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PRESSURE EVALUATION OF SEAMLESS YOGA LEGGINGS DESIGNED WITH PARTITION STRUCTURE

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Abstract:

It is a novel approach to design the partition structure of clothing according to the deformation of the human body surface skin during exercise. The functional evaluation of these products remains unknown, and there is limited knowledge about the effects of the partition structure design on the pressure comfort of clothing. This research carried out a partitioned structural design of the leggings based on the skin deformation of the lower limbs of the human body during yoga exercise and developed two styles of seamless yoga leggings. The skin pressure exerted by the new seamless yoga leggings was compared with two commercial yoga leggings. Eight female college students were invited to wear all the yoga leggings samples and perform yoga exercises. The skin pressure exerted by yoga leggings was measured by the German novel-Pliance multipurpose pressure distribution measurement system on 10 body positions. The results showed that yoga leggings designed with a partitioned structure exert a comfortable pressure on the skin during yoga exercise, and the pressure change was smaller under different yoga postures, which has better pressure stability. The partition structure design model of seamless yoga leggings was optimized, which provided a reference for the functional partition design and product development of seamless yoga leggings.

Keywords:

Yoga leggings, seamless knitting, partition structure, clothing pressure, pressure evaluation

1. Introducton

As a fashion sport, yoga has attracted more and more people to participate and promoted the development of the yoga clothing market [1, 2]. In sportswear, pressure comfort is the most important performance, which will affect the wearer's sports performance and efficiency. Free movement and no sense of restraint are the standards for the structural design of sportswear. The characteristics of sports items and human body structure should be considered in the style design [3]. Zhou et al. [4] designed clothing styles and determined pattern-making parameters according to the skin deformation of key parts of the human body in the climbing posture and selected appropriate fabrics to make mountaineering clothing and try on. Feng and Wang [5] constructed a model of football tights and provided a basis for the loose weight of football tights by studying the skin deformation of men's lower limbs in football postures and combining the physiological structure of the human body. Gao [6] optimized the structure of the tight short-track speed skating suit according to the characteristics of human skin deformation in short-track speed skating. Cheng and Kuzmichev [7] unify the morphological features of the male torso and underwear construction into a universal system of virtual underwear design，which have improved the method of underwear design, making the underwear more comfortable and suitable for individual morphological features. By exploring the characteristics of the human body in the state of exercise, designing clothing styles, and setting loose weights, the pressure comfort of the clothing can be improved.

Clothing pressure is the result of the interaction between clothing and the human body. As an important indicator for evaluating clothing comfort, it has become a research hotspot in the clothing industry. Wang et al. [8] calculated the pressure comfort threshold distribution of the female upper body based on psychophysical limit-step method. Zheng et al. [9] evaluated the pressure of the newly developed seamless bra and commercial bra and established an empirical equation for predicting the pressure of the bra. Kuzmichev et al. [10] determined the allowable pressure range of the human body based on the sensory analysis of female participants.

At present, the structural design of yoga clothing on the market is chaotic, which cannot effectively protect the stretching and deformation of muscles in yoga exercises, or produces a sense of restraint and pressure during large movements [11]. It is necessary to divide the human body into different areas according to the characteristics of the human body movement in yoga exercise. Then, the clothing is designed with a reasonable structure division to make it more suitable for human wearing comfort [12].

In this study, we designed the partition structure of the clothes based on the skin deformation of the lower limbs of the human body during yoga exercise and used seamless technology to develop new knitted yoga leggings. We evaluated its pressure comfort compared with commercial yoga leggings. The design principles for further development of seamless yoga leggings are proposed.

2. Experiment

2.1. Skin deformation of the lower limbs of the human body during yoga exercise

In yoga exercises, body movements are basically produced by joint movements, which correspondingly drive changes in muscles, subcutaneous fat, and body surface skin, and they are finally reflected in the stretching and deformation of body surface skin [13]. By measuring the skin deformation data of the lower limbs of the human body during yoga exercises, the skin deformation map of the lower limbs is drawn and applied to the partition structure of yoga leggings.

In the yoga postures, the lower limbs movement takes the femoral and the knee joint as the two major fulcrums, and they have a certain range of activity. We classified and screened yoga postures according to the principles of human joint movement and finally selected five yoga postures, namely Warrior Bending Pose (posture 1), Warrior Body Printing (posture 2), Triangle Pose (posture 3), Leg Side Lifting (posture 4), and Tree Pose (posture 5). Among them, posture 1 and posture 2 stretch the front and back sides of the leg, the main stretch parts of posture 3 and posture 4 are the inner and outer parts of the leg, and posture 5 causes stretch to the knee. The above postures have a large range of motion and a strong sense of involvement in the legs. Eight female college students (ages 20 to 24) were selected as subjects, and their lower limbs were divided. The horizontal reference line is the characteristic line of the human body: the waist line (W_1), the hip line (W_2), the knee line (W_5), the ankle line (W_8), and the bisecting line (W_3, W_4, W_6, W_7) between the characteristic lines. The longitudinal reference line is the anterior midline (H_3), the posterior midline (H_7), the inner suture line (H_1) and the outer suture line (H_5), and the bisecting line (H_2, H_4, H_6, H_8) between the center line and the side suture line, and we pasted the marking point on the intersection of the horizontal reference line and the longitudinal reference line. The VITUS Smart XXL three-dimensional scanning system (Human Solutions, Germany) was used to scan and record the three-dimensional human body images of the subjects under standard standing and yoga postures. We used ScanWorX software to measure the horizontal and longitudinal lengths between the marked points, and finally, we calculated the rate of skin change on the body surface according to the dynamic and static change rate formula.

$$K = \frac{L_2 - L_1}{L_1} \times 100\%$$

Where L_2 refers to the length between the marked points under the yoga action, and L_1 refers to the length between the marked points in the static standing state.

Due to the difference in skin deformation of the same part under different yoga postures, in order to make the clothing meet the pressure comfort requirements, it is necessary to ensure that the clothing pressure under the largest skin deformation is still in the comfortable pressure range. The maximum value of skin changes under five yoga postures is selected, and the data grading method is used to divide the skin deformation values to obtain a grid map of lower limb skin changes in yoga postures, as shown in Figure 1.

2.2. Knitting and performance testing of fabrics

In the knitting of fabric, 78dtex nylon and 30D pure Spandex yarn, which are commonly used in high-elastic clothing, were selected. Among them, spandex is the ground yarn, and nylon is the veil. We used the Santoni seamless underwear circular knitting machine (SM8-TOP2 MP2) to knit five kinds of fabric structures commonly used in seamless garments, as shown in Figure 2.

We measured the tensile force of the fabric under constant elongation in the longitudinal direction by the YG028 Electronic Fabrics Strength Tester (Ningbo Textile Instrument Company). The elongation is set to 10%, 20%, 30%, 40%, and 50%, which corresponds to the skin deformation rate of the lower extremities (Figure 1). The results are shown in Table 1. According to the cluster analysis method, the fabric structure is classified, and the five types of fabric structures are divided into three categories, namely low-stretch fabrics: 3 and 4; medium-stretch fabrics: 2, 5; and high-stretch fabrics: 1.

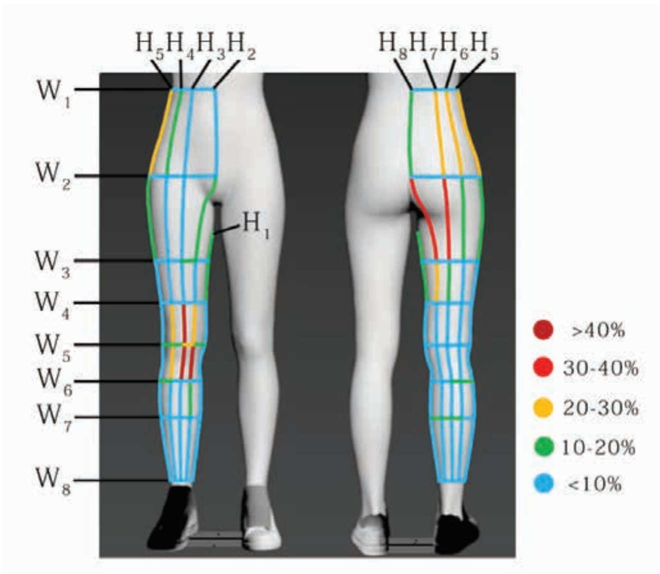

Figure 1. Skin deformation of human lower limbs during yoga exercise

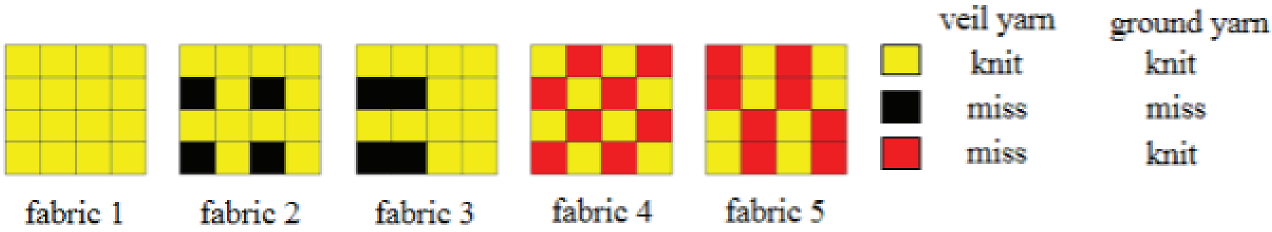

Figure 2. Fabric structures

Table 1. Fabric tensile properties

Fabric number	Stretching force at elongation/N				
	10%	20%	30%	40%	50%
1	0.42	0.70	0.92	1.33	1.58
2	0.54	0.99	1.38	1.60	1.79
3	0.59	1.07	1.47	1.81	1.97
4	0.57	1.08	1.34	187	1.96
5	0.59	0.99	1.27	1.62	1.72

2.3. Knitting of yoga leggings samples

The style of seamless knitted yoga leggings is shown in Figure 3. Style 1 is to divide the clothing area according to the skin deformation map of the lower limbs of the yoga exercise human body. The division line is used to distinguish the different skin deformation areas, and the physiological structure of human body is considered in the setting of the division line. In order to increase the control group, the waist and tie-up design of style 2 is the same as that of style 1, and the other areas are not designed for zoning.

To make the clothing have good body-fitting and pressure comfort, the clothing fabric should be adapted to the expansion and contraction of the skin surface of various parts of the human body as much as possible [14]. When the fabric is deformed by an external force, the skin pressure exerted on the human body is still in the comfort zone and fluctuates within a certain range. Therefore, the different fabric structures in various areas of the clothing are applied, so that the tensile properties of the fabric structure in each area of the clothing form a level change, which corresponds to the skin deformation. Knit an easy-to-stretch structure in the area where the skin deformation exceeds 30%, that is, high-elastic fabrics. Use medium-elastic fabrics in the 10%–30% deformation area, and low-elastic fabrics in the area where the deformation is less than 10%, to ensure that the stretching force of each part of the fabric tends to be consistent when stretched. Combining the forming principle of seamless clothing, the fabric structure of the clothing is shown in Figure 4. The waist and ankle ties are all made of false ribs. Style 2 is made of high-elastic fabrics as a whole. The garment is knitted with Santoni seamless underwear circle (SM8-TOP2MP2). The gray fabric of the off-machine is stitched at the mouth of the tube for finishing, and finally it is cut and stitched. The finished product is shown in Figure 5: sample 1 is style 1, and sample 2 is style 2.

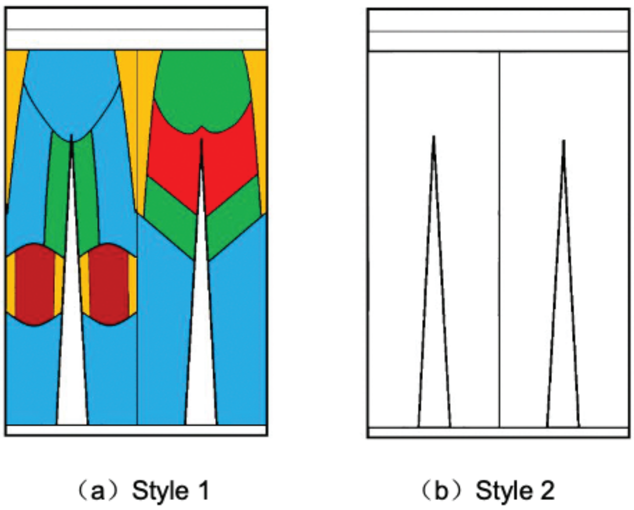

Figure 3. The style of seamless yoga leggings

2.4. Selection of commercial yoga leggings

In order to evaluate the comfort performance of the newly developed seamless yoga leggings, two commercial yoga leggings of the same size were selected for comparison, as shown in Figure 6. Sample 3 uses a knitted fabric (NuluTM) for traditional cutting and sewing, and the fabric of this sample has better elasticity than other samples (sample 1, sample 2, sample 4). Sample 4 uses nylon and spandex as raw materials, uses seamless technology for knitting, and the elasticity of this sample is less than that of sample 2 and sample 3. The styles are similar to the newly developed seamless yoga leggings, but there is no regional knitting design of fabric structure for clothing.

In order to reduce the influence of clothing size on the experimental results, the sizes of four leggings were measured. The results are shown in Table 2. The sizes of the four leggings

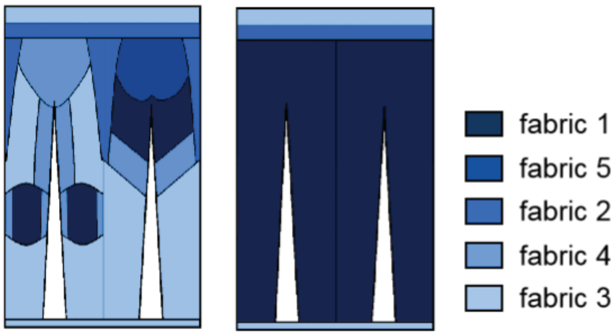

Figure 4. The fabric structures of newly developed seamless yoga leggings

Figure 5. The fabric structures of newly developed seamless yoga leggings

Figure 6. Two commercial yoga leggings

are relatively close, and the difference in size of the same part is not more than 3 cm.

2.5. Human subjects

Eight female college students with a height of 160–165 cm were recruited as experimental subjects, with an average age of 23.8 years and an average weight of 51.2 kg. The average circumference of their lower limbs is shown in Table 3.

2.6. Yoga leggings pressure evaluation

In this study, eight subjects all wore two newly developed seamless yoga leggings and two commercial yoga leggings for pressure evaluation. With reference to the literature on trouser pressure and the characteristics of human movement in yoga exercise, a total of 10 points were selected for pressure evaluation, and the location of the measurement points on the human body is shown in Figure 7, and their definitions are given in Table 4 [15,16].

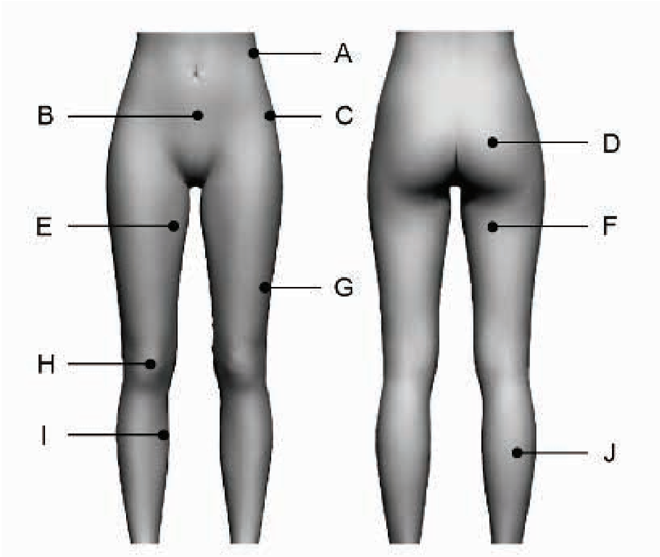

Figure 7. Pressure measuring point on human body

The German novel-Pliance multipurpose pressure distribution measurement system was adopted, as shown in Figure 8. The measurement system is equipped with capacitive sensor, and the sensitive components in the sensor are highly accurate and can accurately measure the pressure distribution of the three-dimensional surface. The subjects practiced yoga movements on a yoga mat, became familiar with the movements, They then wore yoga leggings to maintain a standard standing posture and practiced five yoga movements, as shown in Figure 9, and

Table 2. The size of the leggings

	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8
Style 1	57.3	67.8	36.6	29.9	27.5	24.3	21.5	18.7
Style 2	57.3	65.9	37.0	30.2	26.7	24.5	21.7	18.5
Style 3	58.1	68.2	37.1	32.0	26.9	23.8	22.2	20.2
Style 4	60.0	68.4	35.7	30.6	27.4	24.6	22.4	20.0

Table 3. Body measurements

Body measurements	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8
Mean	68.6	89.2	48.4	42.0	36.3	33.3	34.5	21.7

Table 4. Definitions of pressure measuring points

Point	Body	Point	Body
A	outside waist	F	reverse thigh
B	abdomen	G	outside of upper knee
C	outside hip	H	front of knee
D	buttock	I	inner calf
E	inner thigh	J	reverse calf

adjusted their body postures through a protractor to ensure the standard and consistency of yoga movements. Single sensors were used to measure the pressure at the points on the body for three times. Time pressure data was continuously collected for 60 seconds. Twenty pressure measurements per second were recorded.

3. Results and Discussion

3.1 Pressure of yoga leggings under standard standing posture

Figure 10 shows the average pressure of eight subjects at each measurement point. The clothing pressure at the measurement point is between 0.2 kPa and 1.2 kPa, and less than 1.96 kPa, which are in the comfortable range of tight-fitting clothing pressure [17]. In Figure 10, points A and F have smaller pressures relatively in all the measurement points，less than 0.6kPa. This is because the curvature of the hips and knees of the human body is large, resulting in a small fit between the clothing and the human skin. The pressure at points I and J are relatively high, just right at the calf. It may be that the muscles of the calf are raised and the circumference increases, which makes the clothing pressure at this place larger. The pressure of the four samples at points B, C, and D (hip line) are quite different, especially the pressure of sample 4 is significantly lower than other samples, which indicates that the fabric has a greater impact on the pressure of the hip area.

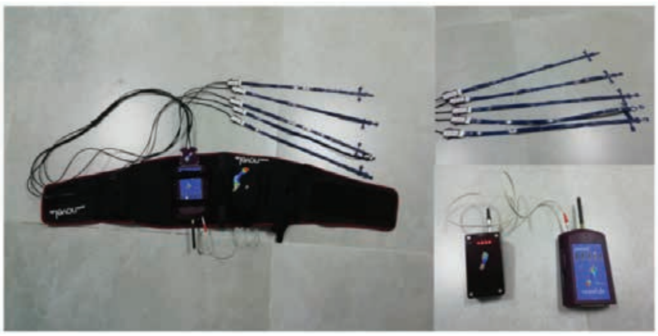

Figure 8. Novel-Pliance multipurpose pressure sensor

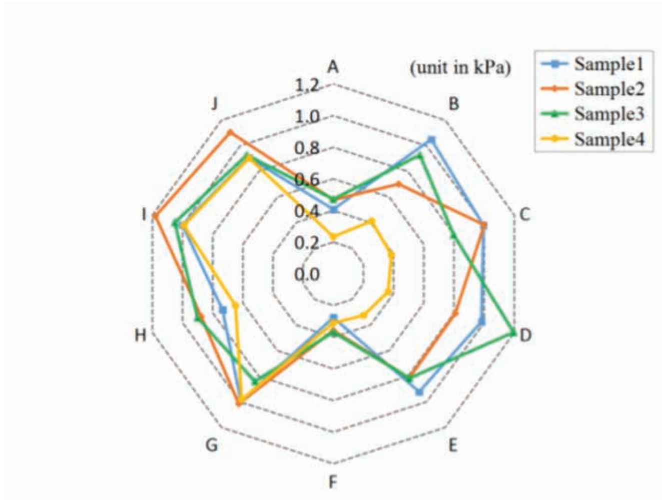

Figure 10. Pressure of four samples under standard standing posture

Figure 9. Measurement of the pressure of the subject’s body

3.2 Pressure of yoga leggings under yoga exercise

Yoga is a static exercise. Practitioners need to coordinate body movements on a static and natural basis and maintain a posture for a long time. Therefore, we analyzed the clothing pressure while the human subjects maintaining the yoga posture to evaluate the pressure comfort performance. Figure 11 shows the pressure at the measurement points on subjects wearing four samples during yoga exercise. The pressure at each measurement point are the average of eight subjects.

3.2.1 Pressure of newly developed and commercial yoga leggings

Since the newly developed seamless yoga legging (sample 2) and commercial yoga leggings (sample 3, sample 4) have a similar structural design, the overall clothing uses fabrics with the same fabric structure, so it was chosen for comparison with commercial yoga leggings. The order of the excellent tensile properties of the three samples: sample 3, sample 2, and sample 4.

Overall, the pressure range of sample 3 is the smallest, followed by sample 2, and the pressure range of sample 4 is the largest, exceeding 2.0 kPa. The pressure of measurement point of sample 3 has the smallest change during yoga exercise, while sample 4 has the largest fluctuation, which indicates that the tensile properties of clothing fabrics are an important factor affecting clothing pressure, and the better the tensile properties, the more stable the clothing pressure during dynamic sports. The newly developed yoga legging has higher pressure at point A (outer waist) and point D (buttocks), because the waist is one of muscle belt and fat center belt in the adult female body. Waist movement causes skin compression and muscle squeeze to protrude, which increases pressure on clothing, and the new yoga legging has a knitted fake rib on the

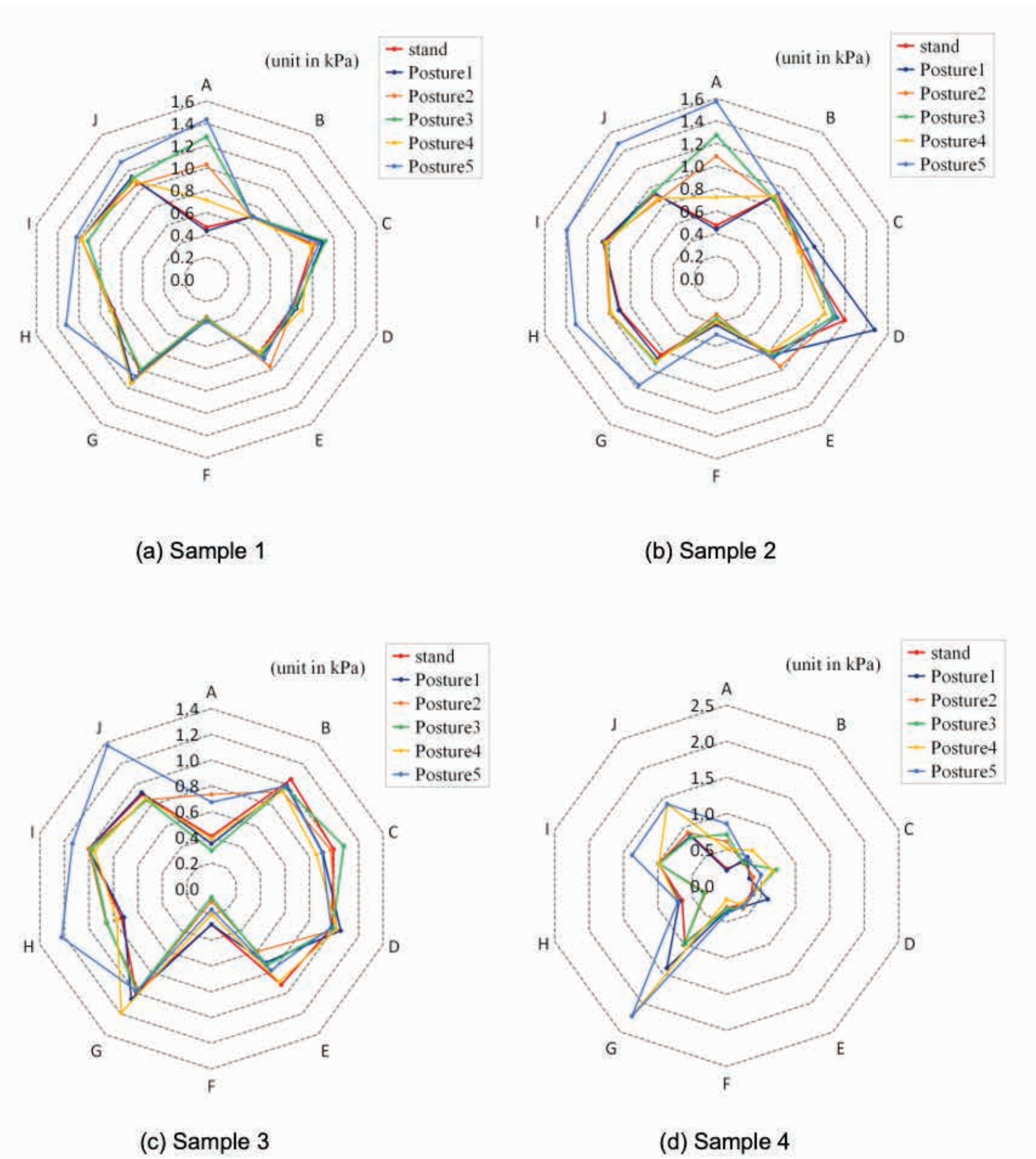

Figure 11. The pressure of two newly developed and two commercial yoga leggings

waist, which increases the thickness of the garment. So it has a higher pressure than other samples. In posture 5, the pressure of points H, I, and J (knee and calf) reach the maximum. When the knee is bent, the skin stretches and deforms greatly, the calf muscles are in a tight state, the clothing produces stretch deformation to adapt to the skin deformation, and the pressure on the skin increases.

3.2.2 Pressure of two newly developed yoga leggings

The two newly developed yoga leggings are made of the same yarn and machine. Sample 1 is designed with a partition structure, and sample 2 is knitting with a fabric structure. Therefore, the two samples are compared.

The pressure of the two samples is less than 1.6 kPa. In posture 1 and posture 5, points D (hip), H, I, and J (knee and calf) are where the pressure fluctuates greatly. The pressure of sample 1 is less than sample 2 and is closer to the pressure under other postures, which shows that clothing designed with a partition structure has lower pressure changes during yoga.

3.3 Pressure change of yoga leggings under yoga exercise

Figure 12 shows the pressure change rate at each measurement point of the subjects wearing four samples during yoga exercise, which are the average values of eight subjects.

3.3.1 Pressure change of newly developed and commercial yoga leggings

In samples 2, 3, and 4, overall, the pressure change rate of sample 3 is the smallest, and sample 4 is the largest. This shows that improving the elastic properties of clothing fabrics can reduce the pressure changes exerted by clothing on the human body during dynamic movements. Among the 10 measurement points, the pressure change rate of point A is the highest, because yoga mainly exercises around the spine. The waist can perform movements of different amplitudes and

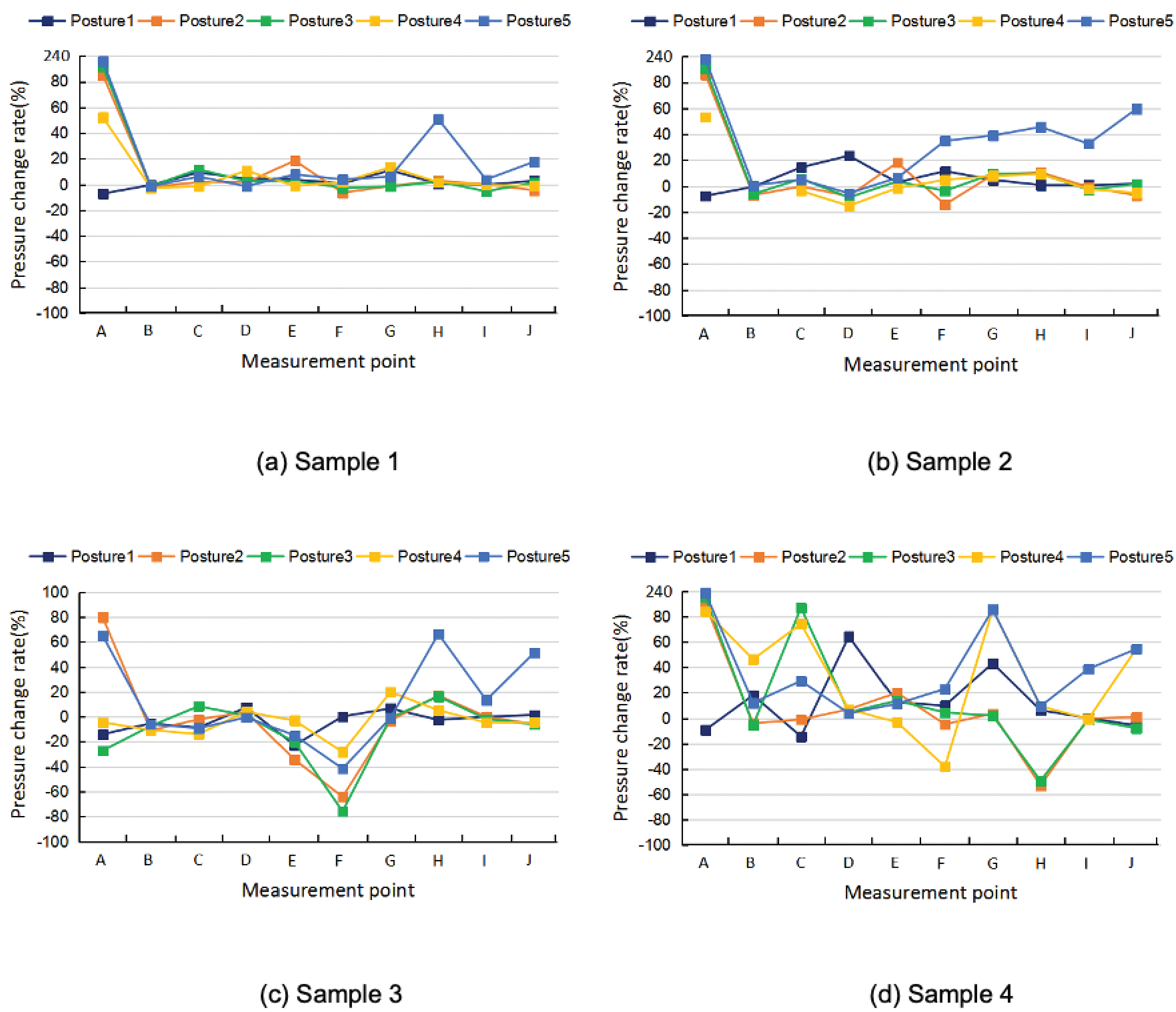

Figure 12. The pressure change of two newly developed and two commercial yoga leggings

angles through the twisting of the spine and other movements, which makes the clothing exert pressure on this part to produce obvious changes under different yoga movements[18]. At points H (knee circumference), I, and J (calf), the clothing pressure increases significantly due to the bending of the knee, and the pressure change rate is the largest among the five yoga postures. Point F is located on the lower side of the buttocks, because the buttocks are round and protrude backward, there is a gap between the clothing and the human body, and the contact area between the sensor and the human body is unstable, which makes the pressure at the measurement point change greatly.

3.3.2 Pressure change of two newly developed yoga leggings

The clothing pressure change rate of sample 1 and sample 2 are relatively similar. On the whole, the pressure change rate of sample 1 is less than that of sample 2. Except for point A and point H, the pressure change rate of other points is less than 30%, which indicates that the partition-structure-designed yoga leggings have a small range of changes in the skin pressure exerted on the human body during yoga exercises and have better pressure stability.

3.4 Clothing pressure comfort evaluation of yoga leggings

The pressure value is one of the standards to evaluate the comfort of clothing pressure [19,20]. During exercise, the smaller the pressure change caused by the deformation of the fabric, the smaller the pressure change rate. The pressure exerted by the clothing on the human body fluctuates in a small range, and the wearing comfort of the clothing is higher. In order to better evaluate the pressure comfort performance of yoga leggings, according to the pressure value and pressure change rate of the measurement point under the yoga action, we combined the cluster analysis method, the assignment method, and the function evaluation method to make a comprehensive evaluation of the four yoga leggings.

3.4.1 Classification and assignment of clothing pressure

In the subjective evaluation of clothing pressure comfort, the five-level interval scale method is often used for scoring to quantify subjective feelings. In the objective pressure test, the pressure values of different sample measuring points are distributed widely and irregularly. In order to facilitate analysis and evaluation, the pressure values and pressure change rates of the measuring points are clustered and analyzed. Refer to the subjective comfort evaluation method, divide the pressure value and the pressure change rate into five intervals, and use the assignment method to assign a certain value to the classification interval [21,22]. During the objective pressure process, eight subjects made a subjective evaluation of the comfort of the measuring point. When the pressure value is 0.8–1.0 kPa, they feel the most comfortable. Therefore, this interval is assigned a value of 5, the interval is taken as the midpoint, and the assignments on both sides decrease. In the pressure change rate, the smaller the value, the larger the value assigned. The results are shown in Table 5.

3.4.2 Establishment of functional evaluation value

To easily compare the difference between the pressure values of each measuring point, establish the function evaluation value, and use the linear addition method to obtain the sample function evaluation value S_{kj}:

$$S_{\mathrm{kj}} = \frac{1}{\mathrm{i}} \sum_{\mathrm{i}=1}^{6} S_{\mathrm{ij}}$$

Where S_{kj} is the function evaluation value of sample K at measuring point J, S_{ij} is the value of posture I at measuring

Table 5. Cluster analysis and assignment results of pressure and pressure change rate

Interregional assignment	Pressure(kPa)					Pressure change rate(%)				
	0-0.5	0.5-0.8	0.8-1	1-1.2	1.2-2.3	0-10	10-30	30-60	60-80	80-300
	1	3	5	3	1	5	4	3	2	1

Table 6. Function evaluation value of pressure value

Measurement point	A	B	C	D	E	F	G	H	I	J	A-J
Sample 1	1.67	3.00	3.67	5.00	5.00	1.00	3.67	4.33	3.33	3.33	34.00
Sample 1	1.67	5.00	4.67	2.67	5.00	1.33	4.33	4.00	2.67	4.33	35.67
Sample 1	1.67	4.67	4.67	4.00	5.00	1.00	4.33	4.00	3.17	4.33	36.83
Sample 1	2.67	1.33	2.00	1.33	1.00	1.00	2.33	2.33	4.33	3.67	22.00

Table 7. Function evaluation value of pressure change rate

Measurement point	A	B	C	D	E	F	G	H	I	J	A-J
Sample 1	1.83	4.17	4.00	4.00	4.00	4.17	3.83	3.67	4.17	4.00	37.83
Sample 1	1.83	4.17	4.00	3.83	3.50	3.50	3.33	3.33	3.67	3.83	35.00
Sample 1	2.83	3.83	4.00	4.17	3.33	2.67	4.00	3.33	4.00	3.83	36.00
Sample 1	1.50	3.50	2.33	3.67	3.50	3.67	2.50	3.50	3.83	3.67	31.67

point J, *k* is 1–4 samples, *j* is a total of 10 measuring points A-J, and *i* is six postures.

According to formula 1, the function evaluation values of 10 measuring points of four samples were calculated, as shown in Table 6 and Table 7 .

From the analysis of the pressure value, the function evaluation values of different samples were arranged in descending order: samples 3, 2, 1, and 4. That is, for yoga leggings, the better the fabric elasticity, the better the overall pressure comfort of the garment. From the analysis of the pressure change rate, the functional evaluation values of different samples were arranged in descending order: samples 1, 3, 2, and 4. That is, clothing designed with a partition structure has the best pressure stability in yoga.

It can be seen that in the production of yoga leggings, fabrics with good elasticity are used, and the clothing pressure values of different parts of the human body are the closest. In yoga leggings designed with a partitioned structure based on the deformation of the human skin during yoga exercise, the elasticity of the fabric in different clothing areas forms a gradient change, which corresponds to the deformation of the skin. In yoga, clothing pressure changes the least, basically fluctuating in a stable small range.

3.4.3 Elastic distribution of partition structure design of seamless yoga leggings

First, compare the functional evaluation values of different samples at 10 measuring points, select two samples with higher functional evaluation values (pressure values), such as sample 2 and sample 3 with higher functional evaluation values at point B. Second, compare the functional evaluation values (pressure change rate) of the two samples to determine the sample with the largest functional evaluation value of the measuring point. The selection results of each measurement point are as follows: sample 1 (D, E, F, H, I), sample 2 (B, C, J), and sample 3 (A, C, G, J). It can be seen from the results that among the 10 measuring points, only five measuring points in sample 1 have the best functional evaluation values. Therefore, determining the elasticity of the fabric according to the skin deformation can improve the pressure comfort of the garment, but it is not suitable for some areas.

Taking the garment structure of sample 1 as the optimization object, in the measurement points (D, E, F, H, I), high-elastic fabric (fabric 1) is used in the area of points F and H, and medium-stretch fabric is selected at point D (fabric 5). Choose low-stretch fabrics (fabric 4, fabric 3) at points E and I. Among the measuring points (B, C, J), sample 2 has a higher functional evaluation value, and the high-elastic fabric (fabric 1) is selected. Among the measurement points (A, G), sample 3 has the highest functional evaluation value, and the elasticity of the fabric used is better than that of samples 1 and 2. The fabric elasticity with the maximum functional evaluation value at 10 measuring points is integrated, and the fabric elasticity demand of the partition structure of seamless yoga legging is optimized, as shown in Figure 13.

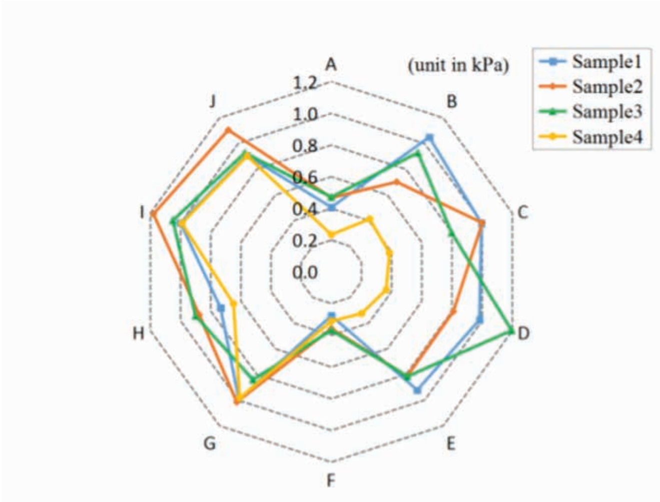

Figure 13. Yoga leggings model with seamless partition structure design

It can be seen from Figure 12 that the waist and the front of the thigh have the highest requirements for fabric stretch performance, followed by the abdomen, the outside of the hip line, the back of the calf, the front of the knee, the back of the thigh, and finally the hips, the inner thigh, and the front of the calf.

The waist belongs to the center point of muscle belt and fat, which is easy to cause muscle squeezing. It is necessary to choose soft and elastic fabrics and reduce the thickness of the fabrics as much as possible. Moreover, the waist can move in multiple angles with a large range. It is necessary to further divide the waist area and study the needs of different regions for fabric elasticity.

4. Conclusions

In this paper, the trouser was designed with a partition structure based on the skin deformation of the lower limbs of the human body during yoga exercise, and two seamless yoga leggings have been developed. The clothing pressures of two newly developed yoga leggings and two commercial yoga leggings were measured on 10 body positions of 8 subjects. The main conclusions are as follows:

The newly developed seamless yoga leggings exert skin pressure on different parts of less than 1.6 kPa. Compared with commercial yoga leggings, yoga leggings designed with a partition structure have a more stable pressure value during dynamic movement, which shows that the newly developed seamless yoga legging provides better comfort for the wearer.

A design model of yoga leggings with a seamless partition structure is constructed, and the clothing is designed with partition structure according to elastic requirements. From large to small, they are: waist, front of thigh; abdomen, outside of hip, back of thigh, knee, back of calf; buttocks; inner leg, reverse side of knee circumference; front side of calf. It provides a reference basis for the functional partition design of seamless yoga leggings.

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