Body composition of athletes in Bahrain

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A total sample of 304 athletes was selected from first class clubs related to four common sports (football, handball, volleyball and basketball) and compared with 53 non-athlete adults. Weight, height, mid-arm circumference and skinfold thickness were measured to assess their body composition. The findings revealed that there were differences in body composition among athletes according to the type of sport. Basketballers and volleyballers were the tallest athletes, while handballers were the heaviest ones. Skinfold thickness measurements showed that basketball and handball players have more subcutaneous fat than other athletic groups. As compared with non-athletes, the Bahraini players had higher means for height, weight, subscapular, suprailiac thickness and mid-arm circumference.

Keywords: Anthropometric measurements, athletes, Arabian Gulf, Bahrain

There is a growing interest in improving the performance of athletes in the Arab Gulf States including Bahrain. However, most of the activities are focused on increasing the physical fitness of athletes without taking into consideration the assessment of their nutritional status and body composition. Specific athletic events require different body types and weight for maximal performance¹. Therefore, understanding the body composition of athletes and then assigning a corresponding competitive weight for those athletes is now considered to be an essential part of the total management process². Body composition of athletes can be measured indirectly by several techniques. Anthropometric measurements such as height, weight and skinfold thickness are the most practical and inexpensive methods to assess body composition¹.

Information on body composition in the Arab Gulf countries is scarce. In Kuwait, Abas and Katter³ found that the mean weight and height of basketball players and gymnasts were below their international counterparts. Similar findings were reported among basketballers, handballers and volleyballers in Saudi Arabia with respect to their height and arm circumference⁴. However, both studies included a limited number of athletes, and none of these studies

measured the skinfold thickness of the athletes. The present study, therefore, was carried out to provide baseline data on weight, height and skinfold measurements of a relatively high number of athletes in Bahrain.

Methods

Athletes participating in four common sports were included in this study, namely: football, handball, volleyball and basketball. An attempt was made to involve all athletes of first class clubs (18 clubs) related to these four sports. However, four clubs were excluded because either they were outside the country at the time of the investigation or they were preoccupied with other events. The total sample obtained was 304; of whom 124 were footballers, 75 handballers, 66 volleyballers and 39 basketballers.

Anthropometric measurements included height, weight, mid-arm circumference, triceps, subscapular, suprailiac and mid-calf. Height was measured without shoes to the nearest 0.1 cm using a portable stadiometer. Weight was taken without shoes and with as few clothes as possible using portable bathroom weighing scales with minimum capacity of 0.5 kg. Upper mid-arm circumference was measured to the nearest 0.1 cm on the left arm⁵, using fibreglass tapes. Skinfold thicknesses were measured to the nearest 0.1 mm on the left side using Lange skinfold calipers (Cambridge Scientific Industries, Cambridge, Maryland, USA) as described by Larson⁶. All skinfold thicknesses were taken by one professional observer.

For the sake of comparison with Bahraini non-athletes, anthropometric assessment was made of 53 male adults aged 19 to 24 years. Data were obtained from the National Nutritional Survey of School Children in Bahrain (Musaiger and Gregory, unpublished). The male adults were selected from five secondary schools using a systematic random sampling technique. Detailed information on the sampling method and anthropometric measurements is given elsewhere⁷.

Results

Means for height and weight for Bahraini athletes and nonathletes are presented in *Table 1*. Basketballers and volleyballers were taller compared with the other athletic groups. The difference between

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Table 1. Weight and height of Bahraini athletes and nonathletes

Sport	Sample size (n)	Age (years)*	Height (cm)*	Weight (kg)*
Footballers	124	22.7(2.9)	172.0(4.7)	65.8(6.8)
Basketballers	39	21.4(3.8)	176.8(6.8)	68.5(8.8)
Volleyballers	66	20.4(2.9)	176.7(6.8)	66.2(7.7)
Handballers	75	20.0(2.9)	174.6(5.8)	73.0(10.8)
Nonathletes	53	20.0(1.2)	169.4(7.0)	62.5(11.6)

*Values are mean(s.d.)

mean heights of basketballers and volleyballers was not significant. This finding contrasts with that of Toriola, Adeniran and Ogunremi⁸ who found that the basketball players were significantly taller and had a markedly larger humerus width than the volleyball players. As for weight, the handballers had the heaviest mean(s.d.) weight (73(10.8) kg) while the footballers had the lightest mean(s.d.) weight (65.8(6.8) kg). The mean weights and heights of nonathletes were lower than that of athletes in the four sports.

Means for height and weight of Bahraini athletes were compared with their counterparts in Kuwait³ and Saudi Arabia⁴. The Kuwaiti basketballers were taller and heavier than similar athletes in Bahrain. With respect to footballers, the Kuwaiti players were taller but weighed the same as Bahraini players. The mean heights for Saudi handballers and volleyballers were less than that for Bahrainis, but the mean height for basketballers was similar. Musaiger, Gregory and Haas⁷ demonstrated that Kuwaiti adolescent boys were taller and heavier than their counterparts in Arabian Gulf countries. They attributed the differences in body composition to interaction between environmental and genetic factors. Additionally, Kuwaitis enjoy better standards of health and socioeconomic conditions than other Arabian Gulf countries. These factors have contributed positively to the growth of Kuwaiti adolescents.

Means for mid-arm circumference and skinfold thickness for Bahraini athletes and nonathletes are illustrated in Table 2. Mean mid-arm circumference was higher among handball athletes, while it was

almost comparable for the other groups. Multiple skinfold sites provide better correlation with body density than a single measurement because of variation in fat distribution¹. Based on the sum of three skinfold thicknesses, basketballers were fatter than other players. This is mainly attributable to the high subscapular fat store in basketballers. For almost all sports, low relative body fat is desirable owing to the high negative relationship between performance and percentage body fat².

Bahraini players had higher subscapular measurements compared with their nonathletic counterparts. However, the mean mid-arm circumference for nonathletes was much lower than that for athletes. An attempt was made to calculate the mid-upper-arm muscle area, as an index of total body muscle mass, because it reflects more adequately the true magnitude of muscle tissue changes⁹. The mid-upper-arm muscle area was lowest among nonathletes (40.5 cm²) and highest among handballers (64.5 cm²) (Table 2).

Discussion

Our results suggest that anthropometric measurement data for Bahraini athletes were lower than those of Western countries^{10,11}. Since Bahraini athletes have become involved in international sport, it is important that their bodies are scientifically prepared for the particular sport in which they are involved. It is essential, therefore, that information on body composition and its role in improving an athlete's performance should be included in any training courses for trainers.

It is worth mentioning that there is a severe shortage of data on body composition of the adult population, whether athletes or nonathletes, in the Arab Gulf countries. This is particularly true for the male population, as most of the studies in the region have focused on anthropometric measurements of adolescent girls and women to evaluate their nutritional status because these are considered as vulnerable groups. We hope that the present study provides a baseline for any further investigation into the anthropometry of athletes and the adult population in the Gulf region.

Table 2. Arm circumferences and skinfold thicknesses of Bahraini athletes and nonathletes

Skinfolds (mm)	Footballers	Basketballers	Volleyballers*	Handballers*	Nonathletes
Triceps [†]	8.8(3.4)	11.4(4.9)	9.1(4.8)	10.6(4.8)	8.4(4.3)
Subscapular [†]	11.6(3.4)	19.7(5.4)	11.6(4.5)	14.9(5.5)	10.9(6.2)
Suprailiac [†]	7.8(3.0)	10.4(4.6)	8.3(4.0)	12.6(6.4)	8.8(6.0)
Mid-calf [†]	5.4(3.0)	8.3(4.0)	6.9(3.5)	8.7(4.2)	—
Mid-arm circumference (cm) [†]	29.3(2.1)	29.1(4.0)	29.8(2.6)	31.8(2.8)	25.2(3.0)
Sum of skinfold thicknesses	(28.2)	(41.5)	(29.0)	(38.1)	(28.1)
Mid-arm muscle area (cm ²) [‡]	(56.1)	(51.9)	(57.8)	(64.5)	(40.5)

*Mid-arm circumference and skinfold thicknesses were not obtained from six volleyballers and five handballers; [†]Values are mean(s.d.);

[‡]Mid-arm muscle area (MAMA) was calculated using the following equation from Gibson 1990⁹:

$$[\text{Mid-upper-arm circumference} - (\pi \times \text{triceps skinfold})^2/4\pi]$$

References

- 1 American Dietetic Association. Nutrition for physical fitness and athletic performance for adults. *J Am Diet Assoc* 1987; **87**: 933–39.
- 2 Wilmore JH. Body composition and athletic performance. In: Haskell W, Scala J, Whittam J, eds. *Nutrition and Athletic Performance*. California, USA: Bull Publishing, 1982: 158–75.
- 3 Abas MM, Katter AM. A comparative study in body composition of Kuwaiti athletes. *Bulletin of the High Institute of Public Health* 1984; **15**: 13–25 (in Arabic).
- 4 Al-Najar AM. Anthropological characteristics of some athletes in Saudi Arabia. *Arab Journal for the Humanities* 1992; **10**: 106–17 (in Arabic).
- 5 Jelliffe DB. *Assessment of the Nutritional Status of the Community*. Geneva, Switzerland: World Health Organization, 1966.
- 6 Larson A, ed. *Fitness, Health and Work Capacity: International Standards for Assessment*. New York, USA: MacMillan, 1974.
- 7 Musaiger AO, Gregory WB, Haas JB. Growth patterns of school children in Bahrain. *Ann Hum Biol* 1989; **16**: 158–67.
- 8 Toriola AL, Adeniran SA, Ogunremi PT. Body composition and anthropometric characteristics of elite male basketball and volleyball players. *J Sports Med Phys Fitness* 1987; **27**: 235–9.
- 9 Gibson RS. *Principle of Nutritional Assessment*. London, UK: Oxford University Press, 1990.
- 10 Smith DJ, Roberts D, Watson B. Physical physiological and performance differences between Canadian national team and universiade volleyball players. *J Sports Sci* 1992; **10**: 131–8.
- 11 Heimer S, Misigoj M, Medred V. Some anthropological characteristics of top volleyball players in SFR Yugoslavia. *J Sports Med Phys Fitness* 1988; **28**: 200–8.

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