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Physical Fitness Profile of Indonesian Female Rugby Athletes for Asian Games 2018

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***Abstract*--the objective of this research is to obtain information on the Physical Fitness Profile of Indonesian Female Rugby Athletes for the 2018 Asian Games. The study was carried out using the survey method. This research work, describes the use of Muscle strength, Explosive power, Cardio endurance, Flexibility and Coordination as a measure of the athletes' physical fitness. The Measurement of the Physical Fitness of the athletes was carried out at the Faculty of Sport Science, Jakarta State University.**

Keywords--physical fitness, muscle strength, explosive power, cardio endurance, flexibility, coordination, rugby athletes

I. INTRODUCTION

Most sporting activities are classified as either having a pre dominant or dominant physical fitness. However, contemporary researches suggest that sports activities can be affected by the athletes' physical fitness. This can be deduced from the fact that the muscular strength of a rugby athlete appears to have an influence on both the speed and stamina of the athlete. The muscular strength and explosive power are significantly related to how fast the athletes can move. An athletes' performance is mostly influenced by the strength, speed, endurance, flexibility and the coordination of the athletes. The objective of this research work is to obtain information for the Physical Fitness Profile of the Indonesian Female Rugby Athletes for the 2018 Asian Games.

II. PHYSICAL FITNESS

Physical fitness is a very important factor used to determine the success of different sports activities. For instance, Muscular strength and explosive power are essential in any sports that require physical stamina. Speed, strength, endurance, coordination, balance, power, flexibility and agility are listed as the eight types of physical fitness stated by Bompa. All rugby athletes must possess all this qualities.

A. Muscle Strength.

Before we continue, it would be in our best interest to have a concise knowledge of what strength is. Strength could be defined as the maximum force or the rotational force exerted by a muscle or group of muscles. It could also be defined as the ability of the neuromuscular system to exert force against an external resistance. Contemporary literature suggests that high levels of muscular strength are significantly related to the athletes' performance. We are quite aware that the muscular strength is related to the speed of the athletes. therefore, we can confidently state that appropriate application of force can alter the neuromuscular system in such a way that it improves the athlete's capacity to produce resistance and this also improves the athletes' performance.

The maximal strength that any athlete can exhibit depends on seven key concepts: (a) the number of motor units involved (recruitment), (b) the rate at which the motor unit is being fired (rate coding), (c) the amount of motor unit synchronization, (d) the use of the stretch shortening cycle, (e) the degree of neuromuscular inhibition, (f) the muscle fiber type, and (g) the degree of muscle hypertrophy The term strength is also used to describe the abilities that contribute to human efforts when participating in sports or other physical activities. Although, there are some disparities in the way the term is being used. It is a widely accepted fact that strength is the ability to exert force, but there is a considerable disagreement as to how strength can be measured. The weight that a person can lift is probably the oldest quantitative measurement of strength. With the modern advancement in Technology, the use of isometric strength testing and, the recent iso-kinetic strength testing are now becoming very popular. The coach and the athlete must have a fore knowledge of how the athletes' strength can affect the athletes' performances. The coach and the athletes need to understand the principles associated with resistance training in order to enhance their performances effectively. Measurement of muscle strength could be by grip, pull/push, leg and back.

B. Explosive Power

Explosive Power is defined as the rate of doing work, where work is the product of the force exerted on an object and the distance moved by the object in the direction of the force being exerted. Quantitatively, work and power are defined as:

- Work = Force x Distance
- Power = Work/Time
- Power = Force x Velocity

Power is defined as the product of the force exerted on an object and the velocity of the object in the direction in which the force is being exerted. It can also be simply defined as the force with respect to time. The Physical fitness of strength and speed are combined to create power. An athlete can be strong and able to move a heavy load but the speed at which this is done varies. Movements such as vertical jumps, broad jumps, different types of tossing, passing or throwing balls (measuring the distance thrown or jumped) can all be used to test power. Explosive power on the other hand is defined as the rate of maximum force developed and this is dependent on the type of muscle action. In activities requiring high acceleration and output, explosive power training is necessary for maximum performance. Some examples of these activities are soccer, hurdle, etc. This type of training is effective in enhancing the athletes' performance.

Athletes do not need to include explosive power trainings in their workout schedule. Cardiovascular and strength training performed in a slow, steady manner would produce adequate results. In contrast, Athletic movements need to be performed at very high speeds. The muscles have to be well developed and trained in order to do this. The type of exercises used in explosive power trainings are determined by the type of sports that is being trained for. For instance, a rugby player trying to improve his jump shots should engage in a training session that would include vertical jumps. Explosive power exercises should be taught and supervised by fitness professionals to reduce the risk of injury. They should also be done in conjunction with a regular workout program in order to ensure that the athlete performs all workout sessions adequately and appropriately. For any athlete to develop his/her explosive power, two things are involved. The first one is that the athlete must be able to work on his/her speed. Secondly, an athlete must have great stamina. A combination of numerous exercises leads to an increase in the development of the muscles.

To improve an athletes' explosive power, the athletes' movement must change from eccentric to a concentric action. One popular method is the plyometrics method. , in this method, the depth jumps are in order. This requires an athlete to fall from a distance, and on landing, jumps upward immediately, in under 0.2 seconds. This is also known as reversible muscular action or the stretch-shortening cycle. This method is used in most sports skills due to the elasticity of the muscles and tendons. . The athlete must apply the appropriate velocities for the movements.

C. Cardio Endurance

Cardio Endurance can be classified into the following; 1) aerobic endurance, this is sometimes referred to as low-intensity exercise endurance, this exercise allows a person to perform some activities continually for a long period of time. 2) Anaerobic endurance, this is also known as high-intensity exercise endurance, this has to do with the ability of repeatedly performing bouts of high-intensity exercises. Most sporting activities rely on some sort of endurance either the high or the low intensity endurance, the type of endurance required has a significant effect on the performers outcome. It is therefore of paramount importance that the coach and the athlete should ascertain the type of endurance that the athlete would be needed for the said sports and how the appropriate endurance would be incorporated into the training plan. The coach and athlete must also put into consideration the athlete's physiological responses to the methods of developing endurance. Once the type of endurance and the physiological responses are understood, the coach can develop a training plan to enhance sports-specific endurance.

The concept of endurance differs for the various sporting activities and this can be defined in several ways. For example, the type of endurance that an athlete who runs marathon races needs should be one that provides the athlete with the ability to continuously perform at a specific power output or velocity for a long period. Conversely, a rugby player needs to repetitively perform periods of high-velocity movements severally in order to obtain adequate periods of recovery. Some form of endurance affects the athletes' performance. If the wrong type of endurance training is implemented, the athlete might develop endurance characteristics that do not meet the needs of that particular sport, and thus the performance capacity might be reduced. To understand the correct application of endurance training, the coach and athlete must differentiate between the two major types of endurance reported in the contemporary literature, which are: the low-intensity exercise endurance (LIEE) and the high-intensity exercise endurance (HIEE).

Activities that are predominated by aerobic energy supply tend to exhibit lower peak powers and thus can be classified as being of lower intensities. These activities require the athletes to perform continually, at a low intensity, for a substantial period. Thus, this type of endurance is known as LIEE or aerobic endurance. Sports that rely on anaerobic metabolism usually require high power outputs or the repetitive performance of high-velocity movements. This is because anaerobic activities require higher power outputs than those seen in aerobic activities. Anaerobic activities can thus be classified as being of a high intensity. Therefore, the ability to sustain and repeat high-intensity exercise bouts is considered HIEE. The development of HIEE does not impair strength and power-generating capacity, unlike in the development of LIEE

D. Flexibility

Flexibility is defined as the range of motions about a body joint. It also refers to the state of the muscle's length, which restricts or allows the freedom of joint movement. Flexibility is very essential for optimum joint and muscle functions. There are many good books that typical explains the assessment of muscle lengths and tensions as well as joint functions. Typical devices used for measuring flexibility are the manual and electric goniometers, they are used to measure the joint angle, another device is the sit-

and-reach box, and this is used to evaluate the combined flexibility of the lower back and the hips. Flexibility measurements are more reliable when standardized warm-up and static stretching precedes the flexibility assessment. During a flexibility test, the athlete must move slowly into the fully stretched position and remain in that position for a while. Ballistic stretching, characterized by bouncing in order to increase the range of motion, should be prohibited during warm-ups and should not be allowed during any flexibility testing.

Flexibility is the range of movement in a joint or around a series of joints, and the lengths of the muscles that cross the joints hence inducing a bending movement or motion. Flexibility varies between individuals, particularly in terms of differences in the length of muscles that make up the multi-joint muscles. Flexibility in some joints can be increased to a certain degree by exercise. The most common exercise that helps to maintain or improve flexibility is stretching. The Quality of performance is enhanced by improving and maintaining a good range of motion around the joints. Individual joints varies, therefore flexibility should be developed according to the needs of the individuals. Loss of flexibility could be a predisposing factor that could lead to some health issues such as pain syndromes and balance disorders. Some important factors should be taken into consideration before engaging in any flexibility test or assessment. They are: the structure of one's joint, ligaments, tendons, muscles, skin type, fat (or adipose) tissue, body temperature, activity level, age and sex. The flexibility level of an athlete is measured or calculated by performing a sit and reach test, and the result is defined as the athletes' personal flexibility score.

E. Coordination

Coordination is a complex ability and it is closely related to strength, flexibility, speed and endurance. If an athlete happens to be lacking in any of these abilities, this can affect their development of proper coordination. In order to improve on an athlete' coordination skills, emphasis should be laid on participating in a large variety of skills and complex exercises. Participating in a variety of skills and exercises is beneficial to the proper development of coordination. Agility, balance, and complex multi directional movements are all useful in the assessment of coordination. Unilateral movements and balance tests are also helpful and useful in determining athletes' abilities in these areas. It is of utmost importance to observe how quickly or how slowly the athletes perform the various movements. it should also be noted that the physiological basis of coordination solely relies on the coordination of the various processes of the central nervous system.

III. RUGBY

Rugby union like many other team sports is a sport of intermittent activities that include both high intensity and low intensity endurances and all the movements performed throughout the game. The ability to identify and understand the specific demands of all sporting activities and the training backgrounds of the athletes is a crucial factor in developing appropriate training and recovery program that would elicit improved performances. Some of the most important factors geared towards a successful performance of rugby union match play include strength, power, speed and both aerobic and anaerobic capacities. it is important to note that Increase in the size and strength of the players correlates with the field performance.

Rugby union was a made a professional sports in 1995 and since then there has been an increase in commercial interest. This increase led to the better management of the players and improved performances in the game. A typical professional rugby season in the northern hemisphere has over 30 games and they all involve speed and stamina. Rugby is a contact sport that is played for 80 minutes, the first half lasting for 40 mins. The Teams are made of fifteen players, and the players are divided into forwards and backs. The players in the forwards tend to be immobile and thrive on physicality. Their primary role is to secure possession of the ball. That has not to say, however, that attack is strictly off limits. In a game analysis conducted by the International Rugby Board, forwards completed an average 42% of passes at the 2011 Rugby World Cup. This shows that forwards are integral to an effective attack. Conversely, if the athletes have speed, power, and skill, they are often placed as the back players. . As rugby becomes increasingly dynamic, every player must be comfortable with the ball in hand and must know how to make active defensive tackles.

Performance programs in rugby should center on the game's physiological, psychological, and logistical demands. a training plan might seem perfect, but rugby is far from being perfect as a result of the various movements. Set plays occur at high speed, and the defensive players must decide on how best to tackle the oncoming attackers. Predictable drills certainly have a part to play in practice, but it's important to progress towards more random drills. The Technical and tactical development have a direct relationship with the physical abilities (physical fitness,), the rugby player needs to develop. Physical fitness include strength, speed, cardio endurance and coordination. The purpose of this paper is to present the profile of physiological physical fitness of Rugby athletes. In addition, it will also analyze my initial theories about the importance of the energy systems to this sport as well as ASEP's model. This analysis will be based on the findings from a five peer-reviewed journal articles that was found by using the SPORT Discus database. Due to limited amount of resources and the absence of a Rugby specific model in the text, I referred to Rugby, since it is similar in many areas.

IV. RESEARCH METHOD

This study was carried out using survey methods. Description of this research work are the use of Muscle strength, Explosive power, Cardio Endurance, Flexibility and Coordination as a measure of Physical Fitness in Indonesian

Female Rugby Athletes. Measurement of their Physical fitnesses was held at the Faculty of Sport Science, Jakarta State University. 21 female athletes were used for sampling.

V. RESULTS

Physical Fitness Profile of Indonesian Female Rugby Athletes.

TABLE I. DATA OF MUSCLE STRENGTH

Muscle Strength	Number	Percentage
Good	8	38 %
Average	5	24 %
Less	8	38 %
Total	21	100%

TABLE II. DATA OF EXPLOSIVE POWER

Explosive Power	Number	Percentage
Good	20	95 %
Average	1	5 %
Less	0	0 %
Total	21	100%

TABLE III. DATA OF CARDIO ENDURANCE

Cardio Endurance	Number	Percentage
Good	1	5
Average	0	0
Less	20	95%
Total	21	100%

TABLE IV. DATA OF FLEXIBILITY

Flexibility	Number	Percentage
Good	6	28.5%
Average	7	33%
Less	8	38.5%
Total	21	100%

TABLE V. DATA OF COORDINATION

Coordination	Number	Percentage
Good	5	23.8%
Average	12	57%
Less	4	19.2 %
Total	21	100%

VI. CONCLUSION

From the above tables, we could deduce that the muscle strength, explosive power, flexibility and coordination of the Indonesian female rugby athletes for the 2018 Asian Games are good, but their cardio endurance is below average.

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