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Relations between Muscular Strength of Upper Arm Muscle Group and the Values of Various Physical Measurements (Report No. 3)

-----Study of Pull-up Exercises Made Viewing from Weight-Corrected Upper Arm Circumference and Weight-Corrected Skinfold Thickness------

By Sadayoshi Imae*

As to the heights, weights, upper arm circumferences, upper arm skinfolds, back skinfolds, abdomen skinfolds and pull-up scores of 635 male university students (18-21 years, excepting members of sports clubs), measurements were determined.

Based on the values of the measurements obtained:

1. Using the following formula, weight-corrected upper arm circumferences were calculated from the upper arm circumferences and studies were made of pullup scores in three groups of those whose weight-corrected upper arm circumferences were under 26 cm, between 27 and 28 cm and over 29 cm respectively.

Y = Upper arm circumference-a X

[a indicates the regression coefficient of the upper arm circumference against the weight deviation from the standard weight, and X indicates the weight deviation from the standard weight $(\pm \%)$.]

2. Weight-corrected total skinfolds were calculated from the total skinfolds (total of upper arm, back and abdomen skinfolds) using the following formula, and studies were conducted of the pull-up scores of those whose weight-corrected total skinfolds were under 34 mm, between 35 and 44 mm, between 45 mm and 54 mm, between 55 and 64 mm and over 65 mm respectively.

Y = Total skinfold-a X

[a indicates the regression coefficient of the total skinfold against the weight deviation from the standard weight, and X shows the weight de-

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viation from the standard weight $(\pm \%)$.]

3. Studies were made of the pull-up scores on both bases, i.e., weight-corrected upper arm circumference and weight-corrected total skinfold, and results were obtained as follows.

(1) In the comparison made between the students whose weight-corrected upper arm circumferences were under 26 cm and those whose values were between 27 and 28 cm, it was known that the pull-up scores of the latter were significantly larger than those of the former (P<0.01); and as for the comparison made between the students whose values were between 27 and 28 cm and those whose values were over 29 cm, the pull-up scores of the latter were significantly larger than those of the former (P<0.05). Fig. 3

(2) In the students whose weight-corrected total skinfolds were under 54 mm, almost no differences were seen in their pull-up scores, however, in the students whose values were 55 mm, their pull-up scores decreased remarkably and significantly (P<0.01), and in those whose values showed over 65 mm, their pull-up scores decreased far more remarkably and significantly (P<0.01). Fig. 7

(3) In the case of weight-corrected total skinfolds:

(1) In the students whose total skinfolds were under 34 mm, no significant differences were noted in their pull-up scores between those whose weight-corrected circumferences were 26 cm, those whose values were between 27 and 28 cm and those whose values were over 29 cm.

(2) In the case of 35 to 44 mm, the pull-up scores of those whose weightcorrected upper arm circumferences were under 26 cm were significantly smaller as compared with those whose values were between 27 and 28 cm (P<0.05), however, no significant difference was noted between the pull-up scores of those whose weight-corrected upper arm circumferences were between 27 and 28 cm and those whose values were over 29 cm.

(3) In the case of 45 to 54 mm, the pull-up scores of those whose weightcorrected upper arm circumferences were under 26 cm were significantly smaller as compared with those whose values were between 27 and 28 cm (P<0.01), and in the comparison made between those whose weight-corrected upper arm circumferences were between 27 and 28 cm and those whose values were over 29 cm, the pull-up scores of the latter were significantly larger than those of the former (P < 0.01).

④ In the case of 55 to 64 mm, almost no differences were noted in the pullup scores of those whose weight-corrected upper arm circumferences were under 26 cm, those whose values were between 27 and 28 cm and those whose values were over 29 cm.

(5) Also, in the case of 65 mm and over, no significant differences were seen in the pull-up scores of those who weight-corrected upper arm circumferences were under 26 cm, those whose values were between 27 and 28 cm and those whose values were over 29 cm.

As stated above, the weight-corrected upper arm circumference functions as a positive factor against the pull-up exercise, while contrary to this fact, the weightcorrected total skinfold functions as a negative factor when the value gets larger in excess of a certain value.

Of the students of the age subjected to the study this time, those who had their weight-corrected upper arm circumferences larger than 27 cm and their weightcorrected total skinfolds under 54 mm demonstrated that they had a body composition advantageous in practicing pull-up exercises.

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