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A Study on the Jacket Blocks for Adult Males according to their Somatotypes XS, YI, Yd, and AD2+

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Abstract

The purpose of this study was to provide dress forms and jacket blocks for adult males based on the analysis of their somatotypes. As the result of the research conducted for this study that was based on 1290 males of 20 to 54 years-old, the shapes of adult male were 20 and each body shape was classified by size factor, height and chest girth. Also, master sizes were selected considering appearance frequency. XS type (master size: height 165cm and chest circumference 88cm), Yd type (master size: height 170cm and chest circumference 91cm), YI and AD2 types (master size: height 170cm and chest circumference 94cm) were selected to develop dress forms and their jacket blocks in this study.

The procedure and results were follows;

1. The dress forms of XS, Yd, YI and AD2 types were produced base on means of 61 body measurements and cross sections of shoulder, chest, waist, hip of subjects belong to each somatotype.

2. New jacket blocks for XS, Yd, YI and AD2 types were developed based on the body surface developments through draping and the results of comparative investigation on the existing jacket blocks by wearing test. Also the drafting methods of new jacket blocks were provided.

3. The sensory evaluation by wearing test showed that the developed jacket blocks were estimated more highly in terms of chest's allowance, the front width's allowance, neck wrinkle, front allowance and overall appearance's fitness items than existing jacket blocks.

Key Words : the body shape and size, somatotype, XS, Yd, YI and AD2 types, dress form, jacket block, wearing test

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Ⅰ. Purpose of Study

In order to satisfy a heightened level of customers' desire for the fitness of measurements of ready-to-wear and to help apparel producers set up their marketing strategies for mass customization, Somatotypes need be classified and basic patterns for each somatotype developed [1].

Somatotypes may be classified according to the size and shape of human body. So, in order to reduce customers' dissatisfaction with the measurements of ready-to-wear, it is necessary to prepare measurement standards applicable to diverse and subdivided somatotypes including the sizes and shapes of human bodies[2]. In particular, in order to more correctly understand somatotypes in consideration for the shapes including posture factors of human body, the frontage and lateral of human body need be separately examined. In this regard, YooKyung Choi ·and SunWon Lee[3] researched separately the frontage and lateral of the body of adult females so as to know the shapes and sizes of their body and classify their somatotypes. JaeEun Jung and SoonWon Lee[4], JaeEun Jung and GuJa Kim[5] did the same as for adult males. If using the classification of such subdivided somatotypes, development is made of basic patterns of ready-to-wear clothes for each somatotype, useful and basic data will be provided for the mass customization by apparel producers.

Somatotype-specific patterns are usually derived from the human body of representatives of the appropriate somatotype. Sometimes they are derived from such dress forms as reproduce human body types representing each somatotype, since suitable patterns of ready-to-wear clothes should be earned not from a certain individual but a group of multiple unspecified customers.

Somatotype and pattern researches[6][7][8] have been recently conducted on human body types, which are reproduced using 3-dimensional scanned materials, but there are yet some limits to the use of such materials in enterprises or colleges. Therefore, in the modern apparel industry, dress forms are used as an important production element to design, manufacture of patterns and samples, inspection of products. Also, dress forms are very extensively used for fashion-related education in colleges. Accordingly, dress forms for females have been so actively developed that even multi-size body has been produced. However, the development of dress forms for males are relatively poor.

At this juncture, this research aims to, based on previous researches into the classification of somatotypes for adult males, produce dress forms and develop their jacket blocks for each somatotype.

The human body shapes of males aged 20 to 54 were classified into a total of 20 somatotypes including four somatotypes for the frontage(X, Y, H, and A types) and five for the lateral(S, I, d, D1, and D2 types) of the body. Then, each somatotype, classifying by human body shapes, was classified according their size factor, height and chest circumference. Moreover, master sizes for each somatotype are set up considering appearance frequency, to produce master patterns of male costumes for each somatotype.

In this research, based on the results of the researches, dress forms are produced and their jacket blocks are developed for somatotypes XS, Yd, YI and AD2 of adult males, which are frequently used for the 20 somatotypes derived from previous researches.

II. Methodology

1. Producing dress forms

Based on the results of previous researches, dress forms are produced for XS type (master size: height 165cm and chest circumference 88cm), Yd type (master size: height 170cm and chest circumference 91cm), YI and AD2 types (master size: height 170cm and chest circumference 94cm). In order to produce dress forms, the average was calculated of a total of 61 human body measurements including height, chest circumference, waist circumference and hip circumference taken from the subjects, whose body is covered by master sizes of each somatotype. Then, the cross sections were earned of the chest, waist, and hip of the subjects. Miz Industry (represented by JiRyeon Lee) was requested to produce the dress forms.

2. Developing jacket blocks

First, in order to develop jacket blocks for each somatotype, body surface were approximately developed for the dress forms for each somatotype through draping. And the primary block including the minimum allowance was developed by amending and correcting body surface development through wearing test.

Second, in order to decide on appropriate allowance of each region, the existing jacket blocks for males were compared and examined through wearing test of the appearance.

The jacket blocks were compared for these three styles: British style (Aldrich)[9] in which the drafting of male costume patterns are advanced; Japanese style (produced by Cultural Costume Academy)[10]; and Jeonglm Lee and YunJa Nam style (Lee and Nam style, below)[11], which amends and applies the Müller style of Germany[12], which has been frequently used as a male costume basic pattern, to the somatotype of Koreans.

Third, based on the developed primary jacket blocks and considering appropriate allowances of the jacket, the final jacket block was developed and then the drafting method of the jacket blocks for each somatotype was suggested.

Fourth, in order to objectively confirm the suitability of research jacket blocks for each somatotype, a wearing test was conducted on the appearance of dress forms for each somatotype. Comparison was made with Lee and Nam style, which was the most highly evaluated from among the existing three jacket blocks.

In the wearing test, evaluation was conducted on a total of 21 measurement items by five graduate students majoring in costume studies employing 5-point rating scales.

3. Analyzing Data

The results of the wearing test were analyzed with SPSS PC+. Average and standard deviation were calculated in each item of sensory evaluation, and the significant difference between research jacket blocks and existing jacket blocks was verified through variance analysis. Moreover, the internal consistency reliability test method was employed to confirm the matching quality among test subjects.

III. Results and Discussion

1. Producing dress forms

In order to produce dress forms, the average was calculated of a total of 61 human body

measurements including height, chest circumference, waist circumference and hip circumference taken from the subjects, whose body is covered by master sizes of each somatotype. Then, the cross sections were earned of the chest, waist, and hip<Fig. 1>.

<Tab. 1> shows the photos of dress forms and major measurements of the produced XS, Yd, YI and AD2 types. Of the horizontal circumference lines marked on dress forms, the uppermost line is chest line, the second uppermost line is flank waist line, and the last is back waist line.

The followings are the characteristics of each somatotype.

Compared to other types, XS type has the narrowest at the frontage, a big difference between shoulder width and hip width and between the abdomen width and flank waist width, and rising shoulder. The lateral is the thinnest and has optically protruded back and lowly protruded abdomen.

The frontage of Yd type is characterized by wide and drooping shoulder, whose width is largely different from flank waist width. The lateral is characterized by upright bust and rarely protruded abdomen, plain front, and protruded hip.

The frontage of YI type is characterized by wide and drooping shoulder, whose width is largely different from flank waist width. The lateral is plain on both the front and the back.

The frontage of AD2 type is characterized by narrow shoulder, wide hip, and wide abdomen. The lateral is characterized by the bust, which is somewhat bent backward, and the waist and the abdomen, which are protruded forward.

2. Developing jacket blocks

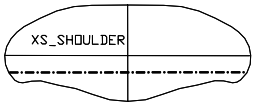
Concerning dress forms for each somatotype, the primary blocks were developed through body surface developments by draping. And based on the developed primary blocks and considering appropriate allowances of the jacket, final jacket blocks were developed after examining the existing jacket blocks.

1) Developing primary block through draping

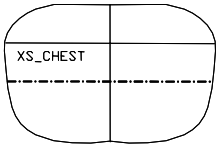
In order to develop jacket blocks for each somatotype, body surface was approximately developed for the dress forms for each somatotype through draping. Body surface development for each somatotype is shown in Fig. 2, which is produced when each part of front and back is connected after chest line is made horizontal. Here, parts of front and back were arranged in such a manner that the parts might not be overlapped.

Fig. 2 shows body surface development, which has two reference lines on the waist, of which the lower line, called natural waist line, refers to the line serving as the reference line when a male's body is measured and the upper one, called the most narrow waist line, refers to the waist line on the slenderest region seen from the front. As for females, when patterns are drafted and when human body is measured, the position of the slenderest waist seen from the front serves as the waist line. In contrast, as for males, no specific references are established.

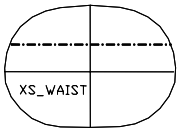
<XS type>



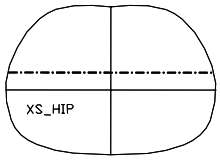
Shoulder cross section



Chest cross section



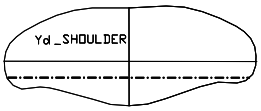
Waist cross section



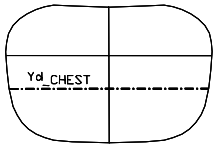
Hip cross section

Item	Mean	Item	Mean
Shoulder Width	35.6	Waist Width	24.6
Shoulder Depth	14.0	Waist Depth	17.9
Shoulder Depth, Back	9.8	Waist Depth, Back	5.8
Shoulder Depth, Front	4.2	Waist Depth, Front	12.1
		Waist Circum.	71.4
Chest Width	30.5	Hip Width	30.5
Chest Depth	20.2	Hip Depth	21.6
Chest Depth, Back	11.4	Hip Depth, Back	9.7
Chest Depth, Front	9.0	Hip Depth, Front	11.9
Chest Circum.	88.1	Hip Circum.	86.6

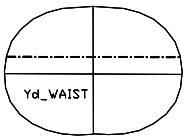
<Yd type>



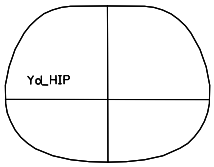
Shoulder cross section



Chest cross section



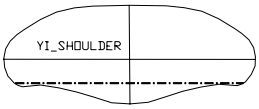
Waist cross section



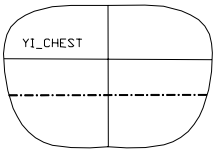
Hip cross section

Item	Mean	Item	Mean
Shoulder Width	38.4	Waist Width	27.2
Shoulder Depth	15.0	Waist Depth	19.8
Shoulder Depth, Back	10.8	Waist Depth, Back	7.9
Shoulder Depth, Front	4.2	Waist Depth, Front	11.9
		Waist Circum.	77.5
Chest Width	31.5	Hip Width	31.2
Chest Depth	20.8	Hip Depth	23.9
Chest Depth, Back	12.7	Hip Depth, Back	12.9
Chest Depth, Front	8.1	Hip Depth, Front	11.9
Chest Circum.	91.4	Hip Circum.	91.5

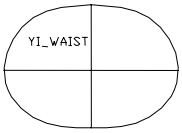
<YI type>



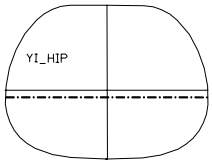
Shoulder cross section



Chest cross section



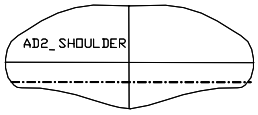
Waist cross section



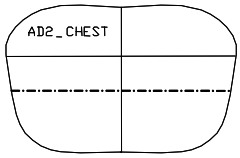
Hip cross section

Item	Mean	Item	Mean
Shoulder Width	39.5	Waist Width	28.1
Shoulder Depth	15.4	Waist Depth	21.0
Shoulder Depth, Back	12.2	Waist Depth, Back	9.9
Shoulder Depth, Front	3.2	Waist Depth, Front	11.1
		Waist Circum.	81.7
Chest Width	32.5	Hip Width	31.8
Chest Depth	22.1	Hip Depth	24.2
Chest Depth, Back	13.9	Hip Depth, Back	14.2
Chest Depth, Front	8.2	Hip Depth, Front	9.9
Chest Circum.	93.9	Hip Circum.	93.7

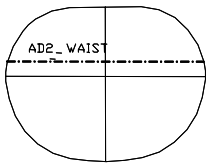
<AD2 type>



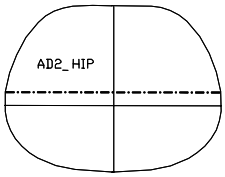
Shoulder cross section



Chest cross section



Waist cross section



Hip cross section

Item	Mean	Item	Mean
Shoulder Width	36.2	Waist Width	29.2
Shoulder Depth	14.7	Waist Depth	22.6
Shoulder Depth, Back	10.8	Waist Depth, Back	8.1
Shoulder Depth, Front	3.9	Waist Depth, Front	14.5
		Waist circumference	84.8
Chest Width	33.0	Hip Width	33.2
Chest Depth	21.2	Hip Depth	25.1
Chest Depth, Back	12.6	Hip Depth, Back	12.1
Chest Depth, Front	8.7	Hip Depth, Front	13.0
Chest Circum.	94.5	Hip Circum.	95.8

<Figure 1> The cross sections of XS, Yd, YI, and AD2 types

<Table 1> The pictures and major measurements of the dress forms

<XS>

[frontage view]

[Lateral view]

Height	164.4cm	Chest Circum.	88.1cm

Shoulder Length	35.6cm	Chest Depth	20.2cm
Waist Width	24.4cm	Waist Depth	17.9cm
Hip Width	30.5cm	Hip Depth	21.6cm

<Yd type>

[frontage view]

[Lateral view]

Height	171.0cm	Chest Circum.	91.4cm

Shoulder Length	38.4cm	Chest Depth	20.8cm
Waist Width	25.7cm	Waist Depth	19.8cm
Hip Width	30.7cm	Hip Depth	23.9m

<YI type>

[frontage view]

[Lateral view]

Height	169.5cm	Chest Circumf.	93.9cm

Shoulder Length	39.5cm	Chest Depth	22.1cm
Waist Width	27.0cm	Waist Depth	21.0cm
Hip Width	31.8cm	Hip Depth	24.2cm

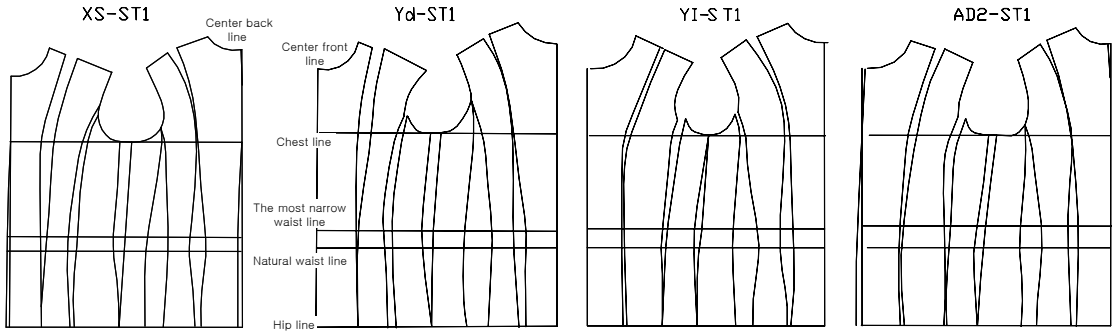
<AD2 type>

[frontage view]

[Lateral view]

Height	170.0cm	Chest Circum.	94.8cm

Shoulder Length	36.2cm	Chest Depth	21.2cm
Waist Width	26.2cm	Waist Depth	22.6cm
Hip Width	33.2cm	Hip Depth	25.1cm



<XS type> <Yd type> <YI type> <AD2 type>

<Figure 2> The body surface developments through draping

In other words, when human body is measured, natural waist line serves as the reference; when basic pattern of an upper garment is drafted, the most narrow waist line is set above the said reference.

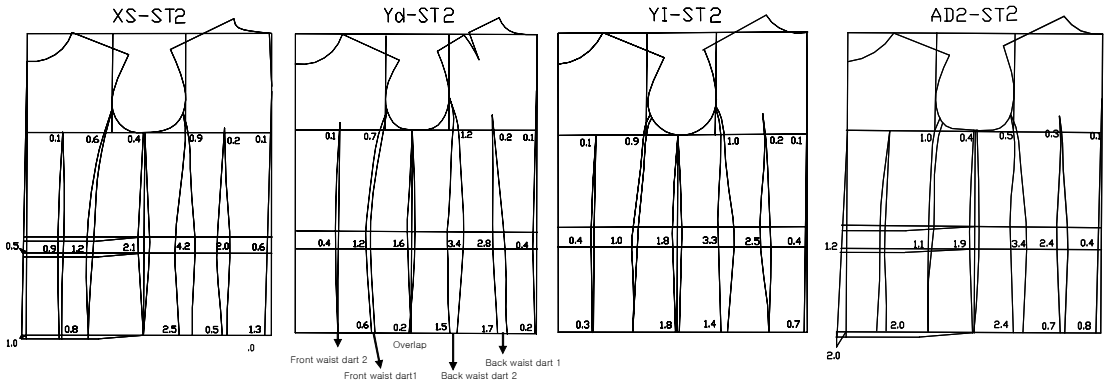
In this research, British style and Japanese style, which are chosen as comparative jacket blocks, set the waist line, which serves as the reference when jacket blocks are drafted, 4cm and 3cm higher, respectively, than the waist line measured of human body. Lee and Nam style employs a conversion formula using the height and sets the waist line 2cm or 3cm higher than the waist line measured of human body. It calls for the establishment of clear reference to waist line when human body is measured to compose the patterns of upper garments for males. That is, when sensory evaluation is applied to the said three kinds of jacket block, the appropriate position of waist line shall be decided on a jacket.

At the next stage, the primary jacket block was produced after half of the chest circumference is added with the allowance of 5cm and the quantity and position of darts generated from body surface developed through draping are re-adjusted, through wearing test,

The allowance of 5cm of half of the chest circumference is the minimum to draft blocks up to hip line. The developed primary block is shown in Fig. 3. And the layered jacket block of each type reference in YI type is shown in Fig. 4. As for the position of darts, re-adjusting was made so that darts could be naturally formed over and under the waist; as a result, two waist darts were set up on front block and back block. Furthermore, darts were also set up on center back line so that center back line could follow the curves of human body.

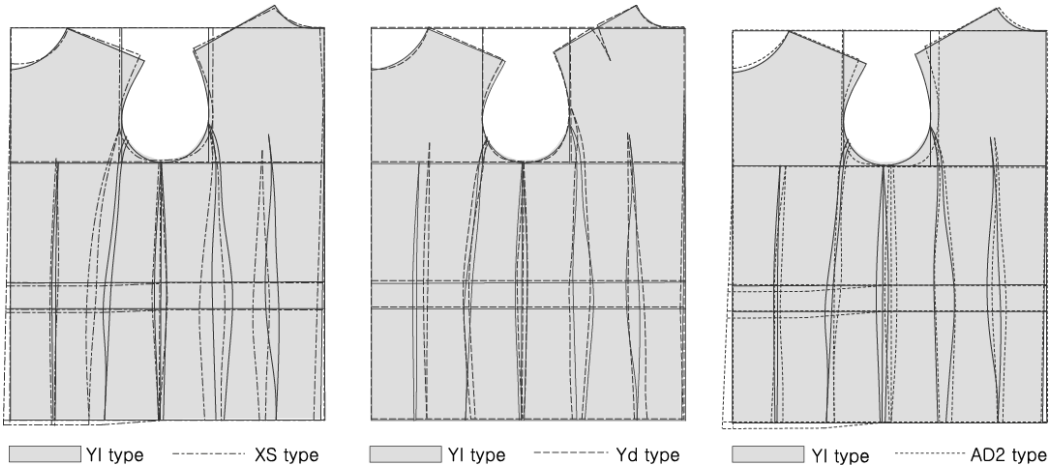
The allowances of waist lines and hip line were set up taking into account the relative ratio of chest circumference, waist circumference, and hip circumference, so that natural external beautiful sights could be maintained. Tab. 2 shows the allowances of waist circumference and hip circumference of a jacket block for each somatotype.

XS type is a thin one, in which the difference between chest circumference and waist circumference is significant and so, the allowance of waist circumference is large. AD2 type was one whose waist and abdomen were protruded forward and in which the allowance of waist circumference was small. Yd type was one whose hip were



<XS type> <Yd type> <YI type> <AD2 type>

<Figure 3> The primary jacket blocks with the allowance of 5cm in half of the chest circum.



<Figure 4> The layered jacket blocks of each type reference in YI type

protruded backward and AD2 type was one whose hip circumference was bigger than that of other types whose chest circumference was the same; so, the allowance of hip circumference of Yd type and AD2 were small. When, based on these data, fitter or looser jackets are produced, the quantity of dart may be adjusted.

The following is the characteristics of human body of each somatotype, based on the primary jacket blocks for each somatotype shown in Fig. 3.

XS type tends to bend backward, in which the vertical length from side neck point to chest line at front block is longer than that from side neck point to chest line at back block.

Yd type and YI type have long and drooping shoulder, no protruded waist and abdomen. In these types, center front line is vertical to chest circumference line. In Yd type, hip are protruded backward and so, the quantity of center back dart on hip line is less than that of other types.

AD2 type has forward protruded waist and abdomen, and XS type has the lower abdomen

<Table 2> The allowance of each somatotype (cm)

Item \ Somatotype	XS	Yd	YI	AD2
Half of Waist Circum.	4.9	4.2	4.1	3.2
Half of Hip Circum.	4.0	3.4	4.5	3.0

protruded forward because of its posture, in which when chest lines are horizontal, center front line is protruded forward under chest line. Such a tendency is more clearly seen not in XS type but in AD2 type, whose abdomen is more protruded.

2) Examining existing jacket blocks

In order to decide the allowance which is the most suitable to jacket block, wearing test was applied to the existing jacket blocks like Lee and Nam style, Japanese style, and British style.

The three existing jacket blocks were drafted to determine dress forms for each somatotype. Then, 16 measurements of the jacket blocks were compared. The results suggest that the basic pattern of Lee and Nam style has the greater allowances of chest circumference and armhole depth than any others of the three basic patterns do and that British style has the least measurements in most items. It implies that British style is the fittest basic pattern. Japanese style has a mediocre level of allowances of armhole depth and chest region and the least back neck width and front neck width compared to other basic patterns.

The following is the results of comparing the three kinds of jacket blocks through conducting wearing test.

As for XS type, it was found that Lee and Nam style had suitable allowances in chest circumference, hip circumference, armhole circumference, front width and back width. Poor points were given to all the three kinds of jacket blocks concerning extra wrinkles of neck line and naturalness, which implies that neck line is not natural in all the three. These results may be brought about by the characteristics of XS type that upper part of the back is bent forward. And the characteristic of the abdomen protruded low leads to the tendency of side lines being bent forward as it goes to the lower end in all the three kinds of jacket blocks. This has an effect on jacket blocks, whose center front gets open and side panel is bent forward is it goes lower.

In the case of Yd type and YI type, Lee and Nam style has suitable allowances in chest circumference, waist circumference, hip circumference, armhole circumference, and back width. Japanese style has more suitable allowances in front width. Lee and Nam style has much allowance near to neck circumference and, resultantly, much allowance in the front width since measurements of front neck width increase so as to draft without chest slant. It was also evaluated that British style was not suitable since, in general, it has small allowances. YI type has wide drooping shoulder; so, both its shoulder slant and the position of its shoulder point were lowly evaluated as for the three patterns.

In the case of AD2 type, it was evaluated that Lee and Nam style has appropriate allowances but earns poor points for chest line, waist line, and side seam line since AD2 type is characterized by protruded waist and abdomen. Moreover, shoulder width of AD2 type is smaller than that

of other somatotypes, but it was evaluated that the shoulder, which is longer than actual shoulder, is suitable, considering overall silhouette.

As for jacket blocks, the position of waist line, which is reference against back waist length, is set up 4cm higher than waist line by British style and 3cm higher by Japanese style, when human body is measured, and 2~3cm higher by Lee and Nam style, which calculates the height through the formula of height/4+2cm. Wearing test finds that Japanese style and Lee and Nam style have more appropriate position of waist line than British style does and that there is no significant difference between Japanese style and Lee and Nam style as for position of waist line.

According to Lee and Nam style calculation, when the height is 170cm, the back waist length is 44.5cm long. The following is the relationship between these measurements and actually measured back waist length. In XS type, back waist length is 45.4cm; in Yd type, YI type, and AD2 type, back waist length is 46.3~46.7cm. It shows that calculated back waist length is about 2cm shorter than actually measured back waist length. And according to Japanese style 3cm shorter than actually measured back waist length. Therefore, it was concluded that jacket block draft sets up back length about 2~3cm higher than human body-measured waist line. Accordingly, in order to decide the position of waist line of research jacket blocks, preliminary wearing test was conducted with back waist length maintained at (height/4+1cm) and (height/4+2cm). The results suggests that back waist length (height/4+2cm) is more appropriate.

The above-mentioned wearing test shows that Lee and Nam style has relatively suitable allowances in chest circumference and armhole circumference. But Yd type and YI type has not suitable shoulder since they have wide drooping shoulder, and that XS type has not suitable neck line and side line since it has the bust bent backward and the abdomen lowly protruded. Furthermore, AD2 type has not suitable side line since it has the abdomen considerably protruded forward.

3) Developing research jacket blocks

Based on the primary jacket blocks developed previous step and considering appropriate allowances of the jacket devised through comparing the existing three jacket blocks, final jacket blocks were developed, And these blocks were amended and corrected though two times of wearing test.

The following is how to draft jacket blocks, taking into account the characteristics of each somatotype.

Drafting methods were suggested using chest circumference and height, and the quantity and position of darts in the primary jacket block were appropriately adjusted according to jacket block draft.

In all the somatotypes, the center of front waist dart 1 was moved 1 cm toward center front from the bisection point of front waist line, and front waist dart 2 to the position of side seam line. Back waist dart 1 was moved onto center back line and back waist dart 2 was moved to the position of side seam line. Front waist dart 1 was set to 1.2 cm irrespective of the quantity of dart in each somatotype because the dart was not fit but indented for aesthetic reasons. The fitness of front block was adjusted to front waist dart 2. Back waist dart 2 was reduced by 0.5cm on the right and the left so that side seam line could be gently curved.

Shoulder length was set to 'human body shoulder length+1.5cm' in all the somatotypes

excluding AD2 type and the pad part of 1.2cm was considering. In AD type, which is characterized by narrow shoulder, shoulder length is 'human body shoulder length+2.0cm'. Part of back shoulder dart was given armhole allowance and part of it given ease on the shoulder.

The same drafting methods were applied to Yd type and YI type because back hip were more protruded in Yd type rather than in YI type, which might be complemented by the allowance of hip line.

(1) XS type

(B = Chest circumference, H = Height)

① Scye depth = (B/10+12)+3 cm

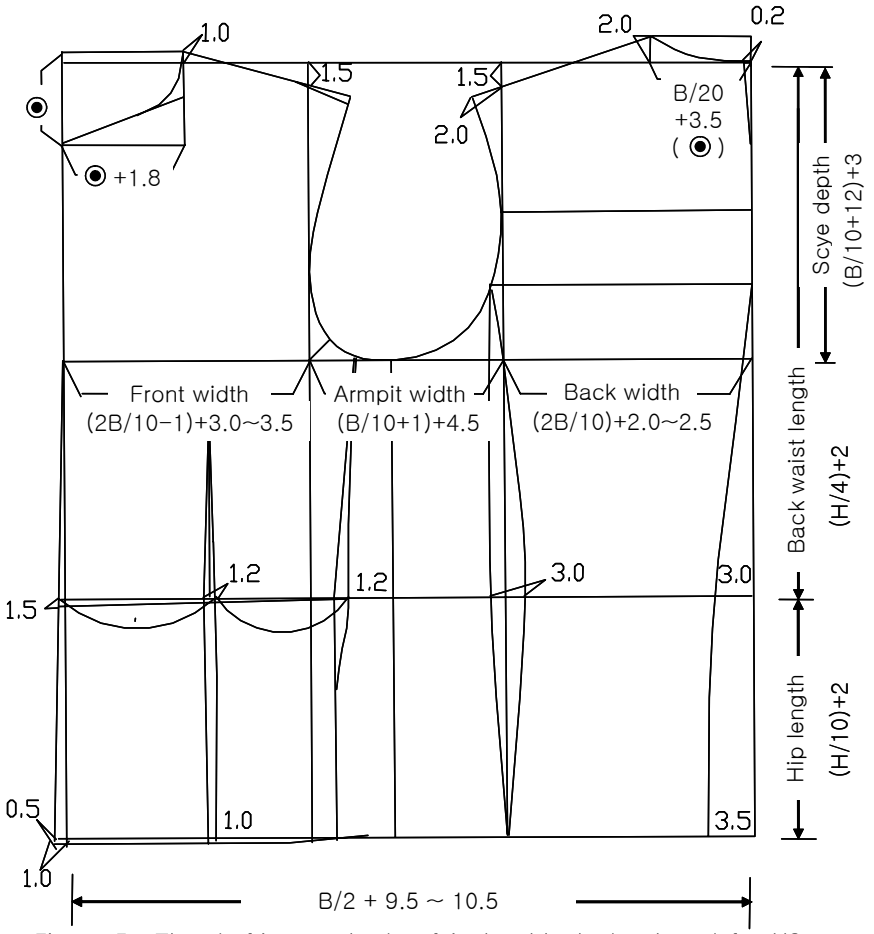
② Back Waist length = (H/4+2) cm

③ In lateral, it is a thin, so armpit width was reduced.

Front width = (2B/10-1) + 3.0~3.5 cm, Back width = (2B/10) + 2.0~2.5 cm

Armpit width = (B/10+1) + 4.5 cm

④ Measurements of front neck width were smaller compared to the existing jacket blocks, so as to reduce too much allowance on front



<Figure 5> The drafting methods of jacket block developed for XS type

neck part because back upper part was bent forward in this type.

Back neck width = (B/20 + 3.5) cm, Front neck width = (Back neck width + 1.8) cm

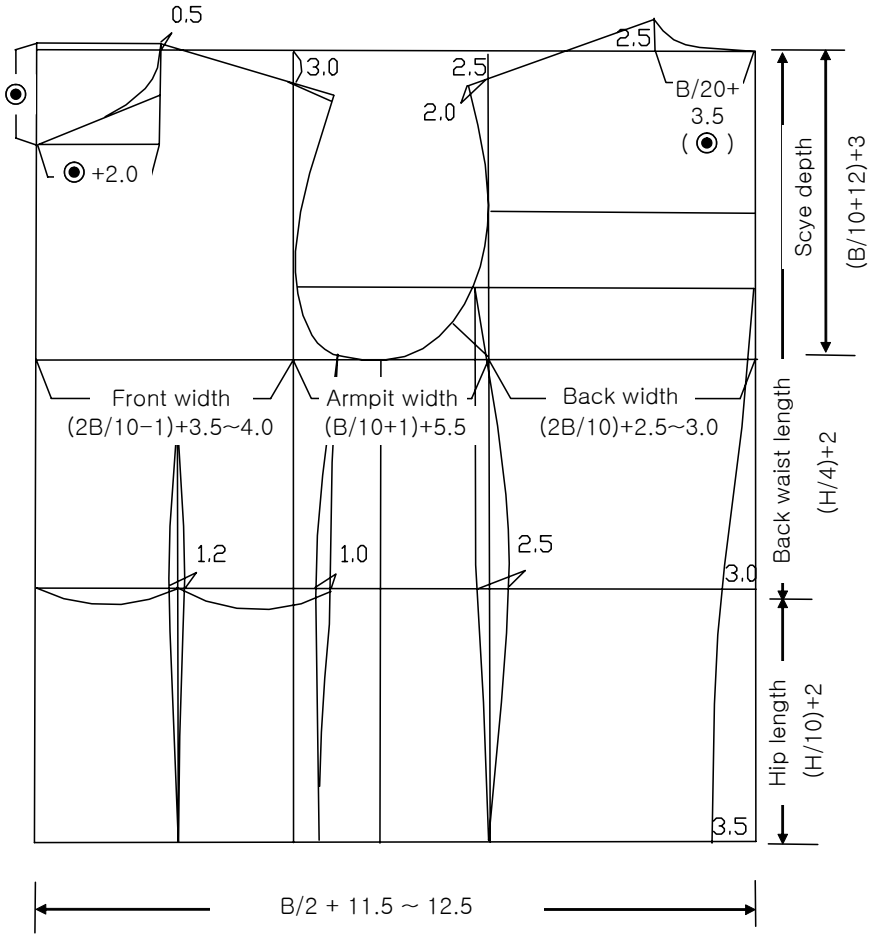
⑤ It was strongly inclined to bend backward, so the horizontal reference line for setting up front neck width was heightened by 1cm from the horizontal reference line for setting up back neck width.

⑥ It had rising shoulder, so drooping measurements of shoulder slant needed be shortened.

⑦ In this type, whose abdomen is lowly protruded, since when center front line is set vertical, sidelines would be bent forward at its lower end, center front line needed be extended by 0.5cm and front drooping offset on waist part. Such an extension of center front line will give allowance to side line under waist, so front waist dart 1 will be formed as far as hip line.

⑧ Front shoulder length = Back shoulder length - 1.0 cm

The detailed drafting methods are present in fig. 5



<Figure 6> The drafting method of jacket block developed for Yd type and Yl type

(2) Yd type and Yl type

(B = Chest circumference, H = Height)

① Scye depth = (B/10+12)+3 cm

② Back Waist length = (H/4+2) cm

③ Shoulder width was big, so allowances for the back width and front width needed be increased.

Front width = (2B/10-1)+3.5-4.0 cm, Back width = (2B/10)+2.5-3.0 cm

Armpit width = (B/10+1) + 5.5 cm

④ Back neck width = (B/20 + 3.5) cm, Front neck width = (Back neck width + 2.0)

⑤ There was drooping shoulder, so drooping measurements of shoulder slant needed be multiplied.

⑥ Front shoulder length = Back shoulder length - 0.7cm

The detailed drafting methods are present in fig. 6.

(3) AD2 type

(B = Chest circumference, H = Height)

① Scye depth = (B/10+12)+3 cm

② Back Waist length = (H/4+2) cm

③ In this type, shoulder width was small, but chest width and back width were not shortened because narrow shoulder was complemented by wearing a jacket.

Front width = (2B/10-1)+3.0~3.5 cm, Back width = (2B/10)+2.0~2.5 cm

Armpit width = (B/10+1) + 5.5 cm

④ Back neck width = (B/20 + 3.5) cm, Front neck width = (Back neck width + 2.0)

⑤ It tended to bend backward, so the horizontal reference line for setting up front neck width was heightened by 0.8cm from the horizontal reference line for setting up back neck width.

⑥ In this type, the abdomen was much protruded. So, center front line was extended by 1.0~2.0 cm and front drooping was applied on waist part.

⑦ Front shoulder length = Back shoulder length - 0.7cm

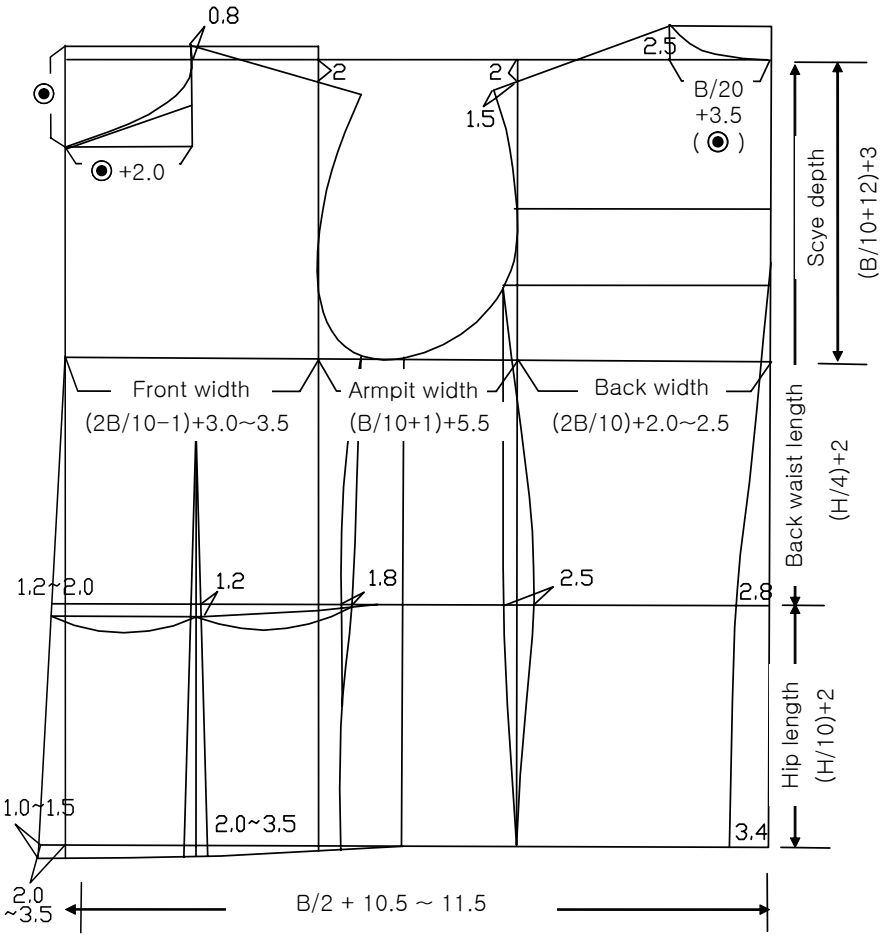
The detailed drafting methods are present in fig. 7.

4) Sensory test on the appearance of research jacket blocks

In order to get objective evaluation of the developed research jacket blocks, the wearing test about appearance was conducted on jacket blocks of XS type, Yd/Yl type and AD2 type, compared to Lee and Nam style, which got the best evaluation from among the existing three kinds ofjacket blockss.

To examine the reliability of the testers, comprehensive reliability coefficient was calculated. The results show that average reliability point of both the existing and research jacket blocks is greater than 0.7. It implies that the results of wearing test are objective and reliable. Moreover, t-test was conducted on each wearing test item to get average point and t value of two jacket blocks. Tab. 3 shows the results. Here, drafting methods for the jacket blocks of Yd type and Yl type were the same, so the results of sensory evaluation of the two somatotypes were added up and analyzed.

As a results, for all somatotypes, in terms of chest's allowance items and the front width's allowance items, research jacket blocks got statistically higher evaluation than the existing jacket block. The reasons why such results were earned of chest circumference's allowance in XS type and AD2 type, in which research jacket blocks and the existing jacket blocks were the same, are that measurements of the existing jacket blocks' front neck width were so big that the allowance was inclined to front center and,



<Figure 7> The drafting methods of jacket block developed for AD2 type

resultantly, allowances on sidelines were small. For the same reason, in terms of the front width's allowance items, the existing jacket blocks earned lower evaluation than research jacket blocks in XS type and AD2 type, which had the same allowances. Furthermore, in terms of line position items of neck line and chest line and extra wrinkles items of neck line, research jacket blocks earned better evaluation than the existing jacket blocks because measurements of the existing jacket blocks' front neck width are greater and larger allowance is formed on center front.

The following is the results of sensory evaluation for each somatotype.

In XS type, in terms of the reference line of waist line and side seam line, research jacket block earned more statistically significant evaluation than the existing jacket block, in which side lines were more bent forward and

waist line was more lifted as it went to the lower end, because the lateral had such tendency that the bust was pulled back and the abdomen was less protruded. Moreover, in XS type, which has rising shoulder and back upper part which is slightly bent forward, in terms of shoulder line and shoulder point position items, research jacket block earned more statistically significant evaluation than the existing jacket block. Consequently, in XS type, in terms of front allowance and overall appearance's fitness items, research jacket block earns more statistically significant evaluation than the existing jacket block.

Yd type and Yl type have wide drooping shoulders. Therefore, in terms of shoulder line and shoulder point's position, front armhole's extra wrinkles, and back armhole' extra wrinkles, research jacket block earned more statistically significant evaluation than the existing jacket block. Consequently, in terms of front and back allowance, overall appearance's fitness items, research jacket block earned more statistically significant evaluation than the existing jacket block.

AD2 type is characterized by the fact that the abdomen is protruded forward, waist line and hip line are lifted, and side seam line is bent forward. Therefore, in terms of the reference line of waist line, hip line, and side seam line, research jacket block earned more statistically significant evaluation than the existing jacket blocks. Consequently, in AD2 type, in terms of front allowance and overall appearance's fitness items, research jacket block earned more statistically significant evaluation than the existing jacket block.

<Table 3> The results of t-test between research and existing jacket blocks

Evaluated items	Somatotype / Jacket block	XS			Yl & Yd			AD2		
		Research	Existing	t value	Research	Existing	t value	Research	Existing	t value
allowance	1. Chest circum.	4.0	3.0	3.16*	4.1	3.1	3.03*	4.0	3.6	2.36*
	2. Hip circum.	4.0	3.8	1.00	3.9	3.3	2.15*	4.0	3.4	2.14
	3. Scye depth	4.0	3.4	1.50	4.0	3.3	2.69	4.2	3.8	1.00
	4. Front width	4.0	3.0	3.16*	4.0	2.9	6.13*	4.0	2.4	5.72**
	5. back width	4.0	3.6	1.63	3.9	3.4	2.06	4.2	2.8	2.36*
Line position	6. Center front	4.2	3.4	1.79	4.2	3.4	2.28	4.2	3.4	1.79
	7. Center back	4.2	3.8	1.41	4.2	3.8	2.12	4.2	3.2	1.41
	8. Neck	3.4	2.0	3.50**	4.0	2.1	8.14***	3.6	2.8	4.43**
	9. Chest	3.6	2.6	3.01*	3.8	2.2	5.00***	3.8	2.0	2.70*
	10. Waist	4.0	3.0	3.21*	3.7	2.5	3.50*	4.0	2.6	2.75*
	11. Hip	4.0	3.2	2.14	3.8	3.0	2.06	4.0	2.8	2.50*
	12. Shoulder	4.0	3.0	3.21*	4.0	3.0	4.74***	4.0	2.5	0.00
	13. Shoulder point	4.0	3.2	2.14	3.6	2.5	4.71***	3.8	3.6	0.63
	14. Armhole	4.0	3.6	1.00	4.1	3.2	5.40***	4.0	2.2	1.63
	15. Side seam	3.8	2.6	2.24*	3.7	3.2	1.39	3.8	2.5	3.54**
Wrinkle	16. Neck Line	4.0	2.2	3.67**	4.0	2.2	7.22***	3.8	2.8	5.66***
	17. Front armhole	4.2	3.6	1.34	4.2	3.4	3.01*	4.0	2.4	1.63
	18. Back armhole	4.0	4.0	0.00	4.2	2.7	4.57***	4.0	3.2	1.50
Allowance & fitness	19. Front	4.2	2.6	5.06***	4.2	2.4	8.54***	4.0	2.8	9.00***
	20. Back	4.0	3.4	1.50	4.2	3.2	4.16***	4.0	3.6	1.63
	21. overall	3.8	2.4	4.43**	4.1	2.3	9.86***	4.0	3.4	6.00***

┼ * $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

IV. Conclusion and suggestion

The purpose of this study were to provide dress forms and their jacket blocks for adult males, based on the analysis of their somatotypes. Previous researches classify the human body shapes of males aged 20 to 54 into a total of 20 somatotypes including four somatotypes for the front and five for the side of the body. Then, each somatotype, classifying by human body shapes, was classified according their size factor, height and chest circumference. Moreover, master sizes for each somatotype are set up considering appearance frequency, to produce master patterns of male costumes for each somatotype. In this research, based on the results of previous researches, dress forms are produced and their jacket blocks are developed for XS type (master size: height 165cm and chest circumference 88cm), Yd type (master size: height 170cm and chest circumference 91cm), YI and AD2 types (master size: height 170cm and chest circumference 94cm), which are frequently used for the 20 somatotypes derived from previous researches.

First, dress forms for XS, Yd, YI and AD2 types were produced. The average was calculated of a total of 61 human body measurements including height, chest circumference, waist circumference and hip circumference taken from the subjects, whose body is covered by master sizes of each somatotype. Then, the cross sections were earned of the chest, waist, and hip of the subjects. The following is the characteristics of each somatotype.

Compared to other types, XS type has the narrowest at the frontage, a big difference between shoulder width and hip width and between the abdomen width and flank waist width, and rising shoulder. The lateral is the thinnest and has optically protruded back and lowly protruded abdomen. The frontage of Yd type is characterized by wide and drooping shoulder, whose width is largely different from flank waist width. The lateral is characterized by upright bust and rarely protruded abdomen, plain front, and protruded hip. The frontage of YI type is characterized by wide and drooping shoulder, whose width is largely different from flank waist width. The lateral is plain on both the front and the back. The frontage of AD2 type is characterized by narrow shoulder, wide hip, and wide abdomen. The lateral is characterized by the bust, which is somewhat bent backward, and the waist and the abdomen, which are protruded forward.

Second, jacket blocks for each somatotype were developed. Concerning dress forms for each somatotype, the primary blocks were developed through body surface development by draping. And based on the developed primary blocks and considering appropriate allowances of the jacket, final jacket blocks were developed after examining the existing jacket blocks.

The following is the characteristics of human body of each somatotype, based on the primary jacket blocks for each somatotype.

XS type tends to bend backward, in which the vertical length from side neck point to chest line at front block is longer than that from side neck point to chest line at back block. Yd type and YI type have long and drooping shoulder, no protruded waist and abdomen. In these types, center front line is vertical to chest circumference line. In Yd type, hip are protruded backward and so, the quantity of center back dart on hip line is less than that of other types. AD2 type has forward protruded waist and abdomen, and XS type has the lower abdomen protruded forward because of its posture, in

which when chest lines are horizontal, center front line is protruded forward under chest line. Such a tendency is more clearly seen not in XS type but in AD2 type, whose abdomen is more protruded.

How to draft jacket blocks, taking into account the characteristics of each somatotype are presented in fig. 4~6.

In order to get objective evaluation of the developed research jacket blocks, the wearing test about appearance was conducted on jacket blocks of XS type, Yd/YI type and AD2 type, compared to Lee and Nam style, which got the best evaluation from among the existing three kinds of patterns. As a results, for all somatotypes, in terms of chest's allowance, the front width's allowance, neck wrinkle, front allowance and overall appearance's fitness items, research jacket blocks got statistically higher evaluation than the existing jacket block.

In this study, the dress forms and their jacket blocks of males' somatotype XS, Yd, YI and AD2 were developed based on the analysis of their body characteristic. These jacket blocks can be used when jacket patterns were drafted, like as single jacket, double jacket, dress jacket, casual jacket and so on. Also, these results can be foundation data to contribute to the improvement of fitness of clothing products.

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