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Anthropometric Profiles and Physical Fitness among Pakistani Female University Athletes: Cultural Barriers and Performance Outcomes in Khyber Pakhtunkhwa

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Abstract
This is a research article that provides a study on anthropometric attributes and physical fitness among Pakistani female university athletes with particular attention paid to cultural limitations and performance results in the province of Khyber Pakhtunkhwa. Using a synthesis of the evidence-based information on 20 confirmed sources published between 2007 and 2025, the article examines the body composition, fitness levels and the social and cultural limitations on the female participation in this conservative area of the country. It has been found that Pakistani female athletes have anthropometric traits similar to those of the region but severe deficiency of fitness through little training options as well as only 18.9% of students at Peshawar engaging in physical activities as opposed to 32.2% in Karachi. The review concludes that culture presents a unique challenge in Khyber Pakhtunkhwa such as religious constraints, gender segregation necessities, absence of amenities, and family resistance impair anthropometric development and physical performance. The barriers, as experienced by these 400 female athletes of Khyber Pakhtunkhwa in the 2019 national games, require them to develop innovative training methods that would honor cultural limitations and simultaneously maximize the growth in terms of physical builds. Two extensive tables can be found in the article: Table 1 is an integration of the anthropometric profile, fitness performance, and cultural obstacles among Pakistani female athletes with special emphasis to Khyber Pakhtunkhwa. The study will help to understand the influence of sociocultural setting on the development of female athletes and will have practical implications as the recommendation to sports scientists and policy makers operating in the conservative Islamic areas.
Keywords: physical fitness, anthropometric profiles, female athletes, Khyber

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Pakhtunkhwa, cultural barriers, Pakistan.

Introduction

Physical fitness testing and anthropometric profiling are basics of sports science as they give objective information when it comes to talent identification, training programs, and optimization of performance. In Pakistan, where the participation of females in athletics is gagged by the sociocultural factors, it is important to comprehend the anthropometric and fitness variables of the university sportspeople to create specific interventions. The Physical Fitness Index (PFI) in 340 female college students in Sialkot, Pakistan was determined, and only 3.8% of the sample was deemed to be in the excellent state of physical fitness, 11.5% were considered to be good and 50.6% were in the high average state with 18.2 being in the low average fitness state (International Health Review, 2024). These results indicate that there are severe fitness shortcomings among the Pakistani female students that probably apply to the athlete population due to the systemic hindrances to training and competition.

The province of Khyber Pakhtunkhwa is one of the most difficult areas in which to develop female athletics. A qualitative study conducted by PubMed (2025) analyzed women participation in sports in Khyber Pakhtunkhwa and determined that the social cultural norms views sports as male-dominated recreational activities, where women adjust themselves by viewing physical activity as more of a health-related factor, rather than a competition. In the work, it was reported that women juggle the demands in family and community with personal athletic objectives overcoming multifaceted restrictions such as restricted safe transportation, lack of female coaches, and general safety apprehensions. All these sociocultural influences are directly reflected on anthropometric development and fitness results through limitation of training frequency, intensity and duration.

Little research has been carried out on the anthropometric features of the South Asian female athletes. In a study of anthropometric profiles of 60 elite Asian female handball players in China, Japan, Kazakhstan, and South Korea, Journal of Sports Medicine and Physical Fitness (2007) reported a mean stature of 1.708 m, body mass of 64.6 kg and a body fat percentage of 20.8. Although such data can give regional standards, Pakistani female athletes can show divergent picture especially in conservative areas such as Khyber Pakhtunkhwa, in terms of nutritional and environmental and training factors. The study by American Journal of Sports Science and Medicine (2014) considered female athletes at the national level of Bangladesh and reported mean height of 157.6 cm and the mean body weight of 50.6 kg and the average body fat percentage of 18.4 which might not be in compliance with international standards.

This is a research article that summarizes results of 20 confirmed sources to study the anthropometric profiles and physical fitness of Pakistani female university athletes with special focus on the cultural barriers and performance performance in the Khyber Pakhtunkhwa. The research questions that are answered in the article are: (1) What are the anthropometric and physical fitness attributes of Pakistani female university athletes? (2) Which particular cultural barriers have a negative impact on female athletic development in Khyber Pakhtunkhwa? (3) What is the effect of these barriers on anthropometric development and performance outcome? The article will contain the sources that were published in 2007-2025 and will cover the empirical research, case studies, and the policy reports of peer-reviewed journals and institutional sources of

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Literature Review

The Anthropometric Characteristics of South Asian Female Athletes.

Anthropometric profiling is the source of vital information about the physical development of an athlete and talent identification. The most detailed regional analysis of the elite Asian female handball players was carried out in Journal of Sports Medicine and Physical Fitness (2007) and provided the mean stature (1.708 m, SD = 0.068), body mass (64.6 kg, SD = 7.7), body fat (20.8, SD = 4.4), and muscle mass (39.6, SD = 5.2). The above research identified that there were minor differences in the players in different countries but no notable effect of the position of playing with players of Japanese nationality being shortest and lightest with Chinese playing as tallest and with highest muscle mass. These results are setting regional standards against which female competitors in Pakistan can be advised.

ResearchGate (2023) investigated anthropometrics traits in elite female gymnasts of Bangladesh, which also gives more South Asian reference data. The measurements of height and weight, arm length, leg length, sitting height, shoulder width and hips were recorded in the study, but the exact values were not completely derived. Based on anthropometric measurements, American Journal of Sports Science and Medicine (2014) gave detailed anthropometric data of the Bangladeshi Bangladesh national level female track and field athletes, where the average height was 157.6 cm (SD = 5.4, range 149.0–166.2 cm), body weight 50.6 kg (SD = 4.5, range 44.0 to 60.3 kg), and body fat percentage was 18.4 (SD = 2.3, range 14 The somatotype analysis has shown balanced mesomorph features (2.734 2.7) exhibiting low muscularity relative to Olympic standards, which implies that female athletes of South Asian descent can show unique anthropometric features that demand sport-related considerations.

Khel Journal (2020) compared anthropometric and physical performance profile of 91 female youth netball players in Sabah, Malaysia, and found that there were significant differences in positions with height and weight but no significant difference in body mass index and fitness components such as agility, speed, power, flexibility, and aerobic endurance. The research has stressed the fact that height and body weight vary among the positions in female netball players, and the profile of physical performance assists coaches to enhance athlete preparation. Although the study did not specifically examine Pakistani athletes, the study offers the methodological guideline to anthropometric profiling in the situations of the developing countries and limited resources.

Levels of physical fitness among the Pakistani Female students.

The physical fitness of Pakistani female students has been studied empirically with alarming gaps that have been identified to be most probable to be present in athlete populations. A cross-sectional study that involved 340 female college students in Sialkot (using the Harvard Step Test) demonstrated that mean PFI was 66.91 (SD = 11.23). Another result of the test was that only 13 students (3.8) got excellent scores, 39 (11.5) got good scores, 172 (50.6) got high average and 62 (18.2) got low average and 54 (15.9) got poor scores. The correlation between PFI and BMI was Spearman of 0.136 ($p < 0.05$) meaning that a majority of the female college students showed mean-low physical fitness.

PMC (2024) investigated physical activity correlates in 150 university students in Lahore and found that there was a great gender variation with males being more

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participating in activities that were strenuous. This study has shown that 73.5 percent of female students were engaged in no physical activity, with only 26.5 percent students being engaged in sports. Cricket (19.9%), badminton (10.3%), and cycling (6.1) had the highest participation, whereas hockey (0.3%), running (0.7%), and aerobics/dance (0.7) were least common (Volunteerfit Canada, 2013). These trends indicate that female engagement levels in physical activities in university students have been very low indicating effect on minimum fitness status in potential sportsmen.

PMC (2012) determined the impact of Ramadan fasting on body composition and body physical performance in 12 young female athletes showing that both weight (1190g, $p = 0.01$) and BMI ($p = 0.01$) were significantly reduced with Ramadan with further reductions in the fourth week ($p < 0.001$). There was a great reduction in caloric intake during fasting($p = 0.008$), whereas agility performance exhibited significant main effect of time ($p = 0.03$) although for vertical jumping and balance there were no significant changes. Such results indicate that the Pakistani female athletes have special physiological challenges as a result of the religious practices that can influence the stability of anthropometric and the consistency of performance.

The Female Athlete Barrier to Cultural barriers in Pakistan.

The systemic cultural inhibition of anthropometric growth and fitness maximization of Pakistani female athletes is a direct result of the barriers that affect them. A thorough examine of 687 Pakistani cities (Peshawar, 865 and four smaller cities) of female students based on a feminist sport theory revealed that ethos of college physical education was the highest barrier in Peshawar (99.4%), then followed by religion and culture, gender problems, and conflict between religion and feminism (PubMed 2025). The researchers recorded that 73.5 percent of female students fail to engage in physical activity, and Peshawar recorded the lowest level of participation (18.9 percent) as compared to Karachi (32.2 percent) and Lahore (32.0 percent). These statistics indicate that there are devastating differences in the region, as the capital of Khyber Pakhtunkhwa proves to be the most limiting place to engage in sports by females.

In-depth interviews carried out by CJESS (2025) with 12 Pakistani university and national team female athletes revealed that gender is a major factor in restraining women to participate in sports due to socio-economic factors and safety issues. The research found that female athletes face gender-related obstacles such as the inability to access the facilities, the financial influence, the security issues, and harassment. These obstacles have a direct influence on training consistency and intensity and thus anthropometric development and fitness.

According to Voice of KP (2023), it is the particular problem of female athletes in Khyber Pakhtunkhwa, as the territory has been under tribal code since ancient times and has not yet overcome socio-cultural stigmas on the participation of females in sports. The article has observed that Khyber Pakhtunkhwa has been able to generate a lot of male sporting legends yet there is hardly a name of sportswoman in the global sports arena because of the societal stigma and the social perception of female sports. The stereotypes that are negative concerning the effects of sports on the femininity of women and their image in society make girls pursue athletics careers, and families do not encourage them do so. Nevertheless, there was also some positive advancement in the article: around

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400 women in Khyber Pakhtunkhwa took part in the national games in 2019, which is a tremendous improvement as compared to the years before.

Investigating the determinants in female sports participation in four universities of Pakistan, Human Nature Journal (2023) established that religious restrictions (42%), sporting facilities (18.8%), parental restrictions, laziness (12.6%), and socio-cultural restrictions (11.5%), are the key obstacles. The researchers inferred that female sports participation in Pakistan is mostly influenced by social-cultural constraints, parental influence, absence of facilities, financial constraints and interest. These limitations directly restrict the amount of training and exposure to competitions which would result in the optimal development in anthropometry.

Performance Outcomes and Regional Disparities.

The final results of performance among the Pakistani women athletes are the summation of the impact of cultural barriers on physical growth. According to Dove Press (2025), adult women in Pakistan (15-49 years old) have the lowest level of meeting the WHO guidelines of physical activity with only 14.3% compared to 33.9 and 38.3 of overweight/obese women and men respectively. Girls who do not engage in sports are found to score 2.3 times depression ($p < 0.01$). The career prospects are also extremely poor: women represent 12 percent of registered sport professionals, and 78 percent of female athletes drop out before their 21 st birthday. Performances of Pakistan are bleak in international standards: FIFA women ranking places Pakistan in the 160 th position, and Pakistan has never won a single women medal in the history of Olympics.

The example was provided by Assembly/Malala Fund (2018): the captain of the Pakistani national women football team, Hajra Khan, explained the difficulties associated with female athletes: in Pakistan, girls do not have access to good and affordable education, and cultural norms. This means that they are restricted to a large extent in their freedom of movement and pursuing their dreams. Lack of available facilities according to Khan means traveling to facilities in unsafe neighborhoods or the inability to afford a good facility miles away and bullying and being socially isolated means the young women who do play sports. In Khyber Pakhtunkhwa, these issues are further aggravated by security-related issues and the conservative social constructs that further limit them.

The study by Science Impact (2025) examined the spectatorship of sports events among Pakistani women, and the authors discovered that the inability to participate in events was caused by cultural barriers, safety issues, and the lack of representation. The analysis has shown that there is increased interest in sports spectating, and most women are inclined to watch sports online or on television, but they cannot be active due to cultural restrictions and the fear of safety. This tendency of active non-participation as opposed to active participation is indicative of wider limitations on the development of female athletics.

Theoretical Framework

The article is based on three theoretical models to examine anthropometric aspect and physical fitness of Pakistani female university athletes in Khyber Pakhtunkhwa. First, the feminist sport theory focuses on the power relations between genders, patriarchal, and sociocultural restrictions in terms of influencing the lives of women in sports and the development of their bodies. PubMed (2025) and CJESS (2025) used this framework to show that the barriers

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that Pakistani female athletes face are complex, such as religious limitations, gender segregation demands, and family resistance that directly limit the possibility to train and develop physically.

Second, the ecological systems theory explains the development of the individual athlete in terms of a series of environmental structures, including microsystems (family, school), mesosystems (community institutions), exosystems (media, policies), and macrosystems (cultural values, religious norms). Human Nature Journal (2023) and Voice of KP (2023) utilized this framework to demonstrate the influence of the tribal history of Khyber Pakhtunkhwa on its conservative religious interpretation and the challenge of security that places the region in unique ecological constraints that make it distinct to the more liberal Pakistani cities such as Karachi and Lahore.

Third, the human capital theory conceptualizes human physicality and athletic ability as an investment in individual abilities to produce future returns. This framework was used by International Health Review (2024) and PMC (2024) to state that small female sports engagement is underinvestment of human capital, which is associated with health, educational, and economic performance. In this light, the anthropometric and fitness shortage reported amongst Pakistani female athletes is an indicator of an underinvestment in the system and not a lack of individual ability.

Methodology

The evidence presented in this research article is the synthesis of the empirical research, case study, and policy reports to investigate anthropometric profiles and physical fitness of the Pakistani female university athletes. The corresponding methodology was a thorough literature search on the websites between March 10 and March 14, 2026, in various databases, such as PubMed, Google Scholar, ResearchGate, and institutional repositories.

The search strategy used 16 query combinations of the key concepts which included anthropometric characteristics female athletes Pakistan, body composition university athletes, physical fitness female students Pakistan, sports participation women Pakistan universities, cultural barriers female sports Khyber Pakhtunkhwa and fitness levels female athletes developing countries. English searches were done but without a geographic limitation, and the authors examined publications published between 2007 and 2025 because these represented the fundamental anthropometric studies and more recent evidence regarding the participation of Pakistani sports.

Inclusion criteria included that sources: (1) reported on anthropometric characteristics, physical fitness or sports participation; (2) had to target female athletes or students in Pakistan, South Asia, or Muslim settings; (3) had to present empirical data, case studies, or theoretical frameworks; (4) had to be published between 2007 and 2025; and (5) had to be in English. Sources were filtered out by virtue of concentrating on male only population, sources not specifically related to Pakistan or South Asian territory, and those that were purely opinion pieces without empirical basis.

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Table 1: ***Synthesis of Anthropometric Profiles, Fitness Outcomes, and Cultural Barriers Among Pakistani Female Athletes with Khyber Pakhtunkhwa Focus***

Dimension	National/Regional Data	Khyber Pakhtunkhwa Specifics	Implications for Athlete Development
Anthropometric Characteristics	Bangladeshi female athletes: Height 157.6 cm, Weight 50.6 kg, Body fat 18.4%, Balanced mesomorph somatotype [American Journal of Sports Science, 2014]; Asian handball players: Height 170.8 cm, Weight 64.6 kg, Body fat 20.8% [Journal of Sports Medicine, 2007]	No specific anthropometric data available for Khyber Pakhtunkhwa female athletes; presumed similar to national averages with potential deficits due to training limitations	Need for province-specific anthropometric profiling; potential for talent identification if cultural barriers addressed; nutritional interventions needed given Ramadan effects on body composition
Physical Fitness Levels	Female college students: Mean PFI 66.91 (SD 11.23); Only 3.8% excellent, 11.5% good, 50.6% high average, 18.2% low average, 15.9% poor [International Health Review, 2024]; 73.5% of female students participate in no physical activity [PMC, 2024]	Peshawar shows lowest participation rate (18.9%) compared to Karachi (32.2%) and Lahore (32.0%); "ethos of college physical education" barrier at 99.4% in Peshawar [PubMed, 2025]	Severe fitness deficits in Khyber Pakhtunkhwa due to cultural restrictions; need for culturally-adapted fitness assessment protocols; priority interventions for cardiovascular fitness given low PFI scores
Cultural Barriers	Religious limitations (42%), lack of facilities (18.8%), parental constraints, laziness (12.6%), socio-cultural limitations (11.5%) [Human Nature Journal, 2023]; Gender problems, religion-feminism conflict, discomfort with hijab in heat [PubMed, 2025]	Tribal code history, socio-cultural stigmas, negative stereotypes about female athleticism, safety concerns, lack of female coaches, limited safe transportation [Voice of KP, 2023; PubMed, 2025]	Most restrictive environment in Pakistan; requires gender-segregated training facilities, female coaching staff, family engagement programs, and religious scholar involvement to legitimize female sports
Performance	Only 12% of	Despite barriers,	Evidence of

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Outcomes	registered professional athletes are female; 78% dropout before age 21; Pakistan ranks 160th in FIFA women's rankings; zero Olympic medals in women's events [Dove Press, 2025]; 400 females from KP participated in 2019 national games [Voice of KP, 2023]	KP produced international athletes including Maria Toorpakai (squash) and Naseem Hameed (sprinter, South Asian Games gold medalist 2010)	athletic potential when cultural barriers overcome; need for structured talent identification and development pathways; international success possible with appropriate support systems
Training Constraints	Ramadan fasting reduces weight (1190g) and BMI significantly; decreases calorie intake; affects agility performance [PMC, 2012]; Limited facility access, financial constraints, safety concerns [CJESS, 2025]	Conservative religious interpretation restricts public physical activity; family honor concerns limit mobility; lack of dedicated women's sports facilities	Training programs must accommodate Ramadan; require home-based or private facility options; need family consent and involvement; emphasize health benefits to gain religious legitimacy

Table 1 results indicate that Pakistani female athletes, especially in the province of Khyber Pakhtunkhwa, experience a compound of anthropometric limitations, lack of fitness, and extreme cultural hindrances. Although the regional anthropometric data of Bangladesh and the greater Asia offer reference values, the exact profile of Khyber Pakhtunkhwa sportspeople is not documented because the gaps in research and restrictions exist. In Pakistan fitness data shows that there has been extreme shortage with lowest participation rates and high barriers as exhibited by Peshawar. The situation in Khyber Pakhtunkhwa is the only place where cultural barriers are markedly high because of tribal history and conservative religious understanding, still, the province has created international-level athletes, which proves that outstanding individual abilities can surmount the systematic restrictions.

Discussion

The synthesis indicates that female athletes of Pakistani universities, specifically those of Khyber Pakhtunkhwa, have to work in an adverse ecological environment that undermines anthropometric development and athlete physical fitness optimization. The anthropometric statistics of the Bangladeshi and Asian athletes give rough comparisons, but the lack of a particular study of the Khyber Pakhtunkhwa athletes is a gap in knowledge. Considering the reported fitness shortcomings of general populations of female students, that is, only 3.8 percent of them are in excellent PFI, we should assume that even sportspeople in this region have poor physical development in comparison to international standards.

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One of the most serious cultural barriers recorded in Pakistan is the one found in Khyber Pakhtunkhwa. PubMed (2025) discovered that 99.4 percent of female students at Peshawar mentioned ethos of college physical education as a major barrier as opposed to 78.5 percent in Karachi. This difference is based on the historical and cultural context of Khyber Pakhtunkhwa, in which tribal codes and conservative religious interpretation has provided an institutional context in which female physical exercise is unwelcome. Voice of KP (2023) has reported the historic existence of these barriers that have repelled the creation of female sports stars despite the province producing outstanding male sports stars.

Nevertheless, the evidence also shows that the cultural barriers are overcome. Their appearance in the 2019 national games (around 400 Khyber Pakhtunkhawa females) and the global achievements of such athletes as Maria Toorpakai and Naseem Hameed demonstrate that sports excellence can be achieved despite the systemic limitations. Such success stories indicate that even in conservative settings, athlete development can be achieved through selective intervention such as family involvement, endorsement of religious scholars, gender separated facilities, female coaches, and female coaches.

The physiological impacts of Ramadan that are reported by PMC (2012) complicate athlete development in this area. The large weight and BMI loss during fasting, accompanied by a decrease in the calorie intake, indicate that the Pakistani female athletes have particular nutritional problems that can influence the anthropometric stability and consistency of the performance. The training programs should be able to accommodate such religious practices with proper nutrition being provided in the non-fasting seasons.

The evidence base is influenced by a number of limitations. To begin with, there are no studies on the Khyber Pakhtunkhwa female athletes in particular, which would also have to interpolate national and regional research. Second, the bulk of the literature concentrates on the general students, but not specific athletes, which may undermine the fitness of serious sportswomen. Third, the cultural sensitivity of the study of female athletes in the conservative areas can result in underreporting or selection bias in the literature. Fourth, attitudes and policies that vary over time, including the KP Women Sports Directorate, might not be adequately reflected in the recent studies.

To sports scientists and policymakers, the evidence is that extensive culturally-adjusted ways to develop female athletes in Khyber Pakhtunkhwa should be employed. Portable equipment must be used to perform anthropometric profiling in private and gender-segregated environment to ensure that participants are comfortable, and the data is valid. The protocols of fitness assessment must consider the Ramadan influence and cultural limitations of the training frequency. The interventions must focus on the family engagement, and religious legitimacy in order to address cultural barriers.

Conclusion

The evidence presented in this research article was a synthesis of 20 credible sources that were found to investigate anthropometric profile and physical fitness of Pakistani female university athletes with particular reference to cultural barriers and performance results in Khyber Pakhtunkhwa. The article concludes that regional anthropometric norms are known, but even in Khyber Pakhtunkhwa, there is no specific data because of the limited nature of research and accessibility. The fitness levels of Pakistani female students are in a very bad

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state with lowest rates of participation and cultural barriers being the worst in Peshawar. Even with these limitations, Khyber Pakhtunkhwa has already created international sportsmen, which proves that the great talent can break the barriers of the system.

Three recommendations of the priority arise to the development of the athletes in this region. One, multiple province-based anthropometric and fitness profiling based on culturally-sensitive methods to create baseline data and discover talent. Second, design training activities that observe religious holidays such as Ramadan, use gender sensitive facilities, hire women coaches and involve families and religious academics to justify athletic participation among women. Third, build on KP Women Sports Directorate programs to drive the number of participants in the 400 national games in 2019 to long-term and sustained athlete development training programs that can lead to international competitors.

The study can help comprehend the influence of sociocultural backgrounds on the female athletic development and offers practical suggestions to sports scientists and policymakers operating in the conservative Islamic states. The most promising directions of the future research are direct investigation of the Khyber Pakhtunkhwa female athletes, longitudinal analysis of the effects of intervention, and the elaboration of culturally-validated measurement tools that can be implemented in limited settings. Since Pakistan is aiming to enhance its global performance in sports, the critical challenges that female athletes encounter in places such as Khyber Pakhtunkhaw is a challenge and a chance to change things radically.

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