



ISSN: 2350-0328

**International Journal of Advanced Research in Science,
Engineering and Technology**

Vol. 6, Issue 6 , June 2019

Study of the Mechanism of the Process of Adhesion of Fabrics When Designing Clothing for Hot Climate Conditions.

Vokhidova U.A. , Z. I. Ibragimova

Tashkent Institute of textile and light industry
Job seeker

ABSTRACT: In a hot dry climate, clothing is of particular importance. It should protect the human body from the thermal and chemical effects of sunlight and not interfere with heat transfer, air exchange and evaporation of sweat from the surface of the skin. This phenomenon is particularly important when choosing a range of clothing for pregnant women. The article deals with the influence of humidity and temperature on the interaction of textile material with human skin in the operation of clothing.

I.INTRODUCTION

The development of the composition and structure of a rational wardrobe is the basis for the design of the industrial range of clothing. The creation of high-quality competitive clothing mass production in this range for pregnant women , directly aimed at maintaining the demographic policy of the state [1,3,4].

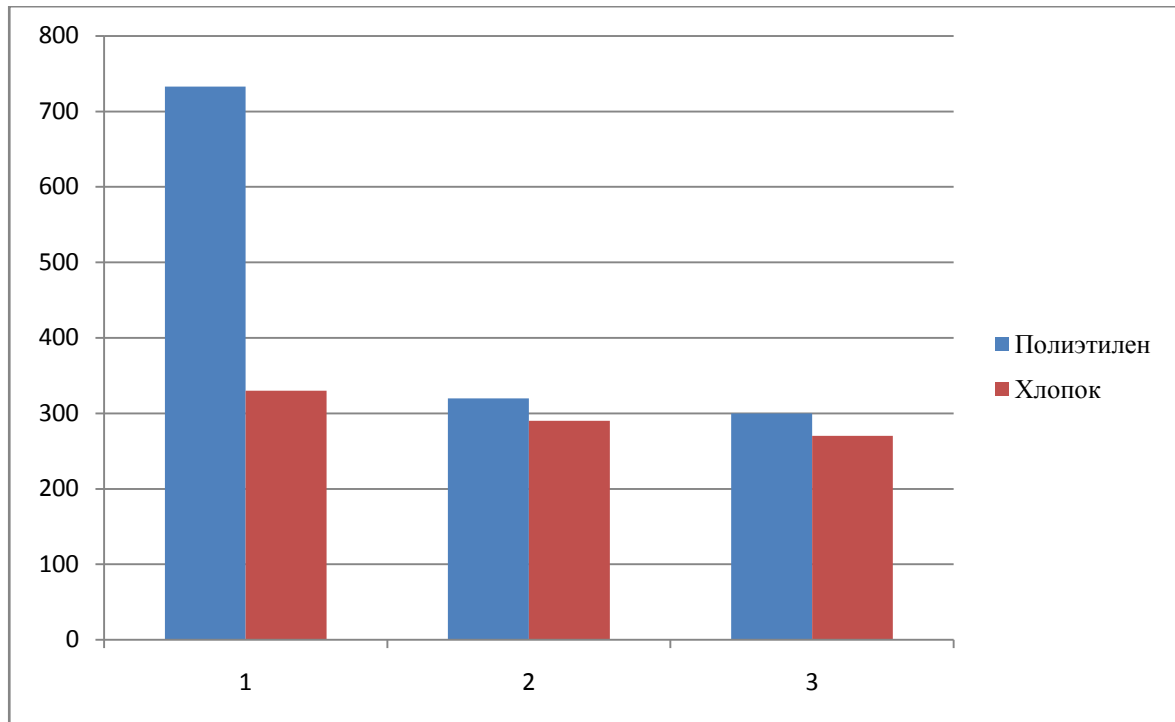
In a hot dry climate, clothing is of particular importance. It should protect the human body from the thermal and chemical effects of sunlight and not interfere with heat transfer, air exchange and evaporation of sweat from the skin surface [1,2,3,4]. In addition, a number of important hygienic requirements specific to local climatic conditions are imposed on rational clothing [2].As the analysis of the range of clothes for pregnant women showed, the question of the production of inexpensive and high-quality clothing still remains relevant.

Features of the formation and functioning of the wardrobe for pregnant women is as follows.

First, the wardrobe of the studied group, unlike other consumer groups, is formed within a relatively short time (1-2 months). The time of its use is also limited to four to five months. At the end of this period, individual items of clothing (most of them) are eliminated from use completely or become a passive part of the wardrobe of women.

In this paper we consider the determination of the adhesive force in the process of interaction of textile material with human skin during the operation of clothing.

The need to ensure a comfortable state of the body of the mother and the fetus determines the paramount importance of physical and hygienic indicators of tissues (Fig.1). Requirements for hygienic properties of fabrics for hot climate should be based on the requirements of "comfort", necessary for normal functioning of the body, as well as on the study of the process of heat and moisture exchange of the human body [1,2,3,4].



Polyethylene Cotton

Fig 1. Influence of the type of clothing on moisture loss indicators
1-overalls; 2- Jacket and pants; 3- Bathrobe

Heat transfer at elevated temperatures is carried out mainly by sweating. Intense sweating leads to the accumulation of drip-liquid moisture under the clothes, which prevents the release and evaporation of sweat and causes the material to adhere to wet skin. The adhesion of clothing in the process of wearing its parts, moistened with water vapor (sweat) to the human body, is especially important to take into account in the hot dry climate of Uzbekistan. The conducted studies (experiments were carried out in a special installation) [2, 3,5,6, etc.] suggest that the values of the adhesion force of tissues indicate the presence of a significant relationship between the adhesion and structural characteristics of tissues, as well as from its environment. The adhesive force does not depend on the mass of the material, but mainly depends on the thickness of the fiber, the density and weave, also depends on the humidity and the use of antistatic agents. The structure of the fabric with a non-smooth surface having a minimum filling coefficient is most favorable at high temperature and humidity. The increase in the surface smoothness of the material, increasing the filling ratio causes sweating, increase skin moisture and clothing air. Thus, when choosing a fabric for clothing in hot climatic conditions in combination with hygienic properties, it is necessary to take into account the rate of adhesion of the fabric to the wet surface of the human skin.

The force applied to the displacement of the adhesive material on the skin was determined accordingly in the presence of sweat and in the absence of sweat for various materials. In order to study the ratio of fibers to water (absorption properties), tissues of different fibrous composition were studied.

According to the fibrous composition for hot climatic conditions, the most acceptable natural fabrics are cotton, silk and blended cotton silk fabrics. Hygienic compliance of clothing, its permeability properties are determined by the structural characteristics of the structure of the fabric: fiber thickness, density, weave and various combinations thereof. Based on this, the dependence of the adhesive force on air humidity, the dependence of the adhesive forces of dry tissue using antistatic and the dependence of the adhesive forces of wet tissue using antistatic was studied. The experimental data were processed by methods of mathematical statistics (Fig.2). As a result, new dependences for the determination of the adhesive force on the moisture content of the material are obtained (correlation coefficient is 0.95) :

$$F = 0.278 W + 27.84,$$

where: F is the force of adhesion; W –moisture

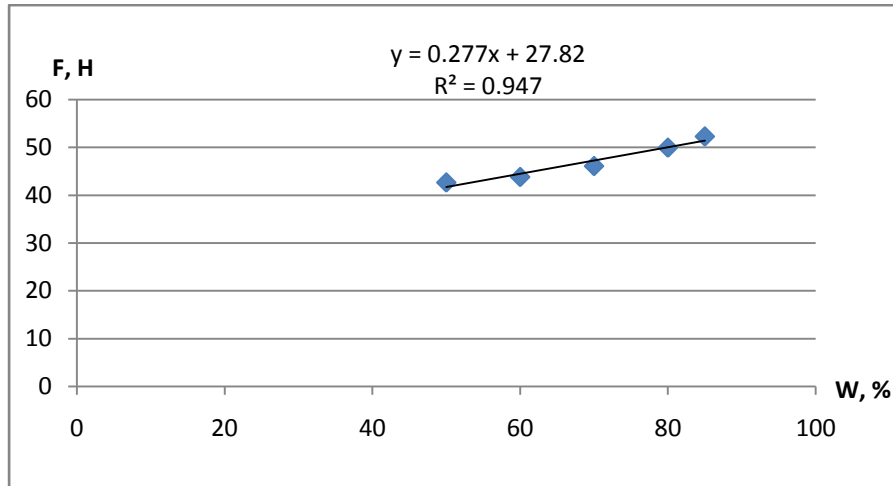


Fig2. Dependence of adhesive force (F) on humidity

As can be seen from the graph, the adhesive force also depends on the humidity. With increasing humidity increases and the strength of tissue adhesion to the skin.

The results of the experiments showed that with the increase in the volume of moisture applied (which in the process of wear occurs with increasing ambient temperature and with increasing physical activity on the human body) increases the strength of the adhesion of tissue to the surface of the skin.

The degree of adhesion of the material is also affected by its structure, air humidity and the use of antistatic agents. In natural fabrics with a non-smooth surface, having a relatively small support surface, the adhesive force is negligible in relation to smooth fabrics. As the results of the study show, the adhesive force depends on the temperature. The experimental data were processed by methods of mathematical statistics (Fig.3). As a result, new dependences for determining the adhesion force on temperature are obtained (the correlation coefficient is 0,98) . The dependence of the adhesive forces on the temperature of the dry fabric using antistatic agent is obtained:

$$F = 0.62 T + 19,06$$

where: F- Sticking force; T – temperature

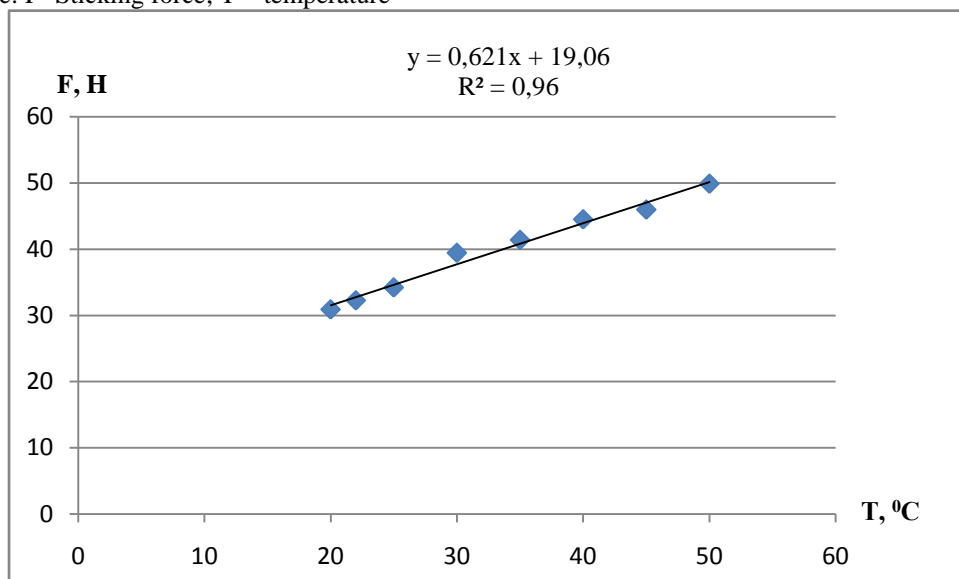


Fig. 3 Sticking force versus temperature (Dry + antistatic)

From the above study it is obvious that antistatic reduces the coefficient of adhesion under all conditions of its environment. The studies suggest that the values of the coefficients of adhesion of tissues indicate the presence of a



ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 6 , June 2019

significant link honey adhesion and structural characteristics of tissues, as well as from its environment. The adhesive force does not depend on the mass of the material, but mainly depends on the thickness of the fiber, the density and weave, it also depends on the humidity and the use of antistatic agents. The structure of the fabric with a non-smooth surface, having a minimum filling ratio, is most favorable at high temperature and humidity. The increase in the surface smoothness of the material, increasing the filling ratio causes sweating, increase skin moisture and clothing air. Thus, when choosing a fabric for clothing in hot climatic conditions, in combination with hygienic properties, it is necessary to take into account the rate of adhesion of the fabric to the wet surface of the human skin.

II. SUMMARY

High external temperature and intense solar radiation, typical for the summer period of Uzbekistan climate, require a special approach to the design of the clothing package in these conditions. Requirements for clothing summer range should be based on the study of "comfortable" conditions necessary for normal functioning of the body, as well as the study of the process of heat and moisture exchange of the human body with the environment.

The adhesion of clothing in the process of wearing its parts, moistened with water vapor (sweat) to the human body, is especially important to take into account in the hot dry climate of Uzbekistan.

The results allow us to scientifically justify the choice of fabric in the design of clothing for hot climatic conditions.

REFERENCES

1. Koski K. J. Hill F. W. Evidence for a critical period during late gestation when maternal dietary carbohydrate is essential for survival of newborn rats. *J. Nutr.* 1990V 120 N9 p 1016-1027.
2. Komilova Kh.Kh., Vokhidova U.A. Analysis of demographic trends associated with the market for the consumption of specialized clothing. *ToshDTU Khabarlari*. Tashkent, 2003. No. 2, 130-134 p.
3. Volovich V.G. Man in extreme conditions of the natural environment. *M.Mysl.* 1983,220p.
4. Midorikawa. T. Sosase A. Hachimoto S. Tokura H. The effect of acrylic and cotton training suits on thermoregulatory reactions and microclimate of clothing at a cyclical ambient temperature. *Jah. Res Assoc. Text End-Uses* 1980. 31 N12 p 591-595.
5. Komilova Kh.H., Vokhidova U.A. Improving the process of designing clothes for pregnant women. The collection of materials MNTK "Modern high technologies and advanced materials of textile and light industry" (Progress - 2004). Part 2. Ivanovo, 2004. IGTA, pp.44-45.
6. Kasimov, A.B., Vokhidova, U.A. Formation of requirements for sportswear from knitted fabrics. *Z-1 Composite materials*. 2016. №1. P.66.