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DEVELOPMENT OF INSTITUTIONAL NORMS IN PHYSICAL FITNESS TEST FOR ATHLETIC SCHOLARSHIP STUDENTS, RANGSIT UNIVERSITY

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Abstract :
The purposes of the present research study were to evaluate physical fitness and establish institutional norms of physical fitness test for athletic scholarship students at Rangsit University. The population in this study was 167 athletic scholarship students of Rangsit University, 106 males and 61 females, aged between 18 – 24 years. The instruments being used included the physical fitness test for national youths and national athletes of Sports Authority of Thailand. The physical fitness testing protocol was consisted of 5 components: 1) body fat, 2) grip muscular strength, 3) leg muscular strength, 4) flexibility, and 5) maximal oxygen consumption (VO_2 max). The results expressed in means and standard deviation, in the male athletic scholarship students were, as following: body fat of 17.11 $\pm$ 6.00%, grip strength of 0.66 $\pm$ 0.12 kg/kg body weight, leg strength of 2.52 $\pm$ 0.75 kg/kg body weight, flexibility of 11.73 $\pm$ 5.16 cm, and VO_2 max of 40.87 $\pm$ 7.50 ml/kg/min. In the females, were 27.09 $\pm$ 4.20%, 0.58 $\pm$ 0.08 kg/kg body weight, 2.35 $\pm$ 0.60 kg/kg body weight, 15.53 $\pm$ 4.81 cm, and 46.58 $\pm$ 26.66 ml/kg/min, respectively. When comparing with the norms of national youth and national athletes, their physical fitness both in males and females were mostly at the moderate level (39.49% and 44.48%). When considering as each component, only the results of leg strength that had the very good level (61.54% and 41.67%).

Keywords: development of norms, physical fitness test, athletic scholarship students, Rangsit University

INTRODUCTION

Physical fitness is necessary for all types of sports competition. Basically, competitive results depend upon the physical fitness. Therefore, it is essential for trainers and coaches to understand the test methods in order to apply the test results for efficient evaluation of fitness training. Moreover, the trainers and coaches shall be able to find out the enhanced methods for training athletes to reach their maximum capacity of each physical fitness test. Physical fitness is considered as the crucial evaluation which can lead the athletes to the highest stage of development (Sports Authority of Thailand, 2011). The enhancement of physical fitness relies on special training in addition to general training, by focusing on the performance of some organs. For examples, the soccer players must specially train the power of legs, shoulders, and body; the international boxers must focus on the power of arms, shoulders, chest, legs, and body. Some kinds of sports require high muscular power but low endurance, and some sports require the effectiveness in several aspects, etc. Composition of physical fitness is based on the coordination of various systems, especially the movement system including bone system, muscular system, respiratory system, cardio-vascular system, and nervous system. If one or more systems have defects, they will be obstacles to other causing the decline of physical fitness (Krabuanrat, 1997).

Thus, the researchers view that the chance for the athletes to be achieved in the competitions, must not only derive from recruiting the suitable athletes whose body appearances are fit to a proper kind of sports, but also importantly need the completeness of physical fitness with regular standardized training. Hence, the methods of training can be regarded as an advantage of athletes to lead them to the success. Rangsit University which has supported the scholarship of special competence to the athletic students for studying further in Bachelor degree and Master degree levels; however, some of their competitive sports results were likely unsatified. Furthermore, it is interesting that according to the study of physical fitness on the Rangsit University athletes who participated in the 27th Thai Universities Sports Competition (Rodtassana, 1999); the results were found that a comparison between the 1st and the 2nd tests had no statistically significant difference (at *p value* < 0.05). This can be stated that the physical fitness of Rangsit University athletes had a little development especially, in terms of muscular strength and aerobic capacity. Apparently, the competition results indicated that the athletes did not have absolute physical fitness. Therefore, they were hard to be successful or won the competition. Only if their physical fitness is much improved, they may achieve, conquer and succeed in competitions. Thus, the researchers were fully interested in seeking the supported and enhanced tools for training the athletes to the complete condition. The present study aims to evaluate the physical fitness of athletic scholarship students, Rangsit University, and to establish the institutional norms of physical fitness for the athletic scholarship students at Rangsit University. The study results may help consider the recruitment of athletes at the initiative stage and further lead to the development of physical fitness test and evaluation for a particular kind of sports.

MATERIALS AND METHODS

The present study is a cross-sectional quasi-experimental research study. The population of the study was the athletic scholarship students at Rangsit University. The subjects were selected by purposive sampling. A total of 167 healthy subjects were 106 males and 61 females, aged between 18 and 24 years. The subject's informed consent was voluntarily given. Every athletic scholarship student between the 1st Study Year and the 4th Study Year had participated in the study. They had no injury and fully cooperated with the test. The data was collected in Academic Year 2009. The ethical clearance of the present study was not performed because all the test methods were parts of the athletic scholarship students' training program and non-invasive.

The instruments used for data collection in this study were general physical fitness test in accordance with all kinds of sports, including:

1. Body size and composition: Weight, height, body mass index, and body fat
2. Flexibility: Sit and reach
3. Muscular strength: Grip and leg strength
4. Aerobic capacity: Maximal oxygen consumption (VO_2 max)

The data collection was taken place at the Enhanced Physical Fitness Section, Sports and Health Center; the 1st floor of Recreation Building, Rangsit University.

The study procedures and data collection were performed, as the followings: 1) In order to establish the physical fitness test with the scale of 3 levels suitably for every type of sports, the researchers had selected the physical fitness testing components using Sports Authority of Thailand norms for national youth athletes and national athletes. 2) Submitted the physical fitness test proposal to the experts of sports science for consideration and seeking approval of at least 80%, this meant that the physical fitness test proposal had a high quality and reliability. 3) Performed the testing method of each aspect. 4) Conducted the physical fitness test in each aspect and in order. Prior to commencing physical fitness test, an

appointment with the athletes was made and their general health status was checked. Hence, if any athlete had the abnormality, they had to be treated and recovered before testing. The healthy athletes then reported to the testing section, filled in the background information, had the health-related data checked such as, pulse rate, blood pressure, body weight and height, percent of body fat; and then performed the physical fitness test, after that the data was evaluated. According to the statistical analysis in this study, percentage was used for a comparison between the data obtained and the norms for testing physical fitness of national youth athletes and national athletes of Sports Authority of Thailand. Mean ($\bar{x}$) and standard deviation (SD) of physical fitness were presented. Lastly, norms of physical fitness for athletic scholarship students at Rangsit University were constructed. The stage of the norms could be divided into 5 levels (i.e. very good, good, moderate, low, and very low).

RESULTS AND DISCUSSION

General health-related data

One hundred and sixty seven athletic scholarship students of Rangsit University participated in the study. They were 106 males and 61 females, aged between 18 – 24 years. The subjects were mainly studying at the 1st year level (30.54%) in the Faculty of Mass Communication Arts (25.15%), secondly was Faculty of Business Administration (17.96%). Most of the athletes were the footballers (19.16%). For the general characteristics of male subjects, they had the average weight of 69.65 ± 12.92 kg and height of 173.1 ± 12.12 cm. The resting pulse rate was 79 ± 13.75 beats/min and body mass index was 24.10 ± 13.29 kg/m^2. In female subjects, they were 57.62 ± 10.50 kg, 162.70 ± 10.27 cm, 85 ± 13.84 beats/min, and 21.91 ± 4.55 kg/m^2, respectively. The study results were shown in the Table 1.

Table 1. Mean and standard deviation of general health data of athletic scholarship students, Rangsit University

SPORTS	Weight (kg.)		Height (cm.)		Pulse rate (beats/min)		BMI (kg./m.^{2})	
	Male	Female	Male	Female	Male	Female	Male	Female
Go	74.45 ± 86	59 ± -	165.5 ± 9.19	152± -	86 ± 12.73	80 ±-	26.55±10.69	25.54 ±-
Volleyball	-	59.44± 6.36	-	170.11±6.31	-	83 ± 9.27	-	20.62 ±2.19
Judo	78.42±19.48	64.68±16.09	170.5 ± 5.06	158 ±18.48	65 ± 30.17	83 ± 9.85	26.96± 6.45	26.58 ±7.81
Swimming	69.33± 7.08	56 ± -	179.88 ± 4.90	162 ± -	83 ± 12.12	92 ±-	21.39±1.59	21.34 ± -
Football	66.08 ±8.19	-	172.77 ± 5.55		71 ± 10.36	-	22.17±2.86	-
Basketball	82.15 ±13.68	60.11 ± 6.55	184 ± 8.38	166.45±5.37	73 ±15.16	74±16.80	24.13± 2.58	21.66 ±1.64
Takraw	64.1 ± 5.25	-	172.4 ± 3.8	-	76 ±14.75	-	21.58± 1.74	-
Golf	76.15±13.07	53.1 ± 8.85	170.58± 3.8	158.33±2.36	86 ± 7.25	91±23.71	26.22±4.95	21.17±3.38
Sprinter	67.84± 9.74	49.87±5.21	172.81± 3.83	159.41±3.51	76 ±11.92	82±11.74	22.56± 2.93	19.61±1.87
Badminton	73.55±18.04	-	178.08 ±10.10	-	73 ± 7.01	-	22.95± 4.09	-
Petanque	69.7 ± 12.04	56.11±8.04	176.33±7.95	16245 ± 3.81	80 ±14.52	87±11.68	22.30± 2.72	21.23± 2.66
Tennis	66.83± 4.08	-	175.67±1.60	-	90 ±11.06	-	22.14± 1.55	-
Taekwondo	66 ± 6.81	44.2 ± -	173 ± 3.16	148 ± -	87 ±17.97	90 ±-	21.98± 1.53	20.18± -
Total	**69.65±12.92**	**57.62± 10.50**	**173.10±12.12**	**162.70±10.27**	**79 ±13.75**	**85±13.84**	**24.10±13.29**	**21.91±4.55**

Physical fitness

Table 2 shows the means and standard deviation physical fitness of athletic scholarship students. The male subjects had body fat at the average of 17.11 ± 6.00%, grip strength of 0.66 ± 0.12 kg/kg body weight, leg strength of 2.52 ± 0.75 kg/kg body weight, flexibility of 11.73 ± 5.16 cm, and maximal oxygen consumption of 40.87 ± 7.50 ml/kg/min. In the females, were 27.09 ± 4.20%, 0.58 ± 0.08 kg/kg body weight, 2.35 ± 0.60 kg/kg body weight, 15.53 ± 4.81 cm, and 46.58 ± 26.66 ml/kg/min, respectively. When comparing with the norms of physical

fitness for national youth athletes and national athletes of Sports Authority of Thailand in each composition, it was found that the athletic scholarship students, Rangsit University both male and female had the physical fitness in terms of body fat and average leg strength higher than the norms whereas, the grip strength, flexibility, and maximal oxygen consumption were lower than the norms.

Table 3 shows the percentage of physical fitness of athletic scholarship students, Rangsit University by comparing with the norms of physical fitness for national youth athletes and national athletes of Sports Authority of Thailand. The results were found that their physical fitness both in males and females were mostly in the norms of moderate level, i.e. 39.49% in males and 44.48% in females. When considering each composition, it was found that only leg strength was at the norms of very good level (61.54% in male and 41.67% in female).

Table 2. Mean and standard deviation of physical fitness

SPORTS	Body Fat (%)		Grip Strength (kg./weight)		Leg Strength (kg./weight)		Flexibility (cm.)		VO_2 max (ml./kg./min)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Go	19.95±13.93	32.70±-	0.55±0.26	0.47±-	1.87±0.33	2.24±-	5.70±5.23	11.90±-	25.59±8.23	35.59±-
Volleyball	-	25.51±3.41	-	0.52±0.05	-	1.80±0.61	-	16.64±2.89	-	42.33±6.98
Judo	19.58± 7.26	29.35±5.05	0.56±0.30	0.51±0.13	2.01±1.73	2.13±0.92	3.84±6.91	10.92±4.00	37.36±4.73	42.34±7.13
Swimming	15.20± 1.20	28.50± -	0.70±0.08	0.62± -	3.24±0.42	2.25± -	18.78±4.38	29.90± -	39.26±0.90	41.25± -
Football	14.82±3.60	-	0.64±0.09	-	2.53±0.48	-	16.34±6.29	-	53.02±8.78	-
Basketball	18.27±5.50	27.90±3.20	0.61±0.10	0.56±0.07	2.03±0.78	2.34±0.33	9.37±6.87	13.28±8.36	44.61±8.66	47.45±7.22
Takraw	12.69±3.27	-	0.82±0.06	-	2.94±0.92	-	19.87±5.94	-	48.89±9.76	-
Golf	19.95±5.74	24.90±5.31	0.67±0.16	0.62±0.09	2.24±0.72	2.47±0.73	9.53±4.01	18.00±3.39	37.71±7.12	43.59±4.79
Sprinter	13.98±4.03	23.23±3.96	0.73±0.06	0.63±0.08	3.18±1.29	2.64±0.59	15.60±5.22	15.32±5.83	45.78±8.33	44.30±8.90
Badminton	16.75±5.87	-	0.66±0.15	-	2.41±0.57	-	11.47±5.77	-	44.18±9.71	-
Petanque	24.45±12.80	28.06±4.26	0.70±0.08	0.56±0.07	2.72±0.89	2.27±0.46	7.13±4.62	12.40±4.41	34.08±9.71	39.07±5.71
Tennis	15.39±4.19	-	0.73±0.07	-	2.49±0.32	-	8.41±4.78	-	37.66±5.88	-
Taekwondo	14.28±4.57	23.71±-	0.69±0.09	0.76±-	2.54±0.48	3.03±-	14.73±1.89	11.40± -	42.27±8.24	45.14±-
Total	**17.11±6.00**	**27.09±4.20**	**0.66±0.12**	**0.58±0.08**	**2.52±0.75**	**2.35±0.60**	**11.73±5.16**	**15.53±4.81**	**40.87±7.50**	**46.58±26.66**

Table 3. Percentage of Physical Fitness Level of athletic scholarship students, Rangsit University comparing as the norms of physical fitness for national youth athletes and national athletes of Sports Authority of Thailand

No.	Test Lists	Percentage of Physical fitness Level									
		very good		good		moderate		low		very low	
		M(%)	F(%)	M(%)	F(%)	M(%)	F(%)	M(%)	F(%)	M(%)	F(%)
1.	Body Fat	31.73	0.00	8.65	1.67	8.65	50.00	9.62	25.00	12.5	18.33
2.	Grip Strength	12.50	0.00	19.23	1.67	19.23	50.00	7.69	25.0	4.81	18.33
3.	Leg Strength	61.54	41.67	15.38	26.67	15.38	25.00	4.81	3.33	0.96	0.00
4.	Flexibility	4.81	15.00	17.31	13.33	17.31	51.67	12.50	16.67	6.73	3.33
5.	Aerobic capacity	11.54	13.33	10.58	15.00	10.58	38.33	14.42	16.67	28.85	13.33
Total		**24.95**	**14.48**	**14.54**	**12.07**	**39.49**	**44.48**	**10.02**	**17.93**	**11.00**	**11.03**

Establishment of fitness norms

The norms of physical fitness of the male and female athletic scholarship students, Rangsit University as shown in Table 4 and 5, have derived from data collection with the results of each aspect and each sport type by separating male and female. The mean and standard deviation of physical fitness in each aspect could be divided into 5 levels including very good, good, moderate, low, and very low fitness. Each item of the tests was scored as 5, 4, 3, 2, and 1 point, respectively.

Consequently, all five components of physical fitness test can be applied as the tools for further evaluation of physical fitness for the athletic scholarship students, Rangsit University.

Table 4. Norms of physical fitness of the male athletic scholarship students, Rangsit University

Level	Body Fat (%)	Grip Strength (kg./weight)	Leg Strength (kg./weight)	Flexibility (cm.)	VO_2 max (ml./kg./min)
Very good	11.09 - down	0.80 - up	3.28 - up	18 - up	48.39 - up
Good	11.10 - 14.10	0.73 - 0.79	2.91 - 3.27	15 - 17	44.63 - 48.38
Moderate	14.11 - 20.11	0.60 - 0.72	2.14 - 2.90	9 - 14	37.12 - 44.62
Low	20.12 - 23.12	0.53 - 0.59	1.77 - 2.13	6 - 8	33.36 - 37.11
Very low	23.13 up	0.52 - down	1.76 down	5 - down	33.35 - down

Table 5. Norms of physical fitness of the female athletic scholarship students, Rangsit University

Level	Body Fat (%)	Grip Strength (kg./weight)	Leg Strength (kg./weight)	Flexibility (cm.)	VO_2 max (ml./kg./min)
Very good	22.87 - down	0.68 - up	2.97 - up	20 - up	54.16 - up
Good	22.88 - 24.98	0.63 - 0.67	2.66 - 2.96	17 - 19	50.37 - 54.15
Moderate	24.99 - 29.19	0.54 - 0.62	2.05 - 2.65	13 - 16	42.80 - 50.36
Low	29.18 - 31.28	0.49 - 0.53	1.74 - 2.04	10 - 12	39.01 - 42.79
Very low	31.29 up	0.48 - down	1.73 down	9 - down	39.00 - down

Table 6 and 7 shows the evaluation of physical fitness in male and female athletic scholarship student, Rangsit University. In general, the results can be summarized that the athletic scholarship students, Rangsit University both male and female as a whole and each aspect had the physical fitness at the moderate level. However, when considering by separating the types of sports, it was found that the physical fitness of Takraw athletes was at the very good level, male athletes of swimming, soccer, basketball, and tracks and fields were at the good level. Meanwhile, the athletes in the lower norms included the male and female of go, judo, and petanque.

Table 6. Evaluation of physical fitness of the male athletic scholarship students, Rangsit University

SPORTS	Body Fat (%)	Grip Strength (kg./weight)	Leg Strength (kg./weight)	Flexibility (cm.)	Aerobic capacity (ml./kg./min)	$\bar{X}$	Interpretation
Go	3	2	2	2	1	2	low
Volleyball	-	-	-	-	-	-	-
Judo	3	2	2	1	2	2	low
Swimming	3	3	4	5	3	3.6	good
Football	3	3	3	4	5	3.6	good
Basketball	3	3	2	3	4	3	good
Takraw	4	5	4	5	5	4.6	very good
Golf	3	3	3	3	3	3	moderate
Sprinter	4	4	4	4	4	4	good
Badminton	3	3	3	3	3	3	moderate
Petanque	1	3	3	2	2	2.2	low
Tennis	3	3	3	3	3	3	moderate
Taekwondo	3	3	3	4	3	3.2	moderate
Total	3	3.08	3	3.25	3.17	3.1	moderate

Table 7. Evaluation of physical fitness of the female athletic scholarship students, Rangsit University

SPORTS	Body Fat (%)	Grip Strength (kg./weight)	Leg Strength (kg./weight)	Flexibility (cm.)	Aerobic capacity (ml./kg./min)	$\bar{X}$	Interpretation
Go	1	1	3	2	1	1.6	low
Volleyball	3	2	2	4	2	2.6	moderate
Judo	2	2	3	2	3	2.4	low
Swimming	3	3	3	5	2	3.2	moderate
Football	-	-	-	-	-	-	-
Basketball	3	3	3	3	3	3	moderate
Takraw	-	-	-	-	-	-	-
Golf	4	3	3	4	3	3.4	moderate
Sprinter	4	4	3	3	3	3.4	moderate
Badminton	-	-	-	-	-	-	-
Petanque	3	3	3	3	2	2.8	moderate
Tennis	-	-	-	-	-	-	-
Taekwondo	4	5	5	3	3	4	good
Total	3	2.89	3.11	3.22	2.44	2.93	moderate

CONCLUSION

The findings from the current study could be reliable that the determination of physical fitness test of athletic scholarship students, Rangsit University could be effectively applied to the further testing physical fitness of athletic scholarship students, Rangsit University. When considering the study results, it suggested that one of the crucial factors to physical fitness was that the proper program management of training could manage how much it was in accordance with the purposes, such as, the suitable shape size of body for playing that kind of sport; muscle strength, flexibility, cardio-respiratory endurance. Ketsing (1980) stated that to send the athletes for competition with global athletes, it had to rely that which chance to conquer the competitors. Principally, to conquer others had to rely on a few things starting from recruiting the athletes first. Not only recruiting the persons who had the appropriate body with each sport type, but the athletes also had to realize the physical fitness as well. The most importance to focus on was that the physical fitness of athletes had to be complete sufficiently.

There should be some consideration about the improvement and development of norm score and norms of physical fitness test of the athletic scholarship students, Rangsit University in every two years, etc. in order that the norm score and standard norms can be updated all the time.

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