color fastness to washing of different samples dyed with cool pigment dye. Single jersey sample remains unchanged after washing but color grading value slightly changed for fleece and terry samples.

3.3 Color fastness to Perspiration

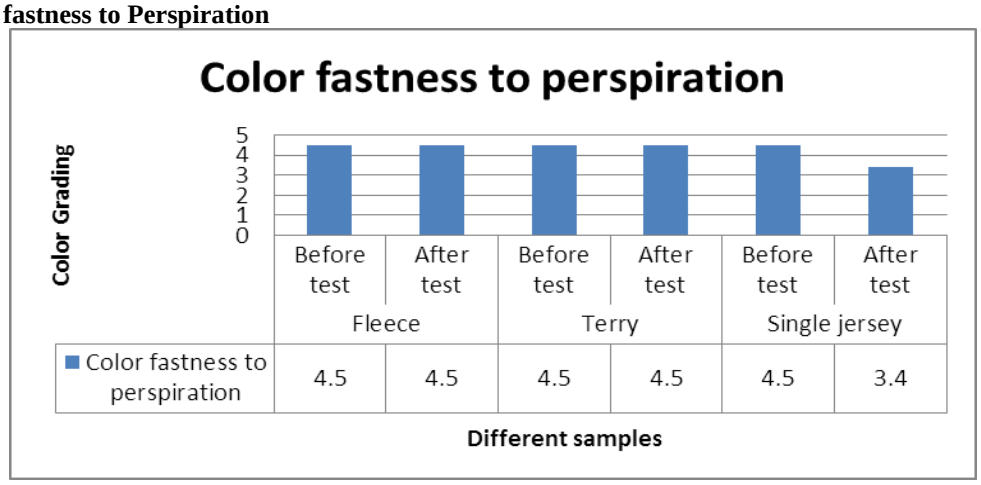

Fig.3 Changes in color fastness to perspiration of different samples

After test results of Color fastness to perspiration is unchanged in case of fleece and terry fabric but color grading reduce to 3-4 in single jersey sample. Overall result of color fastness to perspiration is satisfactory.

3.4 Color fastness to saliva

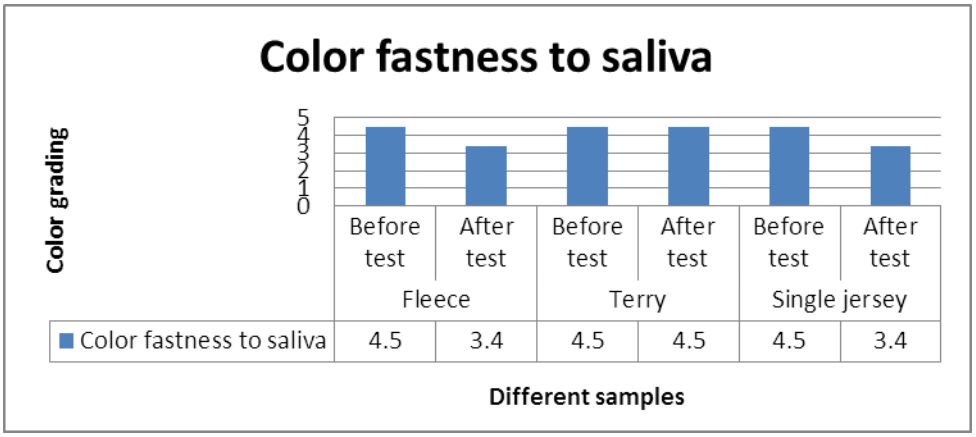

Fig.4 Changes in color fastness to saliva of different samples

Saliva test must be done for fabrics used for baby/infant garments. Fig.4 indicates the resistance of the cool pigment colour regarding influence of saliva. No color staining occurs in terry sample but slight changes found in fleece and single jersey samples.

3.5 Color fastness to water

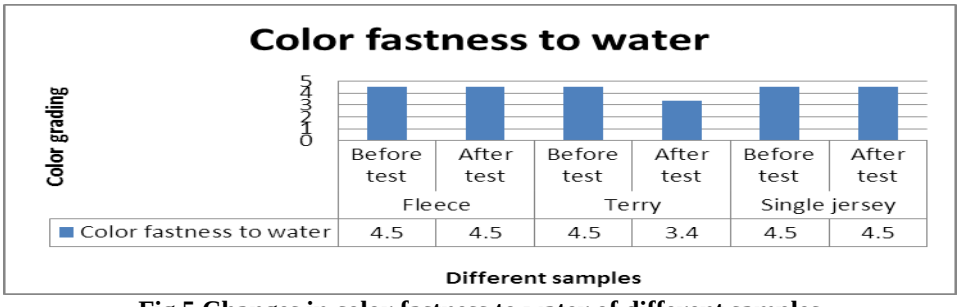

Fig.5 Changes in color fastness to water of different samples

Results of color fastness to water against cool pigment dye are also satisfactory. Above graph shows this.

3.6 Color Fastness to rubbing

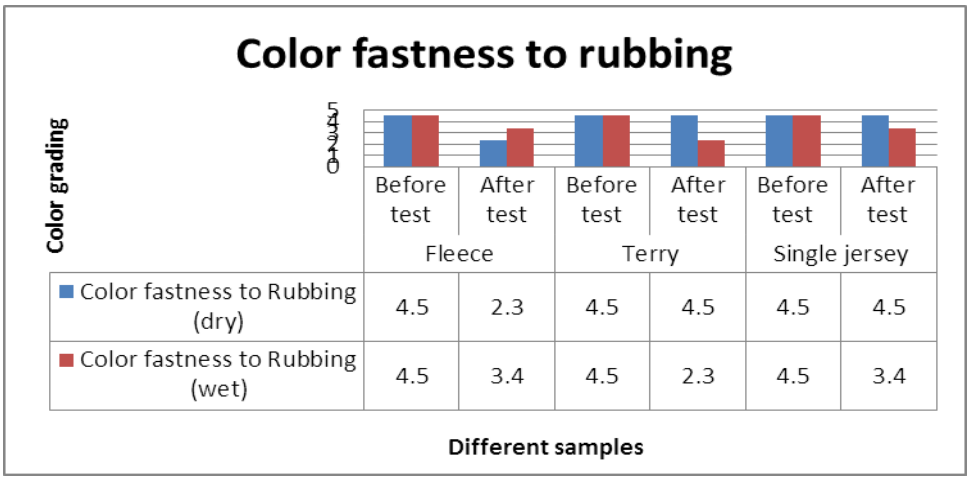

Fig.6 Changes in color fastness to rubbing of different samples

A lot of changes found in color fastness to rubbing result. We know dyeing with colorant like pigment or cool pigment is surface dyeing and the dyestuff adheres on the fabric surface so, color staining occur in both dry and wet state for almost all the samples.

3.7 Dimensional stability to wash

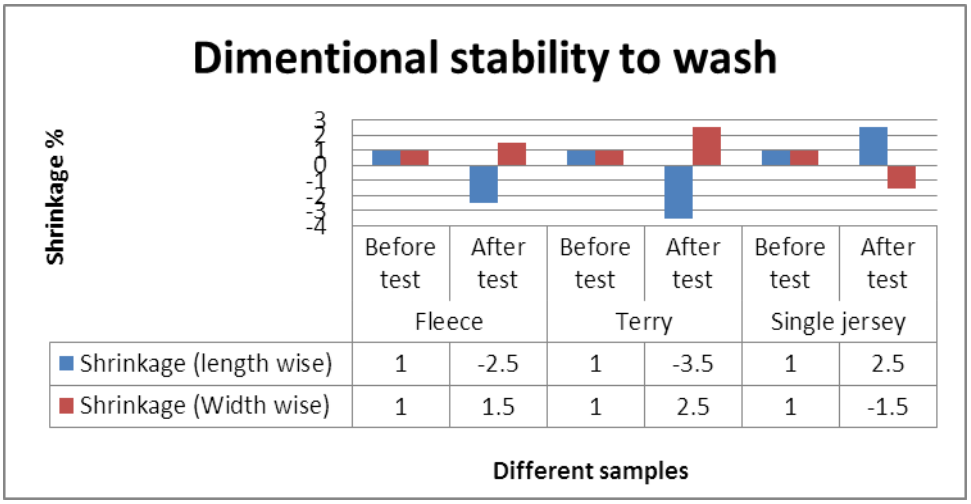

Fig.7 Shrinkage% (length wise & width wise of different samples)

Fig.7 shows shrinkage% of different samples in length and width wise direction. As these are knit fabric so, shrinkage occur in both direction.

IV. Conclusion

In the concluding part I want to point out the findings of my work;
GSM increases of all the samples (fleece, terry & single jersey).
Color grading slightly changes for color fastness to washing in case of fleece and terry but single jersey remains unchanged.
There is a little change in color grading due to perspiration in single jersey sample but results of other samples are satisfactory.
In saliva test slight changes found in fleece and single jersey samples but terry remains unchanged.
All the samples show quite good results against color fastness to water. A slight change found only in terry sample.
Cool pigment dye makes noticeable changes in all samples due to rubbing test.
A lot of changes found it dimensional stability due to wash. Both (length and width wise) shrinkage occurs in all samples.
From the above discussions it is clear that cool pigment dye not only gives the color but also brings a remarkable change in different chemical and physical properties of knit fabrics.

There are some limitations one is if I could use garment sample instead of fabric then the samples can be evaluated in different portion such as different seam and others. So, further research can be done on this topic.

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