Comparison of body composition between fashion models and women in general

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INTRODUCTION

Professional fashion models are thought to exemplify bodily perfection and become symbols of ideal beauty for the general public. [1-2] By taking a leading part in popular culture, professional fashion models are mediators between fashion and the public; as such they influence the public and become objects of envy. [3-4] Moreover, the fact that a tall stature and thin body are necessary conditions for modeling, requiring continual attention by designers and individual models, cannot be overlooked. [5-6]

Research performed outside of Korea and reported by the World Health Organization in 1998 showed that 66% of professional fashion models were underweight and that around 1/4 of American fashion models had a body mass index (BMI) below 17.5, the cutoff for anorexia defined by the American Psychiatric Association. [7-9] Review of international research reveals a diversity of positions. Some state that the body type of the fashion model is ideal and beautiful, [10-11] while others claim that female models with a waist-to-hip ratio (WHR) of 0.7 are the most attractive and that they set the standard for appeal; still others list professional fashion models among the groups affected by eating disorders. [12-15] This diversity shows that professional fashion models are subject to social pressure to maintain a thin or ideal body type.

Research in Korea focused mainly on the following: the choice of specialization by professional fashion models, the level of satisfaction about their choice, their career awareness, their awareness about specialization and their choice of a professional path through national modeling agencies, the state of the management industry, the diversification of the profession, and historical changes and trends affecting male and female fashion models. [16-23]

Yoo reported that professional fashion models have low muscle mass, longer limbs, and low weight, but high body fat (%). However, this research was done conducted not on real models but on aspiring models such as students in modeling schools. Therefore, the conclusions cannot be directly applied to presently active fashion models.
models.[24] A later study applied vague criteria to differentiate between highly successful professional fashion models and general fashion models, thus making the results unreliable.[25]

Thus, as concern for their health is increasing and since they serve as standards of physical beauty for the general public, there is a need to broaden the research on body composition of Korean professional fashion models. The present study aimed to quantify the body types of professional fashion models, and thus to foster a healthy body image and help correct a dysfunctional occupational attitude.

METHODS

Research subjects
The research sample was obtained by employing convenience sampling to select 90 professional fashion models presently active in Korea and 100 women in the general population. Fashion models were selected from among those with more than one year of professional experience and participating in an average of 10 or more yearly regular fashion shows. The average professional experience of the sample was 5 years and 7 months (±3 years and 2 months). Women in general were selected among Seoul residents aged 20 to 30 years old. The physical characteristics of the sample are presented in Table 1.

Research procedures and methods
Prior to any measurement, all participants were advised of the purpose of the research and consent was obtained and confirmed through a written form. Adhering to the standards set by the International Society for the Advancement of Kinanthropometry (ISAK), body measurements were taken twice. An average was obtained based on measurements on the right side of the body. Whenever an error higher than ±2% was registered, a third measurement was taken. In these cases, the median value was taken as a representative value.

For the measurement method, we followed the guidelines of the ISAK.[26] Sites chosen for subcutaneous body fat measurement included biceps, triceps, subscapular, and suprailliac regions, using conversion formulas [27] as follows:

1. BMI = weight (kg)/height (m)²
2. WHR = waist (cm)/hip (cm)
3. Body density (20-29 years old) = 1.1599-(0.0171 × L)
   *L is the log of the sum of four skinfold measurements.
   *The DW equation is age dependent.

Means and standard deviations were obtained by processing the data collected throughout the research using Microsoft Excel, while the comparison between professional fashion models and women in general was performed using SPSS 20.0 for Mac. An independent t-test was used to compare the two groups and the significance level (α) was set at 0.5.

RESULTS

Comparison between body measurements in professional fashion models and women in general
Table 2 shows the comparison between body measurements in professional fashion models and women in general. Professional fashion models had significantly thinner biceps, triceps, subscapular, and suprailliac areas than women in general (p<.001). However, there was no significant difference in hip circumference (p>0.05).

Comparison between body composition in professional fashion models and a control group
Table 3 compares the body composition in professional fashion models with that of a control group of women

Table 1. Physical characteristics of professional fashion models and general females

|                      | FM (n=90) | Con (n=100) | p-value |
|----------------------|-----------|-------------|---------|
|                      | M ± SD    | Range       | M ± SD  | Range       |         |
| Age (year)           | 24.4 ± 3.2| 18 - 33     | 23.0 ± 2.4| 20 - 28     | 0.001   |
| Weight (kg)          | 54.3 ± 3.1| 46 - 63.4   | 53.5 ± 6.2| 41.1 - 73.5| 0.236   |
| Height (cm)          | 177.9 ± 2.0| 174.4 - 182.4| 161.2 ± 5.4| 148.2 - 174.7| 0.001   |

FM: professional fashion model, Con: female control

Table 2. Professional fashion models and general females body measures comparison

| Skinfold site (mm) | FM (n=90) | Con (n=100) | p-value |
|--------------------|-----------|-------------|---------|
|                    | M ± SD    | Range       | M ± SD  | Range       |         |
| Biceps             | 6.8 ± 2.4 | 0.3 – 1.5   | 8.7 ± 3.3| 0.3 – 2.0   | 0.001   |
| Triceps            | 12.6 ± 2.7| 0.5 – 1.8   | 16.2 ± 3.9| 0.7 – 2.6   | 0.001   |
| Subscapular        | 11.2 ± 2.6| 0.6 – 2.0   | 16.7 ± 5.0| 0.7 – 3.0   | 0.001   |
| Suprailliac        | 11.8 ± 3.6| 0.5 – 2.5   | 15.9 ± 5.0| 0.7 – 2.9   | 0.001   |
| Waist              | 62.2 ± 2.6| 5.7 – 7.1   | 66.3 ± 6.2| 5.0 – 9.6   | 0.001   |
| Hip                | 89.7 ± 2.4| 8.3 – 9.7   | 90.5 ± 4.5| 8.2 – 10.1  | 0.157   |

FM: Professional fashion model, Con: female control

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Physical characteristics of professional fashion models

Table 3. Professional fashion models' and general females' body composition compared

|                  | FM (n=90) | Con (n=100) | p-value |
|------------------|-----------|-------------|---------|
|                  | M ± SD    | Range       | M ± SD  | Range     |
| **BMI**          | 17.1 ± 0.9| 14.5 - 19.6 | 20.6±2.1| 15.9 - 26.6| 0.001 |
| **WHR**          | 0.69 ± 0.03| 0.63 - 0.78 | 0.73±0.06| 0.59 - 1.06| 0.001 |
| **Body density (mg/mm)** | 1.04381± 0.00617| 1.03040 - 1.06365 | 1.03463 ± 0.00788| 1.01810 - 1.05845| 0.001 |
| **Body fat (%)** | 24.2±2.8 | 15.4 - 30.4 | 28.5±3.6 | 17.7 - 36.2 | 0.001 |

FM: Professional fashion model, Con: female control

DISCUSSION

The present research is the first comparative study on body composition in professional fashion models and Korean women in general. The purpose was to provide information on body measurements and composition as baseline data for use in selection of healthier models as well as for education.

There have been a limited number of studies on body type in fashion models and most have used photographic material or self-reporting rather than data based on actual measurements.[25, 28] BMI can be calculated without actual measurement, but the values may not be accurate. Similarly, WHR values determined from photographic material can be imprecise.

The skinfold test employed in this research uses calipers to measure subcutaneous fat. This test was reported to be inefficient due to its dependence on the skills of the measurer and other technical issues.[30] However, it is widely used among researchers because it can be used in any setting and is easy to perform.[30, 31]

In addition, even though several methods can be used to determine body fat (%) from measured values, the method employed in the present study is highly reliable because different formulas are used, depending on the sex and age of the research subjects.[27, 31]

Other than hip circumference, the results showed that there was a significant difference between the two groups in all other areas (p<.001). These results prove that professional fashion models have very low levels of subcutaneous fat in relation to the general female population. We conclude that fashion models are obliged by their profession to look thin before the public and that their thin body type is a result of excessive dieting.

On the one hand, the BMI of professional fashion models appeared significantly lower than that of women in general (p<.001), whereas their body density appeared to be significantly higher (p<.001). This may reflect the fact that model heights are considerably greater than that of women in general, which is significantly thinner in fashion models (p<.001).

Second, the BMI, WHR, and body fat (%) in professional fashion models were significantly lower (p<.001), while body density was significantly higher (p<.001).

Thus, we verified that the body composition of professional fashion models was lower in subcutaneous fat than that of women in general and that their BMI, WHR, and body fat (%) was lower than average. A close association was observed in fashion models between dieting for weight loss to meet occupational requirements and low weight and subcutaneous fat levels.

As professional fashion models gain importance in the fashion industry, the need for an appropriate approach to their health becomes more significant. The following conclusions were drawn.

First, the comparison between professional fashion models and women in general indicated that, with the exception of hip circumference, all other areas were significantly thinner in fashion models (p<.001).

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high heels. Moreover, due to the characteristics of their profession, they follow continuous diets and in general maintain strict regimens, so that the above measurements may reflect these efforts.

Body fat (%) in fashion models was 24.2±2.8, significantly lower than that in women in general (p<.001). This result is also low with respect to the value of 25-32% that the American Council on Exercise has indicated as appropriate for women in general. Jeong analyzed the body types of Korean fashion models and hinted at the possibility of professional fashion models being skinny-fat, which is verified when the muscle volume is low with respect to the amount of body fat.[25] However, since the body fat calculation method based on the skinfold test can only predict body density and body fat percentage, the results are insufficient to determine the possibility of skinny-obesity.[25, 33] Therefore, there is still a need to verify the body fat(%) using either bioimpedance analysis or dual energy X-ray absorptiometry.

Similar to dancers, fashion models stand on the stage and communicate feelings not through words but through the movement of their bodies.[34] However, in order to highlight their clothing, they are required to work hard on maintaining a thin body type. Dancers are asked to keep restrictive diets to maintain their body types because they stand on the stage and entertain the public by emphasizing their physical appearance.[35-36] However, dancers need to exert their muscles in order to stage an impressive performance, and usually accompany their dieting regimen with necessary training. By contrast, the reality of professional fashion models is that they focus exclusively on food restriction rather than accompanying it with physical exercise. Therefore, fashion models should combine dieting with physical exercise. Professional fashion models receive the attention of the public and are an object of envy for women. Instead of simply employing starvation diets, correct maintenance of body type requires a diet based on adequate nutritional education and the development and application of a training program that responds to the professional needs of fashion models.

Professional fashion models not only raise the purchasing desires of the public but also create new fashion and thus can influence trends. For this reason, a study on the physical and biological characteristics of professional fashion models seems to be of value to both the general public and are an object of envy for women. Instead of simply employing starvation diets, correct maintenance of body type requires a diet based on adequate nutritional education and the development and application of a training program that responds to the professional needs of fashion models.

As a suggestion for future research, studies should focus on professional fashion models as a special occupational cluster and should use a variety of methods for the development of body fat (%) equations, including bioimpedance analysis and dual energy X-ray absorptiometry. The results may show differences in BMI and body composition between normal women and fashion models. Future research will also need to consider the importance of a healthy body type and objective and correct awareness about body types.

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