A Study on the Comparison of Body Types among Korean, Chinese and Chosunjok College Women II

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Abstract

The purpose of this study is to compare the constitutions comparatively among Korean, Chinese and Chosunjok college women and thereby, provide for some basic data helpful to the development of export apparels befitting the Chinese consumers. For this purpose, Korean, Chinese and Chosunjok college women aged between 17 and 24 were sampled to be subject to body measurements. The measurement data obtained were indexed for each part of the body to set a total 29 constitutional indices, which were analyzed by factor dictating the major shapes of body. Thus, based on the constitutional factors constructed, the differences of constitution among three groups were comparatively analyzed. The results of this study can be summarized as follows;

It was found through this study that Korean college women had thickest neck compared with body size and had longer lower limbs compared with stature. Moreover, their lower body was absolutely longer than the other two groups, and thus, Korean college women were found slimmest. On the other hand, Chinese college women had most voluminous chest turned over most with most loose shoulders. Namely, Chinese college women had their upper bodies turned over with shorter and thicker body. They were obesest. Chosunjok college women had longest upper body but shortest breast length. Their lower body was obesest, and their body was longer compared with stature. Moreover, Chosunjok college women's lower limbs were shortest, while their arm scyes were small nearest body type.

Key words : body measurements, indices, body type, factor analysis.

I. Introduction

Today when the global markets are being formed briskly, the Chinese market adjacent to Korea is being spotlighted much. Besides, the *Chosunjok* amounting to about 2 million are well positioned as important minority group in

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China.

The constitutions differ wide depending on skeleton structures, thickness and position of subcutaneous fats and behavioral postures as well as on regions and social environments. Therefore, it is wise and necessary for Korean apparel exporters to take into due consideration such constitutional differences as differ depending on peoples or regions.

On the other hand, when we review the constitutions for our apparels to befit them, we need to depart from the "conventional size-only concept" and instead extract the elements of potential consumers' physical forms by indexing and proportioning the measurements of various physical parts and thereby, express the characteristics of consumers' constitutions in a numeric way or language.[1,2]

With such a basic conception in mind, this study aimed to help those Korean textile businesses who have advanced or are advancing into the Chinese market to develop their apparels befitting their consumers' constitutions. To this end, Korean, Chinese and Chosunjok college women were surveyed to determine their constitutional structures, respectively, and then, index, analyze and compare their constitutional measurements to provide for some basic data useful to those Korean textile exporters targeting at the Chinese market.

II. Survey Method

1. Sample

College women totalling 300 were sampled from Yenbyen University, The Beijing Institute of Clothing Technology, Sookmyung Women's University, Inchon University and Konkuk University to be subject to four rounds of physical measurement on the spots from July, 1998 to April, 1999.

2. Method and Category of Anthropometric Survey

1) Method of Anthropometric Survey

The anthropometry was based on R. Martin's method, and standard lines and standard points coincide with those in the National Anthropometric Survey of Korea[3]. The subjects were wearing brassieres and drawers, and standing upright the toes spreading 45° apart.

2) Categories of Anthropometric Survey

There were 31 anthropometric categories in which 4 are relating to stature, 7 are relating to length, 6 are relating to breadth, 6 relating to depth, 8 relating to circumference and 1 relating to weight as listed in <Table 1>.

These measurement points were combined appropriately to set 29 constitutional indices for six parts of body. The linguistic information for each constitutional index are shown in <Table 2>.

3. Data Analysis

The collected data were processed using the SAS statistical program for means and standard deviations to determine the differences of body types among Korean, Chinese, and Chosunjok college women as well as for F-test to verify the statistical significance. Furthermore, in order to determine the factors comprising the body types of three college women groups, factor analysis was conducted, and thereupon, F-test was performed to test the differences among factors scored.

[1] Kazuko Hirasawa and Kumiko Nagai, Classification of Women's Body Shapes(part I)-The Characteristic of Upper Body Shapes-, *Japanese Home Economics of Journal* Vol.44 No.7 pp.587-588.

[2] Kazuko Hirasawa and Kumiko Nagai, Classification of Women's Body Shapes(part II)-The Characteristic of Lower Body Shapes-, *Japanese Home Economics of Journal* Vol.44 No.9 pp.761-767.

[3] National Anthropometric Survey of Korea, *Korea Research Institute of Standards and Science*, National Institute of Technology and Quality(NITAQ), (1997).

<Table 1> Comparison of Korean, Chinese and Chosunjok in anthropometric measurements

Body measurement \ Statistics	Korean Mean	Korean S.D	Chinese Mean	Chinese S.D	Chosunjok Mean	Chosunjok S.D	F-value	Duncan
Stature	161.03	5.25	158.40	5.33	156.89	5.24	15.89***	a b c
Neck height side	135.64	5.05	133.33	4.85	131.86	4.90	14.99***	a b c
Acromion height	131.35	5.06	128.17	4.92	126.74	4.75	23.18***	a b c
Waist height	99.95	4.42	98.71	4.25	96.09	4.34	20.82***	a b c
Neck root breadth	12.16	1.42	12.32	0.70	11.76	0.98	7.12**	a a b
Nipple to nipple breadth	16.54	1.39	17.31	1.26	16.60	1.23	10.76***	b a b
Chest breadth	25.92	1.67	25.77	1.39	25.49	1.50	2.06	
Waist breadth	23.27	1.48	22.21	1.37	22.41	1.57	14.64***	a b b
Hip breadth	31.96	1.59	32.25	1.44	31.52	1.45	6.02**	a a b
Abdomen breadth	28.75	1.62	29.36	1.93	29.11	1.53	3.19*	b a a
Neck side to nipple length	25.00	1.63	25.42	1.46	24.37	1.40	12.27***	a a b
Neck side-nipple-waist line length	40.16	2.10	41.13	1.71	41.25	2.00	9.53***	b a a
Waist front length	31.66	1.83	33.36	1.63	33.43	1.68	34.40***	b a a
Waist back length	38.62	1.96	37.34	1.41	38.23	1.91	13.53***	a b a
Front interscye length	31.57	1.89	33.01	1.66	31.42	1.94	22.82***	b a b
Back interscye length	35.12	2.15	35.90	1.75	35.25	1.99	4.43*	b a b
Arm scye length	69.91	3.77	68.62	3.05	67.32	3.73	13.51***	a b c
Crotch length								
Neck root depth	10.46	1.18	10.72	0.70	10.10	0.72	12.26***	b a b
Arm scye depth	10.40	1.93	10.58	0.87	9.98	0.88	5.49**	a a b
Chest depth	20.82	1.84	21.56	1.72	20.94	1.55	5.35**	b a b
Waist depth	16.42	1.52	16.91	1.45	16.23	1.32	5.89**	b a b
Abdomen depth	18.77	1.81	19.95	1.75	19.08	1.68	12.20***	b a b
Hip depth	20.66	1.63	20.89	1.49	20.14	1.47	6.28**	a a b
Neck root circumference	38.90	2.34	37.72	1.76	37.47	1.97	14.23***	a b b
Arm scye circumference	38.10	2.90	37.40	2.60				
Chest circumference	82.02	5.07	83.69	4.63	82.31	4.40	3.60*	b a b
Under chest circumference	72.12	4.26	72.57	4.25	72.43	3.98	0.30	
Waist circumference	66.32	4.59	67.05	4.34	65.92	4.14	1.74	
Abdomen circumference	78.55	5.54	80.26	6.50	79.13	5.05	2.31	
Hip circumference	90.59	4.31	91.67	4.38	88.45	4.37	14.26***	a a b
Thigh circumference	53.05	3.94	54.29	4.13	52.01	5.03	6.76**	b a b
Weight								

* p<.05, ** p<.01, *** p<.001

III. Results and Discussion

1. Comparative Review of Indices Item

As a result, significant differences were identified in 17 Indices item among 29 ones. The differences of body measurements between test groups were analyzed as follows;

1) Neck Shape

There was found a difference of the ratio of "neck root breadth" to "neck root circumference" between Chinese college women group (0.33) and the other two groups(0.31). Namely, the Chinese college women had a wider "neck root breadth" compared with "neck root circumference" than the other two groups.

<Table 2> Indices and linguistic Information

	Indices	Linguistic information
Neck	Neck root breadth/Neck root circumference Neck root depth/Neck root circumference Neck root circumference/Chest circumference	Thin or thick neck forward or backward neck
Shoulder	Neck height side/Acromion height Acromion height/Stature	Wide or narrow or slope Shoulder forward or backward Shoulder thin or thick or slacken Shoulder
Chest and back	Chest circumference/Under chest circumference Neck side to nipple length/Neck side- nipple 　　　　　　　　　　　　-waist line length Nipple to nipple breadth/Chest circumference	Large, small, droopy lower or higher breast wide or narrow
	Waist front length/Waist back length Front interscye length/Back interscye length Chest circumference/Waist back length	Forward or backward posture, bent back Short and thick upper body long and slim upper body
Abdomen, hip, thigh	Abdomen circumference/Hip circumference Thigh circumference/Hip circumference Crotch length/Hip circumference	Large or small Abdomen ,Hip and Thigh Short and thick lower body long and slim lower body
Body	Chest circumference/Waist circumference Abdomen circumference/Waist circumference Hip circumference/Waist circumference	Straight and smooth waist slender and constricted waist
	Chest depth/Chest breadth Waist depth/Waist breadth Abdomen depth/Abdomen breadth Hip depth/Hip breadth	Thin or thick upper body thin or thick lower body
	Chest circumference/Stature Waist circumference/Stature Hip circumference/Stature	Large or small horizontal size of body
	Waist height/Stature	Long or short upper body
Arm scye	Arm scye circumference/Chest circumference Arm scye circumference/Arm scye depth	Large or small ellipse, round
Overall	Rohrer Index pv Index	Obesity, thin, average

Also, there was a difference of the ratio of "neck root depth" to "neck root circumference" between Chinese college women group(0.28) and the other two groups(0.27). The former group had a larger "depth-circumference" ratio of neck than the latter two groups.

The Korean college women group had a significantly different ratio of "neck root cir-

cumference" to chest circumference from the other two groups. That is, the Korean college women had a larger "neck root circumference" in reference to "chest circumference".

2) Shoulder Shape
There was a significant difference of the ratio of "neck side height" to "acromion height"

<Table 3> Comparison of Korean, Chinese, and Chosunjok in Indices Item (cm)

Indices		Korean Mean	S.D	Chinese Mean	S.D	Chosunjok Mean	S.D	F-value	Duncan
Neck	Neck root breadth/Neck root circumference	0.31	0.03	0.33	0.01	0.31	0.02	11.07***	b a b
	Neck root depth/Neck root circumference	0.27	0.03	0.28	0.01	0.27	0.02	17.05***	b a b
	Neck root circumference/Chest circumference	0.48	0.03	0.45	0.02	0.46	0.02	24.41***	a b b
Shoulder	Neck height side/Acromion height	1.03	0.01	1.04	0.01	1.04	0.02	8.07***	b a a
	Acromion height/Stature	0.82	0.01	0.81	0.01	0.81	0.01	16.80***	a b b
Chest and back	Chest circumference/Under chest circumference	1.14	0.03	1.15	0.04	1.14	0.04	7.16***	b a b
	Neck side to nipple length/Neck side- nipple -waist line length	0.62	0.04	0.62	0.04	0.59	0.04	22.73***	a a b
	Nipple to nipple breadth/Chest circumference	0.20	0.01	0.21	0.01	0.20	0.01	4.93**	b a b
	Waist front length/Waist back length	0.82	0.04	0.89	0.04	0.88	0.04	83.25***	c a b
	Front interscye length/Back interscye length	0.90	0.07	0.92	0.06	0.89	0.06	5.22**	b a b
	Chest circumference/Waist back length	2.13	0.15	2.24	0.15	2.16	0.14	17.76***	b a b
Abdomen, hip, thigh	Abdomen circumference/Hip circumference	0.87	0.04	0.88	0.05	0.89	0.04	9.64***	b b a
	Thigh circumference/Hip circumference	0.59	0.02	0.59	0.03	0.59	0.05	0.88	
	Crotch length/Hip circumference	0.77	0.03	0.75	0.03	0.76	0.04	10.90***	a c b
Body	Chest circumference/Waist circumference	1.24	0.05	1.25	0.05	1.25	0.06	1.87	
	Abdomen circumference/Waist circumference	1.19	0.06	1.20	0.06	1.20	0.06	1.94	
	Hip circumference/Waist circumference	1.37	0.06	1.37	0.06	1.34	0.06	5.72**	a a b
	Chest depth/Chest breadth	0.80	0.06	0.84	0.05	0.82	0.05	9.13***	b a a
	Waist depth/Waist breadth	0.71	0.05	0.76	0.05	0.73	0.05	33.82***	c a b
	Abdomen depth/Abdomen breadth	0.65	0.05	0.68	0.04	0.66	0.05	10.56***	b a b
	Hip depth/Hip breadth	0.65	0.04	0.65	0.04	0.64	0.04	1.52	
	Chest circumference/Stature	0.51	0.03	0.53	0.03	0.53	0.03	9.85***	b a a
	Waist circumference/Stature	0.41	0.03	0.42	0.03	0.42	0.03	4.13*	b a a
	Hip circumference/Stature	0.56	0.03	0.58	0.03	0.56	0.03	9.96***	b a b
	Waist height/Stature	0.62	0.01	0.62	0.01	0.61	0.01	21.63***	
Arm scye	Arm scye circumference/Chest circumference	0.21	0.02	0.21	0.02	0.20	0.02	1.40	a a b
	Arm scye circumference/Arm scye depth	1.69	0.32	1.65	0.14	1.70	0.19	1.22	
	Rohrer Index	1.24	0.14	1.31	0.16	1.29	0.14	5.88**	b a a
	pv Index	83.19	6.31	85.80	6.31	84.28	5.59	4.64*	b a a

* p<.05, ** p<.01, *** p<.001

between Korean college women group and the other two groups. Namely, Chinese and Chosunjok groups had a larger shoulder slope than Korean group.

On the other hand, the Korean college women group whose ratio of "acromion height" to "stature" was measured 0.82 had their shoulders less slackened than their two counterpart groups.

3) Chest and Waist Back

In terms of the ratio of "chest circumference" to "under-chest circumference", there was a much significant difference between Chinese college women group and the other two groups.

In other words, although there was little difference of "under-chest circumference" among three groups, the Chinese college women had

had the largest "chest circumference". On the other hand, there was little difference of the ratio of "neck side-nipple length" to "neck side-nipple-waist line length" between Korean and Chinese groups, but there was found some significant difference of this ratio between Chosunjok college women and the other two groups. That is, the Chosunjok college women had a shorter "neck side-nipple length" compared to their "upper body length". In case of the ratio of "nipple-to-nipple breadth" to "chest circumference", there was no difference between Korean college women and Chinese-Korean counterparts, but Chinese college women had a significantly wider chest than the other two groups. Meanwhile, the ratio of "waist front length" to "waist back length" was highest in the Chinese college women, followed by Korean and Chosunjok college women, which means that the Chinese college women had their body shape most bent back. In light of the ratio of "back interscye length" to "front interscye length", there was no significant difference between Korean and Chosunjok college women, but there was found some significant difference between these two groups and Chinese college women who were found to have a more forward back body shape. In case of the ratio of "waist back length" to "chest circumference", there was little difference between Korean and Chosunjok, but a difference was found between these two groups and Chinese group, suggesting that the latter group had a larger "chest circumference" compared to their upper body length.

4) Abdomen, Hip and Thigh

There was found little difference of the ratio of "abdomen circumference" to "hip circumference" between Korean and Chinese groups, but there was found some significant difference between these two groups and Chosunjok group. In other words, it was found that the Chosunjok college women had the most obese lower body. On the other hand, the ratio of "crotch length" to "hip circumference" was highest in the Korean college women group, followed by

Chosunjok and Chinese groups, which means that Korean college women had the largest lower body length compared to lower body circumference, while the Chinese college women had the shortest lower body length.

5) Body Shape

In case of the ratio of "chest circumference" or "abdomen circumference" to "waist circumference", there was found no significant difference among three groups. On the other hand, in terms of the ratio of "hip circumference" to "waist circumference", there was no significant difference between Korean and Chinese college women, but there was found some significant difference between these two groups and Chosunjok group who had a relatively smaller hip circumference. In terms of the ratio of "chest depth" to "chest breadth" or the "ratio of flatness", the difference was more significant between Chinese and Chosunjok groups than between either of the groups and Korean group. The "ratio of waist flatness" was largest in the Chinese college women, followed by *Chosunjok* and Korean college women, while there was found a significant difference of "the ratio of abdomen flatness" between Chinese college women and the other two groups. However, there was found no significant difference of "hip flatness ratio" among three groups. In case of the ratio of "chest circumference" or "waist circumference" to "stature", the difference was more significant between Chinese and Chosunjok groups rather than between these two groups and Korean group. And in terms of the ratio of "hip circumference" to "stature", there was found a significant difference between Chinese college women and the other two groups. In all, it was found that Chinese college women had a larger horizontal body size compared to their vertical body size. Meanwhile, in terms of the ratio of "waist height" to "stature", there was found a difference between Chosunjok college women and the other two groups, which means that Chosunjok college women had a longer upper body compared to

their lower body.

6) Arm Scye

In case of "arm scye circumference" to "chest circumference" or "arm scye depth", there was found no significant difference among three groups, suggesting that the three groups had a similar arm scye shape.

7) Overall Body Shape

In light of such overall body obesity indices as "Rohrer Index" and "PV Index", there was no significant difference between Chinese and Chosunjok, but there was found some significant difference between these two groups and Korean college women who showed lowest obesity index.

2. Factors of the Constitution

In order to determine the factors of the body type for three groups, 27 Indies were analyzed, and in consideration of a scree-test result and factor interpretation, 8 factors were determined as comprising the body type. The accumulative contribution rate of these 8 factors to the body type was 65.2%. Effect, unique value and variance of each factor which were calculated with Varimax revolution are shown in <Table 4>.

The first factor involved higher positive ratios of chest circumference against under chest circumference and waist back length, modest positive ratio of chest circumference against stature or waist depth against waist breadth, but higher negative ratio of neck root circumference against chest circumference. In short, this factor represents the obesity and flatness of the upper body; The higher this factor is, the under chest circumference is larger compared with the chest circumference, which means a constitution having voluminous breasts. Namely, such a body shape may equate with larger horizontal size than vertical one and thus, a thick body. Its eigenvalue is 5.6, while it explains about 20.7% of the entire variances.

The second factor involved higher positive

ratios of hip and chest circumferences against waist circumference but higher negative ratio of waist circumference against stature. That is, the hip and chest circumferences are larger compared with waist circumference, while waist circumference is smaller compared with stature. Such a constitution represents smaller body shapes, being dictated by the conditions of lower body or waist. Therefore, the higher this factor is, the "drop" measurement for chest and hip is larger, which means a small waist and long body. Its eigenvalue is 2.6, while it explains about 9.7% of the entire variances.

The third factor involved higher positive ratio of hip circumference against stature but higher negative ratio of crotch length against hip circumference. This factor represents the shape of hip in all. The higher this factor is, the lower body is shorter and thicker.

The fourth factor involved higher positive ratios of arm scye circumference against chest circumference and arm scye depth, which represents the shape of arm scye. The higher this factor is, the arm scye circumference is larger and more oval.

The fifth factor involved higher positive ratios of shoulder and waist heights against stature but higher negative ratio of neck side height against shoulder height. This factor dictates shoulder shape as well as vertical body size. The higher this factor is, the lower limbs are longer compared with stature, while the shoulders are less loose.

The sixth factor involved very higher positive ratios of abdomen circumference against waist and hip circumferences. The higher this factor is, the abdomen circumference is larger compared with waist and hip circumferences, which means an obese abdomen.

The seventh factor involved higher positive ratios of neck depth and breadth against neck root circumference. The higher this factor is, the neck is thicker.

The eighth factor involved higher positive ratios of nipple-to-nipple breadth against front interscye length and chest circumference, which

<Table 4> Factor analysis results

Factor Item	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Com- munality
Chest circumference/Under chest circumference	.72	.19	.02	.04	.01	-.06	-.11	.06	.57
Chest circumference/Waist back length	.55	-.24	.46	-.26	.08	.19	.02	.11	.82
Chest circumference/Stature	.58	-.44	.48	-.30	-.12	.13	-.03	-.06	.90
Waist depth/Waist breadth	.57	-.24	.09	.04	.01	.10	.22	.17	.53
Chest depth/Chest breadth	.54	-.10	.00	-.21	-.02	-.12	.33	-.17	.55
Neck root circumference/Chest circumference	.62	.22	-.05	.32	.10	.00	-.23	.06	.63
Hip circumference/Waist circumference	-.03	.94	.10	.04	.16	-.03	.14	.08	.95
Chest circumference/Waist circumference	.55*	.65	-.20	-.26	-.01	.16	.00	.00	.86
Thigh circumference/Hip circumference	.08	.52	.07	-.08	.00	-.13	.19	.14	.43
Hip depth/Hip breadth	.20	.58	.26	-.02	.25	.05	.16	-.12	.63
Abdomen depth/Abdomen breadth	.39	.64	.25	.04	.10	.16	.11	-.01	.69
Waist circumference/Stature	.20	.66	.55*	-.12	-.11	.03	-.02	-.05	.96
Hip circumference/Stature	.25	-.25	.84	-.13	.00	.02	.10	.00	.89
Neck side to nipple length/Neck side-nipple-waist line length	.30	-.04	.70	.45	.25	.00	-.34	-.03	.76
Crotch length/Hip circumference	.13	.00	.72	.23	.24	.04	-.12	-.07	.73
Arm scye circumference/Chest circumference	-.26	.01	-.09	.78	-.06	-.03	.18	.07	.82
Arm scye circumference/Arm scye depth	-.07	.05	-.27	.71	-.11	-.01	.01	.02	.77
Waist front length/Waist back length	.16	.02	.06	.55	-.20	.21	.38	.44	.67
Acromion height/Stature	-.07	.02	-.11	-.09	.81	-.15	-.02	-.03	.76
Waist height/Stature	.21	.15	.09	.27	.61	-.03	.06	.03	.64
Neck height side/Acromion height	.12	.02	.11	.16	.74	-.12	.10	-.04	.73
Abdomen circumference/Waist circumference	.03	.35	.05	-.30	.03	.89	.11	.00	.93
Abdomen circumference/Hip circumference	.06	-.43	-.03	-.70	-.10	.74	-.02	-.07	.97
Neck root depth/Neck root circumference	.23	-.12	.11	.20	.14	-.11	.68	-.02	.64
Neck root breadth/Neck root circumference	-.02	.11	.01	.12	-.15	.20	.64	.02	.57
Front interscye length/Back interscye length	.18	-.06	-.16	-.10	.09	-.06	-.11	.74*	.64
Nipple to nipple breadth/Chest circumference	-.15	.12	.19	.19	-.04	-.02	.08	.68*	.63
Eigenvalues	5.6	2.6	2.1	1.7	1.6	1.4	1.3	1.2	
Proportion(%)	20.7	9.7	8.0	6.3	5.9	5.3	4.9	4.4	
Cumulative(%)	20.7	30.4	38.4	44.7	50.6	55.9	60.8	65.2	

* means a factor lord of 0.5 or more

dictate the posture of upper body as well as the shape of breasts. The higher this factor is, front interscye length is longer than back interscye length, while chest is wider compared with chest circumference..

All in all, it was found through this study that Chinese college women were obesest with

thickest body. Particularly, their lower body was shortest and thickest. Chinese and Korean college women had similar shape of arm scyes, but Chosunjok college women were found to have a smallest arm scye size nearest prototype. On the other hand, Korean college women had longest lower limbs compared with stature and

their shoulders were least loose. Chosunjok college women had the obesest abdomen, while Korean college women's abdomen was least obese. Chinese college women's neck was thickest, while Korean college women had the thinnest necks. Korean and Chosunjok college women had similar chest breadth, but Chinese college women had a more turned-over upper body with wider chest.

3. Comparison of Body Type Factors

The results of a comparative review of Korean, Chinese and Chosunjok college women's body type factors are shown in <Table 5>.

As a result of comparatively analyzing the constitutional components or indices among Korean, Chinese and Chosunjok college women, it was found that all the factors but factor 2 differed significantly among the three groups, which suggests that their constitutional components are much different. To review specifically, in case of factor 1 representing obesity and flatness of upper body, the Chinese college women scored highest, while the scores were similar between Korean and Chosunjok college women. In other words, Chinese college women were obeser with thicker body than the other two groups. Meanwhile, in case of factor 3 dictating the shape of hip, Chinese college women also scored highest, being followed by Korean and Chosunjok groups. Namely, the Chinese college

women were found to have shorter but thicker lower body.

IV. Conclusion and Suggestions

As described before, this study aimed to provide for the basic data useful to Korean apparel exporters who want to develop appropriate apparel sizes for Chinese woman consumers. To this end, 300 Korean, Chinese and Chosunjok college women's body measurements were surveyed, and thereupon their constitutional factors were reviewed comparatively to be determined. This study can be concluded as follow together its suggestions.

1. As the results of comparing the body types among Korean, Chinese, Chosunjok college women are significant. Korean college women have comparatively thicker neck for the bodice and have longer lower bodice and lower body under the waist line. Chinese college women have larger and more voluminous breasts with dropped shoulders and their bodice have backward body type. they have the comparatively thickest bodice for bodice length and show highest obesity.

2. It was extracted 8 factors by factor analysis, the obesity and shape of the upper body, shape of waist, shape of the lower body, shape of armhole, shape of

<Table 5> Factor scores and F-test results

Factors	Factor score Characteristics	Korean		Chinese		Chosunjok		F-value	Duncan
		Mean	S.D	Mean	S.D	Mean	S.D		
Factor 1	The obesity of upper Body	-0.32	0.91	0.43	0.91	-0.11	1.02	16.65***	b a b
Factor 2	The shape of the waist	0.11	1.02	0.04	0.98	-0.15	0.99	1.77	
Factor 3	The shape of the lower body	-0.03	0.95	0.34	0.90	-0.31	1.05	11.28***	b a c
Factor 4	The shape of armhole	0.24	1.09	0.08	0.88	-0.32	0.95	8.67***	a a b
Factor 5	The shape of shoulders and vertical body size	0.49	0.85	0.00	0.83	-0.48	1.07	27.87***	a b c
Factor 6	The obesity of abdomen	-0.19	0.95	-0.03	1.03	0.21	0.99	4.23*	b ab a
Factor 7	The shape of the neck	-0.46	1.18	0.54	0.74	-0.08	0.75	30.36***	c a b
Factor 8	The posture of bodice and shape of bust	-0.30	1.03	0.44	0.91	-0.14	0.91	16.43***	b a b

* p<.05,   ** p<.01,   *** p<.001

shoulder and vertical body size, obesity of abdomen, shape of neck, posture of bodice and shape of bust.

3. As the results by comparing the factor score, the three groups showed similarity around the shape of waist, but in the part, there were some differentiations regarding constitution factor of body type. In other words, the Chinese college women have obeser and thicker bodice, especially lower body are the shortest and thickest among three groups. The shapes of armhole are very similar each others, but in terms of size, Chosunjok college women have smaller and rounder armholes. Compared with their height, Korean college women have longer lower-body measurement and smaller amount of shoulder drop than other groups. Around the abdomen part, the Chosunjok college women showed highest obesity, but the Korean college women showed the lowest point. Chinese college women have the thickest, the Korean college women have the thinnest neck. There are no noticeable differentiations between the Korean and Chosunjok college women in posture and distance between nipples, meanwhile, the Chinese college women have longer distance between nipples and more backward body type.

As discussed above, Korean, Chinese, and Chosunjok college women have different body types. Therefore, Korean apparel exporters are requested to take into due consideration such differences, for example, the differences in front, back, upper and lower, or distribution of darts, in their development of prototype apparels.

Based on the above results showing some differences of constitution among Korean, Chinese and Chosunjok college women, the following suggestions are put forwards. Merely, since it was found through this study that three groups showed clear differences on the body shape centering round the waist, it is hoped that future studies would analyze their constitutions centering around the waist by dividing the body into upper and lower parts.

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