Physical Fitness Status of Elite Players of Nepal

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Abstract

Physical fitness leads to better athletic performance, and persistent training will usually develop physical fitness. Overall purpose of this study is to achieve the fitness status of different international athletes who were going to participate in international competitions so that future national team handlers will get reference for their training programs. Eighty seven athletes from different seven sports athletes (55 men and 32 women) were volunteered to participate in this study. Out of seven sports groups studied, within men and women athletes, over all physical fitness of men and women elite players were average but they were below average in flexibility. . More than one fourth of Nepalese elite players (27.78%) were over weighted (BMI>25). Wushu players were more flexbile than other athletes. Taekwondo players in men and athletics in women were most physically fit. Continuous fitness and sports skill research should be done regularly so that athletes as well as sports coaches will be able to know what the condition is and what direction their athletes are going.

Keywords: Physical fitness, endurance (Vo_2 Max), flexibility, agility, explosive strength

Introduction

An athlete is considered to be someone who is proficient with any form of physical exercise or in sports. In general, athletes are said to be very fit and keen on fitness. Singh and Singh (2017) defined physical fitness as the capacity to perform daily activity with vitality and sharpness, without undue fatigue while being able to appreciate recreation time interests and to meet the unpredicted emergencies. Physical fitness leads to better athletic performance, and persistent training will usually develop physical fitness (Cureton, 1956). Physical fitness is a key factor which affects the improvement of the level of the movement (Xu, 2015). Higher level of aerobic fitness decrease injury risk (Malone et al., 2018). The least fit athletes may be exposed to an excessive and too rapid increase in training load, with negative adaptions such as injury and illness, as a consequence (Gabbett, 2016). Physical fitness includes physical ability of actively adapting to life, the ability of working and excising, and the ability of keeping resistance to disease, adapting to the environment of the survival (Xu, 2015).

Fitness components related to health are body composition, cardio-respiratory fitness, flexibility, muscle strength and muscular endurance. The motor potential to carry out physical activity with regard to speed, agility, power, balance, coordination and reaction time is described by skill related physical fitness (Hoeger & Hoeger, 2014).

Performance of elite athletes depends on their technical, physiological and psychological abilities (Lin & Chang, 2009). Levels of aerobic, anaerobic, speed, power, agility, and strength capacities depend on the nature of sports. With specially planned training schedules, professional athletes and athletes who aspire to become elite typically practice year-round. However, it is difficult to isolate various components of performance during competitions. According to athletes' physical status, the training program may require to modify before the competition for optimal performance in the competition (Lin & Chang, 2009). The performance of elite athletes can be enhanced by appropriate fitness training. The fitness training should be designed based on the activities of the athlete during competition. The performance of an athlete in top-sport depends on the athlete's technical, tactical, physiological, and psychological/social characteristics. The demands of competition are closely linked to the physical ability of the athlete in optimum conditions, and can be grouped into the following (Bangsbo et al., 2006).

(i) The ability to perform prolonged exercise (endurance);
(ii) The ability to exercise at high intensity;
(iii) The ability to sprint; and
(iv) The ability to develop a high power output (force) in single actions during competition such as kicking in soccer and jumping in basketball.

A sport performance depends on energetic capacity, consisting of an anaerobic and aerobic part, tactics, technique, and motivation of the sportsmen for maximum use of their potentials on the sporting field (Gacesa, Barak & Grujic, 2009). For example, the most important part in rowing will be aerobic capacity, anaerobic capacity in the sprint, volleyball, basketball, and hockey, technique in jumping, and all five components in soccer, with the advantage of anaerobic capacity (Amusa & Toriola, 2003).

Nepali national players receive relatively less recognition and achievements in the international arena, and this is probably due to deficiencies in player training programs. Only few studies have been conducted on the fitness status of national and international players in Nepal. This study has evaluated all components of physical fitness including flexibility, balance, coordination and reaction time, which have not earlier been studied extensively. Improving the quality of the players to internationally recognized standards with limited resources available is a current necessity in Nepal. This study aimed to assess the physical fitness profiles of different international athletes who were going to participate in international competitions so that future national team managers will get reference for their further training programs.

An athlete's ability to cover a distance in a short period of time is a factor of power and explosive strength of the muscle. Power refers to the ability of the neuromuscular system to produce the greatest possible impulse in a given period of time. Explosive strength, on the other hand, describes the ability of the neuromuscular system to develop high action velocities (Ebada, 2011).

The greatest concern among today's player's in the games like football, basketball and of course in cricket and most other sports is how to improve playing speed-the speed of all movements, including starting, stopping, accelerating, catching, bowling, and batting and split of second decision making during sports competition.

Methods

The current study was an exploratory and descriptive design. This quantitative study comprised 32 elite women and 55 elite men athletes from athletics, boxing, judo, karate, taekwondo, weight lifting and wushu who were in preparation for the national and international tournament in 2013. All athletes were healthy and voluntarily participated in the study. The national team preparation committee approved the research protocol, comprising six general tests namely, 30 m sprint test, Sit and Reach test, Vertical Jump, Broad jump test, 6 x 10-meter shuttle run test and 12-minute Cooper Test to assess speed, flexibility, lower limb explosive, lower body balance and strength, agibility and cardiovascular endurance respectively. VO_2Max was calculated from the distance athletes covered during cooper test. Except in cooper test all the athletes were given two chances in other five tests and best performance were recorded as an official record.

Simple statistical tools were used such as the mean and standard deviation for the analysis of data obtained from the tests. The main aim of the tests was to achieve the fitness status of Nepalese elite athletes preparing for the national teams. National Sports Council provides simple diet, regularly for their athletes for one year. A & D UC-300 Precision Health Scale (Japan) Strain Gauge set for Altitude and Latitude adjusted digital weighing machine was used for measuring body weight. Body weight was measured to the nearest 0.1 kg and height to the nearest 0.1 cm using calibrated scales and station masters. Body Mass Index (BMI) was calculated as weight divided by height squared. The decimal age of the National Team athletes was calculated from their date of birth recorded at the time of testing. For the calculation of relative strength data of London Olympic Games, weightlifting records have been taken from International Weightlifting Federation website.

Results and Discussion

First part of the study results in this study have been presented under different variable groups namely Age, Height, Body Weight and BMI.

Table 1. Average age, height and weight of nepalese national teams-men

S.N.	Name of Game		Age	Weight (kg)	Height (m)	BMI
1	Athletics Mean		26.62	61.64	1.72	20.66
	(n= 7)	SD	3.0	8.75	0.07	1.68
2	Boxing Mean		27.16	68.00	1.68	23.98
	(n=9)	SD	3.48	1.08	0.04	3.51
3	Judo Mean		29.30	80.78	1.71	27.40
	(n= 7)	SD	3.85	12.19	0.06	2.29
4	Karate Mean		27.20	61.56	1.64	22.85
	(n= 8)	SD	6.44	8.09	0.06	2.09
5	Taekwondo Mean		23.27	68.44	1.69	23.39
	(n=6)	SD	3.68	8.51	0.04	3.53
6	Wushu Mean		24.96	62.04	1.65	22.67
	(n= 10)	SD	4.5	9.9	0.1	2.9
7	Weightlifting Mean		32.52	80.55	1.69	28.07
	(n= 8)	SD	6.34	20.16	0.06	5.58

Among the seven sports groups, men weightlifters have been observed oldest with an average age of 32.52 (±6.34) years followed by Judo, Karate and Boxing players with an average age of 29.30 years (±3.85), 27.20 years (±6.44), and 27.16 years (±3.48) respectively. Taekwondo Players have been observed youngest with an average age of 23.27 years (±6.68). Since the Boxing, Judo, Karate, Taekwondo and weightlifting sports competitions were held in various weight categorically, Nepalese Judo and weight lifters were seen with average body weight of 80.78 kg and 80.55 Kgs respectively and Atheltics and Karate players were found with lightest body weight of 61.64 Kg and 61.56 kgs. Similarly, in the height section, Athletics and Judo players were tallest with 1.72 cm (±0.07) and 1.71 cm (±0.06). During the London Olympic Games weightlifting competition, from 56 to plus 105 kg category (top 10 weightlifters from each weight category) top 10 fineshers average age was 24.42 years old (±3.26) and in the women's section average age was observed 25.68 years old (±7.25).

Among the Nepalese National players, Judo 27.40 (±2.29) and weightlifters 28.07 (±5.58) fell on the Overweight category with BMI more than 25. Irrespective of gender, 27.78 percent of Nepalese National players were seen with BMI 25 falling under overweight.

Table 2. Age, height and body weight of nepalese national teams-women

S.N.	Name of Game		Age	Weight (kg)	Height (m)	BMI
1	Athletics Mean		27.36	55.96	1.58	22.31
	(n= 3)	SD	3.68	8.17	0.06	2.31
2	Judo Mean		22.56	61.26	1.57	24.69
	(n= 5)	SD	3.5	7.7	3.2	2.5
3	Karate Mean		26.07	60.36	1.60	23.49
	(n= 7)	SD	3.4	12.85	0.11	2.73
4	Taekwondo Mean		22.38	58.81	1.61	22.58
	(n= 6)	SD	6.09	10.28	0.06	2.68
5	Wushu Mean		20.86	50.31	1.54	20.98
	(n= 7)	SD	4.08	7.88	0.06	2.37
6	Weightlifting Mean		29.47	62.61	1.53	26.70
	(n= 4)	SD	1.52	7.64	0.04	2.90

Table 3. Different motor qualities of nepalese national players-men

S. N.	Name of Game	Sit and Reach (cm)	Vertical Jump (cm)	Broad Jump (cm)	Shuttle Run (Sec.)	30 m Sprint (Sec.)	12 min Cooper (Meters)	VO_2Max (ml/kg/ml)
1	Athletics Mean	11.29	51.71	231.7	15.43	4.09	3377.14	56.66
	SD	6.92	10.96	29.6	1.35	0.31	553.99	8.22
2	Boxing Mean	15.44	45.33	218.3	15.54	4.29	3010.5	51.8
	SD	7.94	3.99	23.26	0.43	0.15	169.98	20.61
3	Judo Mean	10.86	47.00	215.6	15.88	4.44	2527.14	44.07
	SD	7.94	5.04	12.68	0.7	0.23	248.23	3.69

4	Karate Mean	11.25	44.75	235.5	15.28	4.24	30.64	50.81
	SD	8.63	3.6	10.67	0.4	0.14	3.88	5.16
5	Taekwondo Mean	17.5	41.02	244.2	14.69	4.19	2724	47.02
	SD	5.56	9.11	13.63	0.52	0.23	211.43	3.15
6	Wushu Mean	23.3	48.30	222.9	15.47	4.42	26.97.5	46.61
	SD	8.40	4.80	10.5	0.4	0.30	203.5	3.0
7	Weightlifting Mean	5.83	55.67	218.3	16.05	4.38	2010	36.42
	SD	8.83	9.66	24.89	0.99	0.29	434.13	6.44

In the present study, all the six tests were carried to assess the fitness of the elite players. The flexibility is an important factor for most of the athletes. Strength imbalance between the limbs increased the occurrence of injury. However, mean value of flexibility was noted higher in wushu with an average value 23.3 (±8.40) and weightlifters were observed lowest flexible with an average value of 5.83 (±8.83) in Sit and Reach test. The study revealed that wushu men players had good flexibility. Boxing players and taekwondo players were average flexible but atheletics, judo, karate and weightlifting players were poor in flexibility (Physiopedia, 2019)

Weightlifting and Athletics athletes have dominated in the men's vertical jump test. According to standard norms, these top five ranked athletes fell under very good category. Standing vertical jump is commonly used to measure explosive power of lower limbs. Weight lifters had dominated in the vertical jump with an average jump of 55.67 cm (±9.66). According to vertical jump norms (Wood, 2012), all the men elite players had average lower limb explosive power.

Similarly, Broad jump is commonly used to measure the lower body balance and strength. This study found that martial arts players had above average (>231cm) lower body balance and strength and others had below average(<221cm) according to norms (Wood, 2012). Among the martial arts, taekwondo players (244 cm in board jump) had very good lower body balance and strength. The word 'Taekwondo' is translated as 'tae' to hit using the foot, 'kwon' to hit using the fist, and 'do' referring to the art. This term directly translates into the art of kicking and punching. Being one of many martial art forms, Taekwondo is unique by the predominant use of powerful kicking techniques (Kazemi, Perri & Soave, 2010). Among the seven national teams athletes men, Taekwondo athletes came up first with an average Broad Jump of 244.2 cm (±4.80) and Judo players with least average jump of 215.6(±12.68).

The shuttle run test was used to assess agility of the elite players. The study found taekwondo athletes completed 6 X 10 shuttle run faster (14.69 sec) than other athletes. It indicates taekwondo players had high agility i.e they had higher speed, body control and ability to change direction. Weightlifting athletes (16.05 sec) had lower agility.

Although there were mixed of Sprinters, Jumpers and Long distance runners in Athletics group, they demonstrated a fastest average time of 4.09 seconds (±0.31) and fell above average according to norms. They were followed by Taekwondo players with an average time of 4.19 seconds (±0.23) and the slowest were Judo players with an average time of

4.44 seconds ((±0.23), which was according to the norms (Dean, 2011) they fell under average category.

The upper limit of the body's ability to consume oxygen is indicated by the maximal oxygen consumption (VO_2 Max). This is the maximum rate at which energy can be released from the oxidative process exclusively (Dey, Kar & Debray, 2010). An individual's VO_2 max represents the maximum amount of oxygen that can beutilised by working muscles. Well-trained athletes typically have higher VO_2Max compared to those who are less well-trained and are more likely to be able to sustain high intensity exercise using aerobic metabolism, thus avoiding the high levels of fatigue associated with anaerobic exercise. Blood lactate in a trained individual begins to accumulate at a higher level of sub-maximal oxygen uptake but also at a higher percentage of aerobic capacity compared to someone who is untrained (Davis, 2017).

This study exposed that all the athletes excluding weightlifting had above the average VO_2 max according to the norm (Wood, 2012). Athletics men (56.66 ml/Kg/min) had the excellent cardiovascular endurance and weightlifting athletes (36.42 ml.Kg/min) had lower cardiovascular endurance.

Table 4. Different motor qualities of nepalese national players-women

S.N.	Name of Game	Sit and Reach (cm)	Vertical Jump (cm)	Broad Jump (cm)	Shuttle Run (Sec.)	30 m Sprint (Sec.)	12 min Cooper (Meters)	VO_2 Max (ml/kg/m)
1	Athletics Mean	20.67	36.0	204.0	16.54	4.61	2696.67	46.6
	SD	13.57	13.0	26.77	0.6	0.19	329.68	4.91
2	Judo Mean	15.4	34.8	183.4	17.03	4.97	2316	40.9
	SD	7.1	4.70	17.1	0.5	0.30	247.1	3.80
3	Karate Mean	14.86	40.14	204.71	16.86	4.87	2787.14	47.8
	SD	8.06	3.68	10.57	0.71	0.18	213.05	3.04
4	Taekwondo Mean	12.67	37.2	201.4	15.79	4.71	2404	42.26
	SD	7.48	3.92	17.93	0.68	0.21	133.06	1.98
5	Wushu Mean	22.0	32.14	182.14	16.14	4.81	2577.14	44.84
	SD	3.30	4.94	13.43	0.52	0.16	127.81	1.90
6	Weightlifting Mean	17.20	40.0	176.0	17.20	5.32	2097.50	34.87
	SD	1.43	2.83	10.65	0.43	0.12	354.43	7.08

In the women category, wushu players came in the top in sit and reach test (Flexibility) with an average of 22.0 cm (±3.3) followed by athletics players with an average flexibility of 20.67 cm (±13.57). Martial arts (Judo, Karate and taekwondo) women athletes got below average in sit and reach test according to norms (Physiopedia, 2019). It indicates women martial athletes had low flexibility.

In the Vertical and Broad Jump tests women karate players surpassed other games athletes with an average vertical jump of 40.14 (±3.68) and 204.71cm (±10.57) in broad jump respectively. Women karate athletes had high lower limb power, balance and

strength. The result indicated that all the women athletes had average lower limb power, balance and strength according to norm (Wood, 2012).

Similarly, in the shuttle run test, taekwondo players surpassed all others games players with an average of 15.79 second falling excellent categories according to norms. In spite of one marathon runner and two Sprinters in the women athletics team, they came up with second highest endurance capacity with VO_2max 46.6 (ml/kg/min). Surprisingly, women karate players were having highest VO_2max 47.80 (ml/kg/min).

Since 30 meter sprint test was taken with hand time, there will be some human errors while taking time. Keeping this fact aside, boxing, taekwondo and weight lifting athletes are not far away for sprinters and jumpers counterparts in the mens section.

Agility is the physical ability, which enables an individual to rapidly change the body position and direction in a precise manner. In many sports, athletes need to control their own body during high speed movement. Both the men and women top 10 athletes performed very excellent in this test according to standard norms.

Endurance capacity test is the most popular test carried out by most of the athletes around the world. Specially, Long distance runners need to know their oxygen uptake and consumption capacity which determine their success in their events. Many other sports athletes competition time may not be prolonged more time like marathon, long distance and football, tennis, and volleyball. But to train hours and hours for the preparation for competition, one must have good endurance capacity. It was surprising to see that two Karate players are having more VO_2 Max Capacity than one Long Distance runner. In the women's section, except one long distance runner, Karate and Wushu athletes have dominated in this test. But according to standard norms those athletes who are out of the top 10 sports, they need to work more harder to uplift their endurance capacity.

Conclusion

This study concludes that over all physical fitness of men and women elite players were average but they were below average in flexibility.The average age of men and women elite players was 27.28 years and 24.25 years respectively. Men athletes were taller (1.68m) than their counterparts (1.57m). The average weight of men and women athletes were 69 Kg and 49.9 Kg respectively. More than one fourth of Nepalese elite players (27.78%) were over weighted (BMI>25). Wushu players were more flexbile than other athletes in both men and women categories. Weightlifter athletes had more lower limb explosive power in both men and women. The martial art which requires different kicks and fast leg movements, taekwondo in men category and karate in women category, had more lower body balance and strength. Taekwondo players had high speed, body control and ability to change the direction in both men and women categories. Not surprisingly, athletics men and women were fastest runners. Athletics men and karate women athletes had high cardiovascular endurance. Although taekwondo players in men and athletics in women were most physically fit, the physical fitness of elite players should be improved to compete in the international arena. Continuous fitness and sports skill research should be done regularly so that athletes as well as sports coaches will be able to know what the condition is and what direction their athletes are going.

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