MANGAL RESEARCH JOURNAL **Received:** 03-09-2025 **ISSN:** 2773-7802
Volume 6, December 2025, **pp:** 33-38 **Accepted:** 11-11-2025 **DOI:** https://doi.org/10.3126/mrj.v6i1.88179

Body Mass Index and Fat Percentage of Men's Senior Volleyball Players from Kirtipur

Pradip Maharjan

Mangal Multiple Campus, Kirtipur, Kathmandu, Nepal
Email: khokhopradip59@gmail.com

Abstract

Body composition is a key factor for performance in volleyball and helps to achieve an optimal ratio of lean-to fat mass needed for agility, power and endurance. The aim of this study was to assess the Body Mass Index (BMI) and body fat percentage (BF%) of senior men's volleyball players in Kirtipur Municipality in terms of their general fitness profile. A descriptive research design was used, and descriptive statistics of 36 players in four wards, were performed across three thematic dimensions: general anthropometric trends, ward-level differences and association of BMI with BF%. The results revealed that many players were overweight according to BMI but their percentages of body fat were of moderate and attainable range, which means that the excess BMI was a result of higher lean muscle mass and not of overweight. The same kind of thing can also be observed from analysis of ward-wise categories. Players in Ward No. 3 possessed the greatest BMI and BF% combination, indicating worse conditioning conditions, whereas in Ward No. 10 their low BF% looked leaner and more agile. These results demonstrate the criticality of using the BF% in combination with BMI in order to determine the true level of fitness in volleyball players.

Keywords*:* Anthropometric characteristics, body fat percentage, body mass index (BMI), senior volleyball players

Introduction

Sports such as volleyball require explosive power to develop agility, vertical jumping prowess and optimal movement of the court, and anthropometric properties greatly influence performance in the sport. Physiological advantages such as height and ideal body composition have an influence on skill performance and injury prevention (Gabbett & Georgieff, 2007). However, BMI gives a more descriptive indication when comparing the body weight with the height, whereas BF% is a more quantitative measurement of your adiposity and is critical for athletic performance. High body fat could lead to loss of agility, decrease vertical jump height and exacerbate tiredness, while balanced composition of lean and fat mass can provide energy to efficiency in high intensity movement (Cureton, 1956).

BMI, which is a widely used as a preliminary screening tool, may have clear limitations in athletic populations because it does not differentiate between lean mass and fat mass. Therefore, this may cause muscular athletes to be misclassified as overweight (Nevill et al., 2020). This constraint helps further justify the use of BF% alongside BMI since

athletes scoring optimal BF% on agility, endurance and strength tests tend to perform favorably (Nikolaidis, 2013). Examining volleyball players in Yogyakarta's Special Region, other studies likewise emphasise the association between physical activity, BMI and volleyball playing performance (Wahyuti et al., n.d.).

There is also evidence from international studies of disparities, between anthropometrics and physical characters for position and performance level among players in playing. Bigger and thicker players normally serve as blockers and attackers, whereas thinner players have been included into defensive areas for speedy reflexes and high-speed moves (Palao et al., 2014). Both elite beach and indoor volleyball players have lower BF% coefficients and better muscular composition for repeated explosive activities (Topend Sport, 2012).

However, within this variety of literature, few empirical studies have been conducted to examine the anthropometric characteristics of volleyball players in Nepal—especially senior male volleyball players at the community level. Because many players juggle competing duties, diverse lifestyles, and poor training schedules, they are an important but comparatively unexplored population. No previous study has been conducted to determine BMI and BF% patterns among senior volleyball players as a group in Kirtipur Municipality.

Hence, the present study assesses the BMI and BF% of senior male volleyball players from at least 4 wards of Kirtipur Municipality. This report offers the first systematic baseline data in this athletic population in the field, providing comparison of height, weight, BMI, and BF% across wards. This will help the coaches, the trainers, and the sports administrator to plan the research-proven training programs and also to develop the players.

Methods

This study used a descriptive research design to evaluate the Body Mass Index (BMI) and body fat percentage (BF%) of senior men's volleyball players in Kirtipur Municipality. All seven ward teams that took part in the Kirtipur Inter-Ward Senior Men's Volleyball Tournament were part of the population. Thirty-six participants from this population representing the four semi-finalist teams were purposively chosen based on the common characteristic that semi-finalists were higher-performing athletes who sported a better level of preparation and overall competitive state.

Anthropometric data was collected based on standard techniques. Height and weight were measured on digital tools, and BMI in the WHO formula (weight (kg) divided by height (m^2)). Percentage body fat was measured following the Jackson and Pollock (1978) three site skinfold protocol—including triceps, chest, and thigh and a Slim Guide Skinfold

Caliper. Measurements were obtained in the presence of team coaches to minimize errors and to achieve transparency.

Data were analyzed by Microsoft Excel. Descriptive statistics (mostly mean values) were calculated for height, weight, BMI and BF%.

The analysis was divided into three thematical dimensions: general anthropometric features of all players, ward-wise differences in body mass index (BMI) and the association with BF% to identify differences in muscular/fat contributions to body weight.

Ethical considerations were observed. Permission was obtained from the tournament organizing committee, players participated voluntarily with verbal consent, and confidentiality was maintained. Data were used solely for academic purposes.

Results and Discussion

Results are presented within three analytical themes: General anthropometric patterns, Ward-wise variations, and Relationship of BMI-BF between the results. Each theme is supported by results and interpretation and associated literature.

General Anthropometric Patterns of the Players

On average, players fall into the "slightly overweight" BMI category (26.57), yet their moderate BF% (21.82%) suggests the elevated body weight is largely due to lean muscle mass rather than fat. This profile is characteristic of amateur competitive athletes.

Table 1: Mean Anthropometric Characteristics of Men's Senior Volleyball Players

SN	Players	Mean Age	Mean Height (cm)	Mean Weight (kg)	Mean BMI	Mean BF%
1	All Players (N=36)	28.71 yrs	172.9	76.11	26.57	21.82
2	Ward No. 2 (n=9)	29 yrs	176.1	83.24	26.78	22.99
3	Ward No. 3 (n=9)	27.77 yrs	172.94	78.96	27.76	23.54
4	Ward No. 4 (n=9)	28.4 yrs	172.3	78.8	26.6	22.76
5	Ward No. 10 (n=9)	27.77 yrs	159.95	73.34	26.12	18.00

These findings are consistent with those of Nevill et al., (2020), who claim the body mass index (BMI) misrepresents athlete physique composition by deceiving fat from muscle. Another example came from Gabbett and Georgieff (2007) found well-trained volleyball athletes tend to be heavier due to increasing muscle development. Compared with elite athletes, who have lower BF% for explosive power (Palao et al., 2014), Kirtipur players are characterized by acceptable, but not elite, conditioning.

Ward-wise Differential Interventions in Anthropometric Measurements

Meaningful patterns of variation show up in Ward-wise comparisons (Table 1). Ward No. 2 players are the heaviest and tallest, indicating further muscle development and obvious strength and reach advantage with offensive or blocking roles, obviously playing the reach role. Ward No. 3 players have the highest BMI and BF%, demonstrating an accumulation of fat that can reduce agility and slow-step play in fast-paced court transitions. Ward No. 4 players are relatively near the overall averages, showing balanced and moderate conditioning. However, Ward No. 10 is the shortest player with the lowest BF% which means that it is lean and agile more, attributes which are important for defense where quick reflexes and directional quick movements is expected.

These ward-level differences are indicative of different training exposure and positional specialization. Palao et al., report similar patterns (2014), who show that play positions necessitate unique anthropometric attributes. The profile of Ward No. 3 was consistent with previous studies indicating that higher adiposity leads to lower agility and endurance (Nikolaidis, 2013). In contrast, the BF% observed in Ward No. 10, and similar to Wahyuti et al. (n.d.), leaner athletes show higher levels of improved movement efficiency.

Relationship Between BMI and Body Fat Percentage

Theme 3 compares the relations between BMI and body fat percentage across the four wards and considers whether the higher BMI among players may be related to greater muscular mass, or to higher levels of fat. The knowledge of such a relationship is necessary to judge athletes' fitness condition in reality.

Table 2: Relationship Between BMI and BF% across Wards

SN	Players	Mean BMI	Mean BF%
1	Ward No. 2 (n=9)	26.78	22.99%
2	Ward No. 3 (n=9)	27.76	23.54%
3	Ward No. 4 (n=9)	26.6	22.76%
4	Ward No. 10 (n=9)	26.12	18.00%

This positive relationship is consistent across wards: with increasing BMI, BF% similarly increases. Ward No. 3 has the poor composition showing the highest BMI–BF% combination, while Ward No. 10 has the most effective body composition for movement and stamina.

These results provide support for Nevill et al., (2020) suggestion that BMI does not constitute an adequate measure in an athletic setting and should be supplemented with BF%. Further findings of Gabbett and Georgieff (2007), Nikolaidis (2013) and Topend Sport (2012) support BF% as more predictive of agility, jump height and endurance.

Conclusion and Implications

According to this research, senior men's volleyball players from Kirtipur Municipality have moderately elevated BMI but acceptable BF%, which indicates muscular rather than fatty weight. Ward-level differences especially between Ward No. 3 and Ward No. 10, reflects different fitness levels. This relationship between BF% and BMI is positive and highlights the importance of analyzing BF% in addition to BMI when assessing athletic fitness. All in all, the players show enough conditioning for municipal-level competition, just need a targeted training to get up to the next level.

The implications of the findings of this study include several practical implications for the coach and trainer. Percentage of body fat instead of BMI gives a better reflection of an athlete's fitness and development. In addition, depending on its ward-related variances, the coaches can also plan focused conditioning (in particular, decreasing hyper-fats in an athlete with higher BF% to improve agility and performance).

From a human capital point of view, it is highly beneficial if training programs have been arranged that include agility drills, plyometrics and endurance exercises, as well as proper nutritional guidance, to significantly enhance one's body composition and performance. Likewise, placing players in roles that are adapted to their anthropometrical profile, that is to say, assigning a lower fat individual to a defensive role, while using a taller and stronger athlete in an offensive or blocking capacity, can significantly optimize team performance.

From a health and injury prevention perspective, having a lower BF% is associated with lower risk injuries and better stamina. Routine fitness testing and body composition assessment can, therefore, ensure health and promote lifelong physical fitness and the prevention of health problems with a risk of lower conditioning.

At the local level, sports policy interventions such as sports annual fitness assessments and pre-season conditioning program could serve to boost the general health and fitness capacity of the local team. Nutrition workshops are another way to make better training and lifestyle changes for players, so that their athletic development lasts.

There is space for future research to examine comparative results between junior and senior athletes over their body composition and performance development. Examining for successful use of the specific conditioning in agility, endurance, and jumping would also be useful to evidence-based design of the interventions for workouts.

References

Cureton, T. K. (1956). Relationship of physical fitness to athletic performance and sports. *JAMA, 162*(12), 1139–1149. https://doi.org/10.1001/jama.1956.02960390019005

Gabbett, T., & Georgieff, B. (2007). Physiological and anthropometric characteristics of junior national, state, and novice volleyball players. *Journal of Strength and Conditioning Research, 21*(3), 902–908. https://doi.org/10.1519/R-20616.1

Jackson, A. S., & Pollock, M. L. (1978). Generalized equations for predicting body density in man. *British Journal of Nutrition, 40*(3), 497–504. https://doi.org/10.1079/BJN19780152

Nevill, A. M., Stewart, A. D., Olds, T., & Holder, R. (2020). Relationship between adiposity and body size reveals limitations of BMI. *American Journal of Physical Anthropology, 172*(3), 331–341. https://doi.org/10.1002/ajpa.24064

Nikolaidis, P. T. (2013). Body mass index and body fat percentage are associated with decreased physical fitness in adolescent and adult female volleyball players. *Journal of Research in Medical Sciences*. https://pmc.ncbi.nlm.nih.gov

Palao, J. M., Gutiérrez, D., & Frideres, J. E. (n.d.). Height, weight, body mass index, and age in beach volleyball players in relation to level and position. Unpublished manuscript.

Palao, J. M., Manzanares, P., & Valadés, D. (2014). Anthropometric, physical, and age differences by player position and performance level in volleyball. *Journal of Human Kinetics, 44*(1), 223–236. https://doi.org/10.2478/hukin-2014-0128

Topend Sport. (2012). Anthropometry of Olympic athletes from 2012. https://www.topendsports.com

Wahyuti, S. A., Siswantoyo, .., Suhadi, .., Meikahania, R., Paryadi, .., Putro, W. a. S., Perdana, R. P., & Mahendra, W. D. (2022). Relationship between physical activity and body mass index in women's volleyball athletes during COVID-19 pandemic in special region of Yogyakarta, Indonesia. *Journal of Medicinal and Chemical Sciences*, *5*(6). https://doi.org/10.26655/jmchemsci.2022.6.23