

AN EVALUATION OF STRENGTH AND CONDITIONING TRAINING PROGRAMS IN IPU
MEN'S HANDBALL TEAM

IPU 男子ハンドボール部におけるストレングス&コンディショニング
プログラムの評価

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要 旨 : 本研究は、IPU 男子ハンドボール部が6ヶ月間実施してきたストレングス&コンディショニング (S & C) トレーニングプログラムに関する意識調査を目的として行った。部員14名を対象としてアンケート調査を行い、結果はトレーニングによる身体能力の向上(81.8%)・プログラムに関する満足度(92.9%)・専門インストラクターに対する現場指導力(100%)などの項目に対してポジティブな回答を得た。またトレーニングを通じて関連する解剖生理学・トレーニング理論・栄養学などにも興味を持っていることを把握することができた(75.1%)。しかし大半のものは来年度の後輩に対するトレーニング指導に関してある程度の自信しかない(71.4%)と回答したために、単純にトレーニングを行うだけでなく将来指導者としての活躍ができるための教育の必要性も感じた。

キーワード : ハンドボール、ストレングス&コンディショニングトレーニングプログラム、アンケート調査

I. INTRODUCTION

International Pacific University (IPU) has established in April 2007, and IPU men's handball team also has organized at the same time. Members on the team are obviously all freshmen. Amazingly, the team participated in a districted college handball championship game just after one month when the players met each other for the first time. Fortunately, the team won the third place; however, the IPU men's handball head coach was never satisfied with the result even for their first games. He strongly considered that his players were supposed to develop their competitive performance for next games. Thus, he visited at an IPU medical center and requested a team doctor to build up their physical abilities better.

An IPU strength and conditioning (S & C) instructor immediately designed an exercise program, and the coach agreed with the exercise description without any questions. The instructor has been training the athletes hard since the first games were done.

A total of three S & C training programs were design until now. Each training program shows in table 1, table 2, and table 3. Basically, all of the training programs were planned to be performed within approximately two hours including warming-up and cooling-down. The training programs always included with two major purposes following by National Strength and Conditioning Association Guideline; preventing athletic injuries and improving athletic performance (Beachle and Earle, 2000).

At the beginning of the first training section, the instructor explained aims of each exercise,

benefits of the training, and methods of correct movement patterns very carefully and specifically. Although the athletes struggled to understand the trainings in the early days, they gradually learned how they exercise with strong confidence, motivation, and ambition.

It has passed almost six months since they started the trainings. Therefore, the purpose of this study was to evaluate the strength and conditioning training programs in the IPU men's handball team. It might obtain helpful responses how the S&C training programs affected to the athletes and might also provide practical information to identify their current training status through the results.

II. PROCEDURES

SUBJECTS

There are fifteen players in the IPU men's handball team. A total of 14 athletes (average age : 18.7 ± 0.7 years ; height : 172.0 ± 0.04 cm ; mass : 67.9 ± 7.4 kg ; BMI : 23.0 ± 2.4) participated and completed this research. One subject missed this study due to a personal reason. The subjects fully apprised of the nature of the research project and volunteer to participate by signed on informed consent form. This study was approved by the department of physical education for research reviews involving human subjects at IPU.

METHODS

It was one day survey conducted on the 1st campus of IPU during the 2007 semester.

Before filling in a questionnaire, the subjects received a verbal explanation for this study, including a description of its purpose, risks, and benefits. The subjects then received an informed consent form and signed the form if they agreed to participate.

The questionnaire consisted of 10 multiple-choice questions, and the contents show in table4.

Table 4. Contents of the Questionnaire

Q1 : Have you ever been trained by any S&C instructors before entering IPU ?
Q2 : What are your own purposes of the S&C Training?*
Q3 : Do you feel anything has changed since you started the S&C training?*
Q4 : How long do you think the appropriate training time to spend per a section?
Q5 : What lectures do you want to take if the S&C instructor offers?*
Q6 : Do you have any dissatisfaction about the things related to the S&C training?*
Q7 : What do you think about the training programs designed by the S&C instructor?
Q8 : What do you think about the S&C instructor's practical guidance?
Q9 : What do you request for the current S&C training programs?*
Q10 : Do you think you will be able to train freshmen correctly in the next year?

* Two or more answers possible

Those questions assessed the followings : (1) training guidance experience, (2) individuals' training purposes, (3) current conditions, (4) appropriate training time, (5) optional lectures, (6) environmental problems, (7) the exercise contents evaluation, (8) the S & C instructor evaluation, (9) requests for the trainings, and (10) leadership . Some questions allowed choosing two or more answers if they wanted to. There was no time limit to answer, and the subjects' confidentialities were insured by an investigator.

As soon as the subjects filled in the questionnaire, the investigator collected the forms and then averaged the data. In this study, a statistical analysis was not performed.

III. RESULTS

For the question number one, 21.4% of the subjects had been trained by S&C instructors before they entered IPU. The range of their guidance periods were from one day to six months during their high school ages. Conversely, 78.6% of the subjects had no S&C training guidance experiences. (Table 5)

Table 5. Training Guidance Experience

Q1 : Have you ever been trained by any S&C instructors before entering IPU?	
Yes	21.4% (n = 3)
No	78.6% (n = 11)

For the question number two, 36.1% of the subjects trained toward improving their physical abilities as their own purpose ; 30.6% of the subjects trained toward preventing athletic injuries ; and 16.7% of the subjects trained toward learning coaching skills for the future and making ‘teamwork’ better. (Table 6)

Table 6. Individuals’ Training Purposes

Q2 : What are your own purposes of the S&C training?*	
Improving physical abilities	36.1% (n = 13)
Preventing athletic injuries	30.6% (n = 11)
Learning coaching skills for the future	16.7% (n = 6)
Making ‘teamwork’ better	16.7% (n = 6)
Other	0.0% (n = 0)

* Two or more answers possible

For the question number three, 33.3% of the subjects felt their body sizes has developed since the training started ; 30.3% of the subjects felt their muscular strength has increased ; 18.2% of the subjects felt less fatigue during they exercise ; 15.2% of the subjects felt mental toughness has developed ; and 3.0% of the subjects answered feeling ‘the center of the body’ during exercise. (Table 7)

Table 7. Current Conditions

Q3 : Do you feel anything has changed since you started the S&C training?*	
Developing body size (Hypertrophy)	30.3% (n = 10)
Increasing muscular strength	33.3% (n = 11)
Less fatigue during exercise	18.2% (n = 6)
Developing mental toughness	15.2% (n = 5)
Other	3.0% (n = 1)

* Two or more answers possible

For the question number four, 71.2% of the subjects thought two hours long is the appropriate training time to spend per a section ; 14.3% of the subjects thought one hour long ; and 7.1% of the subjects thought either 2 hours and 30 minutes or only 30 minutes long. (Table 8)

Table 8. Appropriate Training Time

Q4 : How long do you think the appropriate training time to spend per a section?	
Over 3 hours	0.0% (n = 0)
2 hours	72.1% (n = 10)
1 hours	14.3% (n = 2)
30 minutes	7.1% (n = 1)
Other	7.1% (n = 1)

For the question number five, 30.6% of the subjects wanted to take ‘Training Methods and Theories’ as an optional lecture if the S & C instructor would offer ; 27.8% of the subjects want to take ‘Sports Nutrition’ ; 22.2% of the subjects want to take ‘Mental Training’ ; 16.7% of the subjects want to take ‘Human Anatomy & Exercise Physiology’ ; but 2.8% of the subjects answered ‘nothing’. (Table 9)

Table 9. Optional Lectures

Q5 : What lectures do you want to take if the S&C instructor offers?*	
Human Anatomy & Exercise Physiology	16.7% (n = 6)
Sports Nutrition	27.8% (n = 10)
Training Methods and theories	30.6% (n = 11)
Mental Training	22.2% (n = 8)
Other	2.8% (n = 1)

* Two or more answers possible

For the question number six, 54.5% of the subjects dissatisfied with the small facility of the training center ; 31.8% of the subjects dissatisfied with less training equipments to use ; 9.1% of the subjects dissatisfied with the training time to spend, the training frequency, and the location of the training center ; but only 4.5% of the subjects satisfied with the current environment. (Table 10)

Table 10. Environmental Problems

Q6 : Do you have any dissatisfaction about the things related to the S&C training?*	
Nothing	4.5% (n = 1)
Small facility	54.5% (n = 12)
Less training equipments	31.8% (n = 7)
The S & C instructor	0.0% (n = 0)
Other	9.1% (n = 2)

* Two or more answers possible

For the question number seven, 92.9% of the subjects satisfied with the S & C training contents ; however, 7.1% of the subjects were afraid of the qualities of the training from the next year. (Table 11)

Table 11. The Exercise Contents Evaluation

Q7: What do you think about the training programs designed by the S&C instructor?	
Very good	78.6% (n=11)
Good	14.3% (n=2)
Bad	0.0% (n=0)
Very bad	0.0% (n=0)
Other	7.1% (n=1)

For the question number eight, the all subjects completely satisfied with the S & C instructor's practical guidance. (Table 12)

Table 12. The S&C Instructor Evaluation

Q8: What do you think about the S&C instructor's practical guidance?	
Very good	92.9% (n=13)
Good	7.1% (n=1)
Bad	0.0% (n=0)
Very bad	0.0% (n=0)
Other	0.0% (n=0)

For the question number nine, 37.5% of the subjects requested to have a personal S & C training program ; 18.8% of the subjects requested to have a program 'for specific playing positions' and 'for weak body parts', yet ; 31.3% of the subjects had no requests. (Table 13)

Table 13. Requests for the Trainings

Q9: What do you request for the current S&C training programs?*	
Nothing	31.3% (n=5)
Designing personal S&C training program	37.5% (n=6)
Introducing the latest and newest exercise program	12.5% (n=2)
I want to train by myself	0.0% (n=0)
Other	18.8% (n=3)

* Two or more answers possible

For the question number ten, 71.4% of the subjects thought that they would be able to train freshmen correctly in some parts in the next year ; 21.4% of the subjects answered they would train new players completely ; but 7.1% of the subjects thought that they had less confidence to

teach freshmen trainings. (Table 14)

Table 14. Leadership

Q10: Do you think you will be able to train freshmen correctly in the next year?	
Yes, definitely	21.4% (n=3)
Yes, some parts	71.4% (n=10)
No, some parts	0.0% (n=0)
No, definitely	7.1% (n=1)
Other	0.0% (n=0)

IV. DISCUSSION

Handball is a sport combining aspects of basketball, soccer, and baseball. This sport requires physical strength and mental toughness similar to the other sports (Cardoso Marques. 2006). It also includes many athletic abilities such as speed, power, agility, balance, flexibility, neuromuscular coordination, and cardiovascular endurance (Rogulj. 2005). There are many athletic injuries happened because handball is a contact sport unlike basketball and volleyball (Olsen. 2006, Langevoort. 2007). Thus, there is no doubt that the IPU men's handball players had to train in order to prevent injuries and to improve athletic abilities.

This study was a fundamental research that evaluated how the S & C training affected to the team. There was some useful information found through the results.

First of all, they enthusiastically work out with no complaints today even though the most of the athletes had never trained by any specific S & C instructors before entering IPU. Roughly 80% of the subjects have felt their physical changes such as developing body sizes, increasing muscular strength, and feeling less fatigues during exercise. Those are the nature of the exercise (Gorostiaga et al. 2006, Izquierdo et al. 2002), yet their enhanced athletic abilities actually caused their athletics' performance positive in next games. Improving athletic performance was one of the purposes of a S & C training, and the players found out the meaning of it all the way through such physical training activities.

Secondly, they have interests in learning about things related to the S&C training. Through the questions number 5 and 9, they answered that they wanted to study 'training methods and theories' and requested to have their own training programs. They just used to exercise in the beginning ; however , they avariciously listen whatever the instructor teach and explain now. It is a huge change of their attitudes compared to the first. They are always motivated to practice, and they are recently seeking for something to improve their abilities. They might seem to enjoy learning new techniques and knowledge of exercise at this time.

Finally, the athletes were satisfied with the current training programs and the training time to spend. The training programs were originally designed for the handball players, and the all programs were created progressively with specific purposes by the instructor. For instance, the training program number one was mainly planned to learn correct exercise motions and patterns. Because of their less training experience, the instructor had to demonstrate correct exercise forms and teach safe techniques. The training program number two included with twisting motions and lateral movements. The instructor modified the second training program because the players require multi-dimensional motions in handball games. The second exercises with multi-planer movements obviously developed their physical abilities contrast to the first exercise program.

In addition, however, the coach and the instructor disappointed one thing of the results that the athletes would teach exercises to new freshmen with minimum confidence next year. IPU has an educational policy 'uniting sports and education' which means that IPU is the school for not only making top athletes but also promoting high-quality skilled coaches and teachers after graduation. Therefore, it must be necessary for the athletes to learn teaching and coaching skills as well as they actually perform exercise at present.

V. REFERENCES

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Table 1. IPU Men's Handball Team Strength & Conditioning Training Program No.1

IPU・環太平洋大学 男子ハンドボール部

Strength & Conditioning Training Program - No.1 - Program Designed by Kinji Kusumoto, MS, ATC, CSCS

【 Purpose 】
 1) カラダ全体(上肢、体幹、下肢)を鍛え、練習・試合時における怪傷を予防する
 2) スポーツの特殊性(ハンドボール)に対応出来るためのカラダづくりを行う
 3) 基礎動作の理解から応用動作への発展
 4) 『俺たちは「誰よりも強い男!」という意識と自覚を身につける』

【 Period 】
 May 31 ~ June 21, 2007 (2 times/week X 4 weeks : Tuesday & Thursday)

【 Programs 】
 Warm-up: Up
 Stretching:

	Wt. (kg)	Reps.	Sets	Rest Time
Upper Body:				
DB Shoulder Press				
WP Uprights row				
DB Bent Lateral Raise				
DB Bench Press				
DB Fly				
DB Pull Over				
Trapezius Extension w/ Shoulder Ext.				
Front Raise				
Lateral Raise				
Wrist Exercise	2.5	2		
	Over 10	10	4	45 sec.

	Wt. (kg)	Reps.	Sets	Rest Time
Core:				
Front Abd.				
R. Side Abd.				
L. Side Abd.				
Hip Raise				
Alternated Leg Ext. & Flex.	Body Weight	10	4	30 sec.
Leg Abd. & Add.				
Alternated Arm Ext. & Flex.				
Arm Abd. & Add.				

	Wt. (kg)	Reps.	Sets	Rest Time
Lower Body:				
Squat	Over 20	10		
Forward Step Lunge	Nc	2		
Backward Step Lunge	Nc	2		
Leg Press				
Leg Curl		10	3	45 sec.
Leg Extension		10		
Calf Raise	Nc	20		
Toe Raise	Nc	20		

Stretching / Cooling-Down
 Clean Up

【 Group 】
 Group A: Upper Body → Lower Body → Core
 Group B: Lower Body → Upper Body → Core



Table 3. IPU Men's Handball Team Strength & Conditioning Training Program No.3

IPU・環太平洋大学 男子ハンドボール部

Strength & Conditioning Training Program - No.3 - Program Designed by Kinji Kusumoto, MS, ATC, CSCS, PES

【 Purpose 】
 1) 試合および練習時におけるスポーツ傷害の予防
 2) 身体サイズアップ(筋肥大)
 3) クイックリフト(パワー-エクササイズ)へ向けての基礎体力づくり
 4) 『俺たちは「誰よりも強い男!」という意識と自覚を身につける』

【 My Goals 】

【 Period 】
 October 18 ~ November 20, 2007 (3 times/week X 6 weeks : Tuesday, Thursday, Friday)

【 Programs 】
 Warm-up: Up | Body temperature & Motivation to Exercise
 Stretching: Static Stretching → Ballistic/Dynamic Stretching

	Wt. (kg)	Reps.	Sets	Rest Time
Upper Body:				
DB Bench Press				
DB Fly				
DB Pullover	Over 10	3		
Bench Press	Over 40	5	7	60 sec.
Bent Over Row	Over 30	5		
Kettle Shoulder Exercise (Swing)	1, 5, 3	8		
Dead Lift	Over 30	6		
Gorilla w/ Kettle ball	1, 5, 3	6 X 3		
Wrist Curl Exercise	2.5	2		

	Wt. (kg)	Reps.	Sets	Rest Time
Lower Body:				
Squat	Over 40	6		
Machine Leg Press		8		
Power Step Front Lunge	Nc	2	8	60 sec.
Toe Raise	Nc	30		
Calf Raise	Nc	30		

	Wt. (kg)	Reps.	Sets	Rest Time
Plyometric Exercise:				
Squat Jump		15		
Split Jump		10		
Single Leg Hop	Body Weight	2	2	60 sec.
Single Leg Side Jump	Weight	2		
Task Jump		5		
Depth Jump		5		

	Wt. (kg)	Reps.	Sets	Rest Time
Core:				
10 Core Exercise	Nc	10	2	30 sec.

	Wt. (kg)	Time	Sets	Rest Time
Cardio:				
①Normal ②Knee Up ③Heel to Heel	Nc	15:15	1	90 sec.

Stretching / Cooling-Down
 Clean Up



Table 2. IPU Men's Handball Team Strength & Conditioning Training Program No.2

IPU・環太平洋大学 男子ハンドボール部

Strength & Conditioning Training Program - No.2 - Program Designed by Kinji Kusumoto, MS, ATC, CSCS

【 Purpose 】
 1) 試合および練習時におけるスポーツ傷害の予防
 2) 体幹の軸を崩さないための(回旋動作)や(横移動)の習得
 3) 『俺たちは「誰よりも強い男!」という意識と自覚を身につける』

【 Period 】
 July 10 ~ August 14, 2007 (3 times/week X 6 weeks : Tuesday, Thursday, Friday)

【 Exercise 】
 Warm-up: Up | Body temperature & Motivation to Exercise
 Stretching: Static Stretching → Ballistic/Dynamic Stretching

	Wt. (kg)	Reps.	Sets	Rest Time
Upper Body:				
DB Shoulder Press w/ R. Twisting		10		
DB Shoulder Press w/ L. Twisting		10		
WP Uprights Row w/ R. Twisting		10		
WP Uprights Row w/ L. Twisting		10		
3 Way Motion: Gorilla (Low)		5		
3 Way Motion: Gorilla (Middle)		5		
3 Way Motion: Gorilla (High)	Over 10	5	3	30 sec.
DB Bench Press		10		
DB Fly		10		
DB Pull Over		10		
Shoulder Full ROM of Ext. & Flex.		10		
Shoulder Full ROM of Abd. & Add.		10		
Wrist Exercise	2.5	4		

	Wt. (kg)	Reps.	Sets	Rest Time
Lower Body:				
Squat	Over 30	15		
Walking Front Lunge	Nc	2		
Walking Back Lunge	Nc	2		
R. Side Step Squat	Nc	1		
L. Side Step Squat	Nc	1		
Leg Press		10	3	30 sec.
Leg Curl		10		
Leg Extension		10		
Calf Raise	Nc	30		
Toe Raise	Nc	30		

Stretching / Cooling-Down
 Clean Up

【 Note 】

	Wt. (kg)	Reps.	Sets	Rest Time
Core:				
Front Abd.				
R. Side Abd.				
L. Side Abd.				
Crunch				
Crunch w/ torso twisting	Body Weight	10	2	30 sec.
Hip Raise				
Alternated Leg Ext. & Flex.				
Leg Abd. & Add.				
Alternated Arm Ext. & Flex.				
Arm Abd. & Add.				

	Sets	Rest Time
Ladder Training:		
Quick Run		
R. Lateral Sprint		
L. Lateral Sprint		
in-out		
Open-Close Jump	2	45 sec.
R. Side Jump		
L. Side Jump		
in-out-out		

	On/Off	Sets	Rest Time
Cardio Training:			
Normal			
Knee Up	(15 sec: 15 sec) X 3	1	90 sec.
Heel to Buttock			

