

# The Study of Subjective Pressure Sensation Developed by Foundation Garment

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**Abstract:** The subjective wearing pressure sensation developed by foundation garment was surveyed and reported in this paper. Wearing experimental procedure was designed and fifteen female undergraduates were employed as subjects for this study. We obtained results of subjective wearing pressure sensation and shaping effect assessment through the questionnaire. Firstly, we studied the correlation between pressure evaluation, shaping effect assessment and time. Secondly, we analyzed the overall pressure sensation and different body part pressure sensation developed by corsets, three main factors were extracted from the 15 positions through statistical analysis, the subjective regression formula  $Y = -0.807 + 0.499 X_1 + 0.187 X_3$  was gained. The overall subjective pressure sensation had significant correlation with the waist (X1) and near waist (X3) pressure evaluation.

**Keywords:** Comfort of pressure sensation, subjective wearing sensation, factor analysis .

## 1. Introduction

Foundation garment is one of the lingerie for body shaping such as corsets, girdles and waister-nippers. Women show high interests in their functional role to shape the body more ideally by redistributing the body fat now. However, at the same time people often complain against the uncomfortable feeling caused by the excessive negative pressure. On the one hand, many studies (Sugimoto, 1991; Nagayama, 1995; Takasu, 2000; Yoshiaki, 2000; Okura, 2000; SUGITA, 2002; Nakahashi, 2005; Liu, 2008; Jin, 2008) have demonstrated that the pressure had negative or positive physiological effects on the body [1-7], we also did a complete research between clothing pressure and physiological variables [8].

On the other hand, Subjective assessment is also very important for the assessment of clothing comfort, which is a complex synthesis of psychological and physiological response of individuals and of the physical properties of the clothing materials, many studies have focused on the predictability between objective physical factors of fabrics and subjective preference [9-11]. But many fundamental problems haven't been clarified which can give supports to designing comfortable clothing, such as which parts of body are more sensitive to the pressure sensation. In this paper, we developed a wearing experimental

procedure and investigated the relationship between the overall subjective pressure sensation and different body parts pressure sensation using factor analysis. This can give a suggestion for the design of foundation garment, and also we can explain that the overall pressure sensation for these clothing were mainly composed by what part wearing sensation of the body, so we can give reasonable plan for garment ease, and the placement of hard material such as strong whale bones.

## 2. Experiment

### 2.1 Test Samples and Sizes

Some test samples were supported by the Beijing Aimer Lingerie Co., Ltd., there were eight corsets and eight girdles sample all together for the experimental, and all the foundation garment had different structures and more than 3 sizes, as shown in Figure 1. The size and materials used for foundation garment are shown in Table 1.

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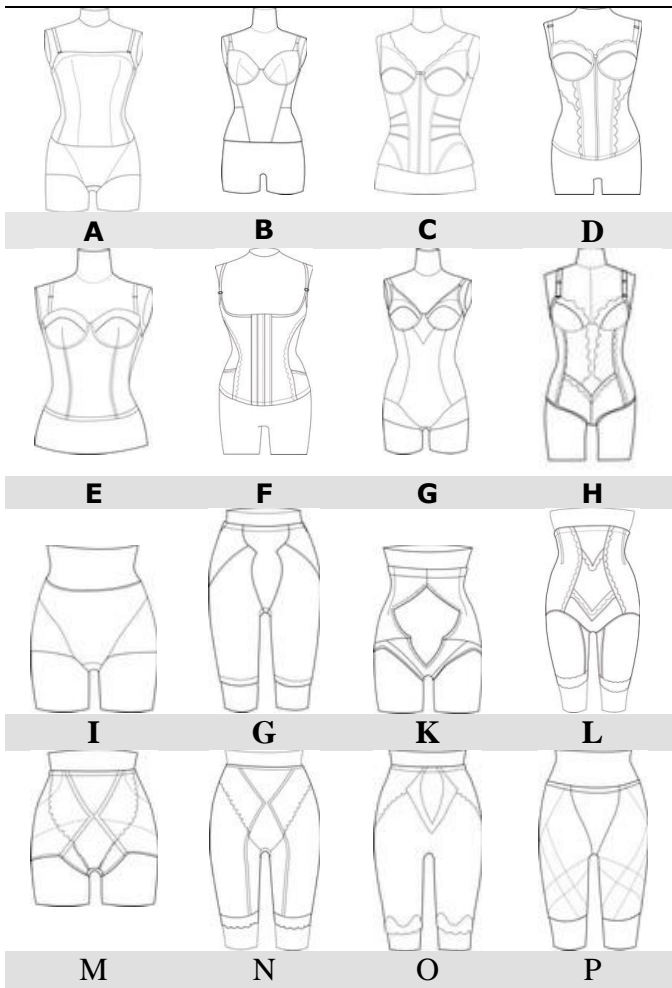


Figure 1 Structures of the foundation garment

Table 1 Size and Material Used for Garment

Sample ID	Knitted Structure	Main fabric content (%)	Garment size
A	Power-net	Ny84% U16%	70C 75B 80B
B	Tricot	Ny58% U23% C19%	75B 75C 80B 85B
C	Tricot	Ny87% U13%	75B 75C 80B 85B
D	Power-net	Ny10% U10%	70B 75B 80B 80C
E	Power-net	P40% Ny48% U12%	70B 75B 80B 80C
F	Tricot	Ny86% U14%	70B 75B 80C
G	Power-net	Ny83% U17%	70B 75B 80C
H	Tricot	Ny90% U10%	70B 75B 80C
I	Power-net	Ny72% U28%	W64 W70 W76
G	Tricot	Ny83% U17%	W64 W70 W76
K	Tricot	Ny69% U31%	W64 W70 W76
L	Power-net	Ny90% U10%	W70 W76
M	Tricot	Ny67% U14% C19%	W70 W76
N	Tricot	Ny67% U14% C19%	W70 W76
O	Tricot	Ny70% U30%	W70 W76
P	Tricot	Ny69% U31%	W70 W76

U: polyurethane, Ny: polyamide, C: cotton, P: polyester

## 2.2 Subjects

The subjects of this study were 18 healthy female graduates within the age range of 21-26 years. They were all about 161cm with the standard deviation 4.17 chosen among 300 students. We shifted 42 female graduates at first and took their body measurements through 3d body scanner, and 15 students were finally invited as experiment samples for their body measurements and wearing habit. Details of physical constitutions are given in Table 2, which were taken respectively by the Martin instruments only with non-elasticity underwear and nude upper body.

Table 2 Physical Constitutions of Subjects

	Min	Max	Mean	Std.
Chest girth	79.00	92.00	83.55	4.07
Bust girth	81.50	96.70	85.99	4.57
Underbust girth	69.60	81.00	74.63	3.04
Waist girth	64.50	84.50	71.23	4.96
Abdomen girth	75.10	94.70	83.80	5.02
Hip girth	86.10	109.30	94.89	5.89
Shoulder point to shoulder point	36.50	42.80	39.66	1.71
Back neck point to waistline	33.00	39.10	36.96	1.68
Height	154.90	171.00	161.30	4.17
body weight	47.75	73.30	56.16	6.64
BMI*	18.72	27.29	21.56	2.18

\*BMI = Body weight (kg) / Height (m)<sup>2</sup>

## 2.3 Experimental Method

The experiments were conducted in an artificial climate chamber where the temperature was controlled at  $27 \pm 1.4^\circ \text{C}$  and the relative humidity at  $32 \pm 2\%$ . To minimize the effects of menstrual cycles and circadian rhythm on body's physical response, the experiment was carried out during the early follicular phase of each woman, and several garments were tested at the same time for each woman on each day. In the experiment, we selected suited size of the foundation garment for the subjects according to their body measurements. Each subject entered the chamber 30 minutes or more before the start of the experiment so that she could become accustomed to the experimental environment. We asked subjects about pressure sensation at 15 positions on the torso and the shaping effect at several parts. The pressure sensation and the shaping effect were evaluated from -2-2 five-grade psychological scale, as shown in Figure 2.