



ANTHROPOMETRIC INDICES, NUTRIENT INTAKE AND PHYSICAL FITNESS OF BASKETBALL PLAYERS (GIRLS 10-15 YEARS)

Rupal Agrawal and Prajakta J. Nande

Department of Home Science, Rashtrasant Tukadoji Maharaj Nagpur University, Mahatma Jyotiba Phule, Educational Campus, Amravati Road-440033, Nagpur (Maharashtra)

ABSTRACT:

The sport of basketball requires specific skills that can be completed under dynamic conditions, in most cases while moving at a high speed or while changing directions. As a result, successful basketball athletes tend to possess high strength, power and agility while maintaining a fairly lean body composition. This study deals with the effect of anthropometric indices and nutrient intake on physical fitness of young girls undergoing basketball training (age=10-15 yrs, n=200). Subjects were selected from basketball clubs of Nagpur city. Height, weight, mid upper arm circumference (MUAC), elbow breadth and shoulder width of players were recorded. Based on three day's dietary recall, nutrient intake of subjects was calculated. Hemoglobin level (Hb) and hand grip strength of players were measured. Players from both the groups were unable to meet the standards of height for age whereas body weight for age & height was greater than the standard values. The mean values for MUAC, elbow breadth and shoulder width of older players was higher than the younger players. The mean energy intake of players from both age groups was found to be lesser than recommended dietary allowances (RDAs). Intake of fat & protein by players was higher than RDAs. Mean values of Hb level for both age groups of subjects were found to be higher than the cut off level of 11gm/dL. 1% and 13% from 10-12 yrs and 13-15 yrs, respectively, were found to be excellent for hand grip strength.

Keywords: anthropometric indices, nutrient intake, RDAs, physical fitness

INTRODUCTION:

Fitness denotes an individual's status of physique in relation to its physical achievements. The latest scientific evidence also denotes the fact that for internal or physiological soundness physical fitness is necessary. Modern physical educators divided the factor of fitness into skill related and health related physical fitness. Physical fitness refers to the capacity of an athlete/player to meet the varied physical demands of their sport without reducing them to a fatigued state. The components of physical fitness are strength, endurance, speed, flexibility and coordination (Rajan et al, 2015).

Basketball is one of the most popular sports in the world and one of the most widely viewed. It is a team sport & is a fast moving game that involves a lot of variety, including shooting, dribbling, passing, rebounding, defense and much more. Basketball is a great workout that can help the person to burn calories, build endurance, improve balance and coordination, develop concentration and self-discipline & build up muscle (http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Basketball_health_benefits?open & <http://www.fitnesshealth101.com/fitness/general/sports/basketball>). Basketball develops physical fitness, as many sports do. However, the intense, fast-paced action of a typical

basketball game simultaneously develops speed, hand-eye coordination and cardiovascular endurance. Moving quickly back and forth across the court develops lower-body fitness, while shooting, defending and passing develop upper-body fitness (<http://www.livestrong.com/article/464674-importance-of-playing-basketball/>). Playing basketball offers a way to engage in fun competition while getting regular, vigorous exercise. Basketball also provides constant social interaction, which benefits young and old players alike.

In order to truly achieve the potential on the court, it is needed that players should develop healthy eating habits. Optimum basketball performance requires sound nutritional habits. Most basketball players are tall and slender, and are looking to add muscular body weight. In order to gain weight, players must consume more calories than they expend on a daily basis (<http://www.strongerteam.com/wp-content/uploads/2014/06/Basic-Nutrition-Guide-for-Basketball-Players.pdf>). The diets of basketball players must fulfill the daily demands of major nutrients like carbohydrates, proteins & fats. High school is a unique time period in working with athletes because of the wide range of age, maturity, and physical stature (<http://www.bigbasketball>

acade.my.com/forms/NutritionalNeedsBasketball.pdf).

This paper explores data on anthropometric indices, nutrient intake & physical fitness of girls undergoing regular basketball training.

METHODOLOGY:

Selection of Sample:

For this study, girls undergoing regular basketball training from age group of 10-15 yrs. were selected. A total of 200 basketballers were chosen from different basketball clubs from city of Nagpur (Maharashtra). Table 1 shows age wise classification of subjects.

Data Collection:

- **Anthropometric Measurements:** Height, weight, MUAC, elbow breadth & shoulder width of subjects were measured using standard equipments and procedures. Comparisons were done with available references for gender & age.
- **Nutrients Intake:** Food intake of each basketballer was recorded using three days dietary recall method. On the basis of this, intake of major nutrients like carbohydrate, protein and fat was calculated using food composition tables (Gopalan et al., 2007). Energy intake of each subject was calculated based on macronutrient intake. Comparisons were done with available recommended dietary allowances (RDAs). (National Institute of Nutrition (NIN)/Indian Council of Medical Research (ICMR), 2009).
- **Hemoglobin Level (Hb):** Hb level of each basketballer was estimated with the help of trained pathologist.
- **Grip Strength Test-** To undertake this test, hand grip dynamometer was used to measure grip strength of players. Maximum reading from three attempts was recorded using dominant hand. Readings were compared with normative data (Nande & Vali, 2010).

Statistical Analysis:

Collected data was tabulated and classified. Mean, standard deviation, range and percentage were calculated. For comparison between age groups for various parameters, 'z' test was used. A level of significance at both 0.01 & 0.05 levels was considered to draw conclusions.

RESULTS & DISCUSSION:

Height is the most noticeable physical characteristic of basketball players, with general graduation among players from the

smaller but highly skilled playmaking guards through to the taller forwards and centres. Table 2 suggests data on anthropometric measurements of subjects. Players were unable to meet the standards of height for age, with % deficit calculated as 1.41 & 0.93, respectively for girls from age groups 10-12 & 13-15 yrs. Difference in their mean height was calculated as 11.95 cm ($z=13.53, p<0.01$).

Body weight of subjects aged 10-12 yrs was found to be higher than the standard values of weight for age & height. % excess was calculated as 5.63. Older players were able to meet the standard with percent calculated as 0.36 (Table 2). The mean difference value between the body weights of subjects from age group 10-12 & 13-15 yrs was calculated as 9.80 kg ($z=8.96, p<0.01$).

Mean MUAC of subjects from age groups 10-12 & 13-15 yrs was recorded as 20.12 ± 2.45 & 21.79 ± 2.18 cm, respectively. Mean elbow breadth of subjects was recorded as 5.03 ± 0.46 & 5.21 ± 0.39 cm, respectively for subjects from age groups 10-12 & 13-15 yrs. Significant difference was noted between two groups of subjects for the measurement of elbow breadth ($z=2.90, p<0.01$).

Older girls's shoulder width value was found to be higher than the younger girls, with a difference of 3.88 cm in the mean values ($z=8.72, p<0.01$, Table 2).

Table 3 shows data on mean daily nutrient intake of subjects. Irrespective of the age, both the groups of players had lower mean daily intake of energy than RDAs. % deficit was noted to be 7.71 & 4.16 for 10-12 yrs & 13-15 yrs, respectively. Greater individual variations were noted for energy intake among subjects ($z=10.25, p<0.01$).

Mean daily carbohydrate intake of younger girls was found to be less than older girls. Mean carbohydrate intake was 313.13 ± 56.65 to 378.51 ± 37.54 g, respectively for subjects from age group 10-12 yrs & 13-15 yrs. Very noticeable differences were found for individual intake of carbohydrate-as low as 156.86 g to as high as 455.55 g ($z=9.62, p<0.01$).

Mean daily protein intake of both the groups of players was found to be higher than RDAs (48.24 ± 7.79 & 58.69 ± 7.33 g with % excess of 19.41 & 13.08 for 10-12 yrs & 13-15 yrs, respectively). Between age group difference for protein intake was significant ($z=9.79, p<0.01$).

Similar to protein intake, mean daily intake of fat was also higher than RDAs for both the groups of players. Mean fat intake was derived as 45.5±6.77 g for subjects aged 10-12 yrs & 53.78±8.16 g for subjects aged 13-15 yrs (Table 3). Older players showed significantly higher intake of fat than younger players ($z=7.81, p<0.01$). Players usually require energy dense foods to avoid bulk food consumption. Fat is a concentrated source of energy & it serves as a very good concentrated source of energy.

Mean Hb level values of blood for both the groups of subjects were estimated as 11.73±1.11 & 11.94±1.16 g/dL (Figure 1). Players differed insignificantly from each other for hemoglobin level of blood ($z=1.33, p>0.05$). It was found out that 29 & 19% girls from age groups 10-12 & 13-15 yrs were classified as ‘mildly anemic’ with their Hb level ranged between 11.0-11.9 g/dL (Table 4). From both age groups, 23% subjects fell in the category of ‘moderately anemic’ with their Hb level ranged from 8.0 to 10.9 g/dL. These results indicate prevalence of anemia which if not treated can affect performance of the players.

Many daily functions and sporting events like basketball require high activity levels of the flexor musculature of the forearms and hands. These are the muscles involved in gripping strength for example, holding the ball firmly. From sports like basketball, some degree of grip strength is necessary to be successful. The most common method of

assessment for grip strength is the use of a handheld dynamometer. For the present study, mean value for grip strength test was found to be 24.96 kg & 28.75 kg, respectively for players from age groups 10-12 & 13-15yrs (Table 5).

It was noted that majority of players from age groups 10-12 & 13-15 yrs were categorized ‘average’ (grip strength 25-30 kg) whereas 21% players from age group 10-12 yrs & 25% players from age group 13-15 yrs were categorized ‘good’ for their grip strength. Older players possessed higher mean value for grip strength as compared to younger players ($z=4.26, p<0.01$) & 13% were rated ‘excellent’ for their grip strength (Table 5).

CONCLUSION:

In the current study, the effect of anthropometric indices and nutrient intake on physical fitness of young girls aged 10-15 yrs taking basketball training was assessed. The players were unable to meet the standards of height for age. Nutrient intake of players from both age groups in terms of energy was deficient. Players surpassed macronutrient’s RDAs like protein and fat. 23% subjects fell in the category of ‘moderately anemic’ with their Hb level ranged from 8.0 to 10.9 g/dL. Physical fitness of older basketballers through hand grip strength test was excelled in comparison with younger players. The results indicate that physical fitness of players is positively influenced by their anthropometric characteristics and nutritional status.

Table 1: Classification of Subjects

Sr. No.	Age Group (Yrs)	Total Number	Age (Yrs) M±SD
1	10 - 12	100	10.94±0.85
2	13 - 15	100	13.60±0.79

Table 2: Anthropometric Measurements of Subjects

Sr. No.	Parameters	Subjects	
		Girls (10-12 Yrs) (n=100)	Girls (13-15 Yrs) (n=100)
1	Standing Height (cm)		
i	M±SD	143.13±7.1	155.08 ±5.26
ii	Range	128-162	143.5-167
iii	Standard	145.17	156.53
iv	% Deficit	-1.41	-0.93
v	‘z’ value	13.53*	
2	Body Weight (kg)		
i	M±SD	36.97±7.84	46.77±7.62
ii	Range	22.5-56	28-69
iii	Standard	35	46.6
iv	% Deficit / Excess	+5.63	+0.36
v	‘z’ value	8.96*	
3	MUAC (cm)		
i	M±SD	20.12±2.45	21.79±2.18

ii	Range	15.5-25.5	17-28
iv	'z' value	5.09*	
4	Elbow Breadth (cm)		
i	M±SD	5.03±0.46	5.21±0.39
ii	Range	3.6-5.9	3.9-6.1
iii	'z' value	2.90*	
5	Shoulder Width (cm)		
i	M±SD	34.11±3.26	37.99±3.04
ii	Range	25-41	28.5-45
iii	'z' value	8.72*	

* z values show significant difference at both 5% & 1% levels.

Table 3: Mean Daily Energy & Macro-Nutrient Intake of Subjects

Sr. No.	Parameters	Subjects	
		Girls (10-12 Yrs) (n=100)	Girls (13-15 Yrs) (n=100)
1	Energy (kcal)		
i	M±SD	1855±294	2233±223
ii	Range	1057-2359	1350-2714
iii	RDA	2010	2330
iv	% Deficit	-7.71	-4.16
v	'z' value	10.25*	
2	Carbohydrate (g)		
i	M±SD	313.13±56.65	378.51±37.54
ii	Range	156.86-404.89	219.63-455.55
iii	'z' value	9.62*	
3	Protein (g)		
i	M±SD	48.24±7.79	58.69±7.33
ii	Range	29.99-64.24	39.85-72.54
iii	Standard	40.4	51.9
iv	% Excess	+19.41	+13.08
v	'z' value	9.79*	
4	Fat (g)		
i	M±SD	45.5±6.77	53.78±8.16
ii	Range	31.22-60.63	34.67-72.41
iii	Standard	35	40
iv	% Excess	+30	+34.45
v	'z' value	7.81*	

* z values show significant difference at both 5% & 1% levels.

Table 4: Classification of Degree of Anemia based on Hemoglobin Level

Sr. No.	Hemoglobin Level (g/dL)	Degree of Anemia	Distribution of Subjects Based on Hemoglobin Level (%)	
			Girls (10-12 Yrs) (n=100)	Girls (13-15 Yrs) (n=100)
1	≥12.0	Non Anemia	48	58
2	11.0-11.9	Mild Anemia	29	19
3	8.0-10.9	Moderate Anemia	23	23
4	<8.0	Severe Anemia	0	0

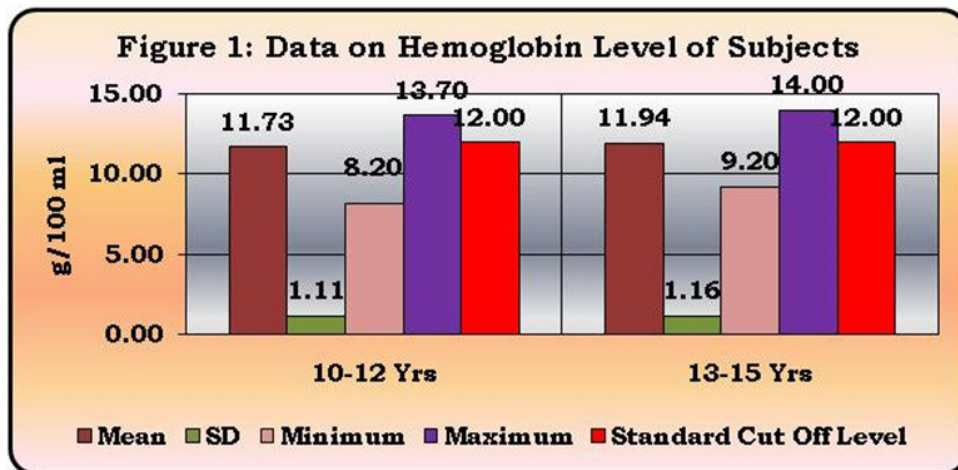
Source: WHO/UNICEF/UNU (2001)

Table 5: Data on Grip Strength of Subjects

Sr. No.	Parameters	Subjects	
		Girls (10-12 Yrs) (n=100)	Girls (13-15 Yrs) (n=100)
I	Grip Strength (kg)		
1	M±SD	25.02±6.09	28.65±5.96
2	Range	13-36	15-41
3	'z' value	4.26*	
II	Gradation of Subjects Based on Grip Strength (%)		
4	Excellent (>36 kg)	1	13
5	Good (31kg-36 kg)	21	25
6	Average (25 kg-30 kg)	31	38

7	Fair (19kg-24 kg)	28	20
8	Poor (<19 kg)	19	4

* z value shows significant difference at both 5% & 1% levels.



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