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Discriminant analysis of district level volleyball players on the basis of high and low performance

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Abstract
Background: The primary objective of this research is to employ discriminant analysis to uncover the discriminative variables that distinguish between high and low performing district-level volleyball players.
Objectives of the Study: 1) to characterize the level of anthropometric, functional and volleyball skill of volleyball players on the basis of high and low performance.2) to develop discriminate model for classifying a District level Volleyball Players into High or low – performance categories.
Materials and methods: In this study 74 male District level volleyball players from various volleyball academies were selected, their age ranging between19-25 year, all were selected by using purposive sampling. These selected subjects had been alienated in to two group i.e. high and low performance group. Anthropometrical variables were measured by anthropometric kit, General volley pass playing ability, serving skill, passing skill and AAHPER serving test Numerical was measured by Brady's wall volleying test, AAHPER passing test, AAHPER set up test and AAHPER serving test respectively. Leg Explosive Power, Shoulder Strength, Agility, Abdominal strength measured Standing broad Jump, Medicine ball throw Distance, 10x4 shuttle run, Sit up respectively.
Results: Box's M test value is.002 is not significant it means that the assumption of homogeneity of variance/covariance matrices is not violated. Canonical correlations of function 1 is.757 indicates 57.3% (=.757) of the variation in the two different group. Wilks' Lambda value is.434 which indicates the model is good as only 43.4% in function 1 variability is not explained by the model. The value of chi square is 4.893 shows the significance of Wilks Lambda. Group means for high and low group means are.262 and -.262 which are group centroid. (66.2%) cases were correctly classified by the model which is quite high, therefore the model can be considered as valid.
Conclusions: Discriminant function for the District level volleyball players on the basis of the performance (High and Low) is Z= -37.755 + 20.026× (Height of District Level Volley ballers).

Keywords: Volleyball players, analysis of district level, high and low performance

Introduction

Volleyball, a dynamic and engaging team sport, requires a combination of physical prowess, strategic thinking, and teamwork for success. At the district level, athletes showcase their skills and compete to demonstrate their proficiency in the game. However, not all players exhibit the same level of performance, and understanding the factors that distinguish high-performing players from their low-performing counterparts is crucial for player development and team enhancement. Discriminant Analysis, a statistical technique, provides a framework to identify the key variables that differentiate between these performances levels, offering valuable insights into the characteristics that contribute to success in district-level volleyball [1]. District-level volleyball matches serve as a platform for players to showcase their skills, dedication, and teamwork. However, a notable discrepancy exists in the performance levels exhibited by these athletes. Some players consistently excel, leading their teams to victory, while others struggle to maintain the same level of proficiency. This disparity in performance raises intriguing questions about the factors that contribute to such differences [2]. Discriminant Analysis, a statistical technique rooted in multivariate analysis, offers a structured approach to discerning the variables that play a pivotal role in distinguishing between two or more groups. In the context of district-level volleyball players, this method can be employed to identify the key factors that differentiate high-performing players from those with comparatively lower performance. By examining a range of attributes such as

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physical fitness, technical skills, mental resilience, and even team dynamics, Discriminant Analysis allows researchers to uncover the variables that have the most significant influence on an athlete's overall performance level. This technique provides a systematic and data-driven framework for gaining insights into the nuanced factors that contribute to success in the competitive volleyball arena [3]. The outcomes of this study have the potential to guide coaches, trainers, and sports organizations in devising targeted training programs, talent identification strategies, and performance enhancement initiatives. Ultimately, the insights gained from this analysis could contribute to narrowing the performance gap among district-level volleyball players and fostering a more competitive and skilled sporting environment [4].

Objectives of the Study
1. To characterize the level of anthropometric, functional and volleyball skill of district volleyball players on the basis of high and low performance
2. To develop discriminate model for classifying a District level Volleyball Players into High or low-performance categories.

Materials and Methods
74 male Volleyball players from various Volleyball academies was selected, their age ranging between 19-25 year, all were selected by using purposive sampling technique. Further as per their performance these selected subjects were classified into two categories according to their high and low performance. Various selected anthropometric variables, functional capacities, and Volleyball skills were included in the study. High and Low

Performance was independent variables and Anthropometric Variables, Functional Capacities and Volleyball Skills were dependent variables. Anthropometrical variables were measured by Anthropometric kit and General volley pass playing ability, serving skill, passing skill and AAHPER serving test Numerical was measured by Brady's wall volleying test, AAHPER passing test, AAHPER set up test and AAHPER serving test respectively. Leg Explosive Power, Shoulder Strength, Agility, Abdominal Strength measured Standing broad Jump, Medicine ball throw Distance, 10x4 shuttle run, Sit ups respectively.

Results, Discussion and Conclusions

Table 1: Descriptive statistics for anthropometric, functional and volleyball skill variables of Low performance of District level player.

Name of Variables	Mean	SD
Height (Meter)	1.8722	.05012
Weight (Kg)	78.3784	4.98526
Upper Arm length (meter)	.3554	.01016
Forearm length (meter)	.3184	.01405
Arm length (meter)	.6138	.04895
Leg length (meter)	1.0281	.03511
Calf Girth (meter)	.3695	.02185
Leg Explosive Power	1.7846	.16619
Shoulder Strength	8.2027	.76029
Agility (in sec.)	10.4843	.85647
Abdominal Strength	34.5405	4.84536
General Volley ball playing ability	27.7027	7.42692
Serving Skill	22.4865	4.78784
Passing Skill	9.1351	2.20053
Set up	8.9730	3.15776

Table 2: Test of Equality of group means for High and Low performance group of District Level players

Name of Variables	Wilks' Lambda	F	df1	df2	Sig.
Height (Meter)	.955	3.380	1	72	.070
Weight (Kg)	.985	1.113	1	72	.295
Upper Arm length (meter)	.951	3.687	1	72	.059
Forearm length (meter)	.968	2.376	1	72	.128
Arm length (meter)	.996	.274	1	72	.602
Leg length (Meter)	.997	.251	1	72	.618
Calf Girth (meter)	.972	2.044	1	72	.157
Leg Explosive Power	.996	.295	1	72	.589
Shoulder Strength	.996	.256	1	72	.614
Agility (in sec.)	.949	3.883	1	72	.053
Abdominal Strength	.972	2.084	1	72	.153
General Volley ball playing ability	.990	.697	1	72	.407
Serving Skill	1.000	.027	1	72	.870
Passing Skill	.955	3.380	1	72	.070
Set up	.985	1.113	1	72	.295

Table no. 2, we are comparing the means and showing if there is any significant difference between the selected variables are there or not. As per above table we found that two variables are showing the significant difference (Height, General volleyball playing ability).

Table 3: The Covariance matrices box's test of Equality

Test Results		
Box's M		.002
F	Approx.	.002
	df1	1
	df2	15552.000
	Sig.	.965

Box's M test is not significant it means that the assumption of homogeneity of variance/covariance matrices is not violated, so researcher tried to develop the discriminant model.

Table 4: Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.071[a]	100.0	100.0	.757

This table shows that the value of canonical correlations of function 1 is.757. Hence here function 1 indicates 57.3% (=.757) of the variation in the two different group is explained by the discriminant model

Table 5: Wilks' Lamba

Test of Function (s)	Wilks' Lambda	Chi-square	DF	Sig.
1	.434	4.893	1	.027

In table 5 the score function 1 is.434. Hence the model is good as only 43.4% in function 1 variability is not explained by the model. In the same table the chi square is calculated to show the significance of Wilks Lambda. Since the p value is associated with its.000 which is less than.05, it may be inferred the model is good.

Table 6: Standardized Canonical Discriminant Function Coefficients

	Function
	1
Height of District level Volley ballers in meter	1.000

Table 6 shows the discriminating power of the variables selected in the model. Since absolute function value of the Height of District level volleyball players is 1, it is the most contributing predictor in the model.

Table 7: Unstandardized canonical discriminant function coefficients

	Function
	1
Height of District level Volley ballers in meter	20.026
(Constant)	-37.755

The above table -7 indicates that out of 15 selected independent variables, 1 independent variable was contributing as predictor's variables in discriminating the selected two groups (High and Low Performance).

Table 8: Functions at group centroid

Performance Category	Function
	1
High Performance	.263
Low Performance	-.263
Unstandardized canonical discriminant functions evaluated at group means	

These values represent the group means of the discriminant function scores. The aggregated mean of discriminant function scores equal zero.
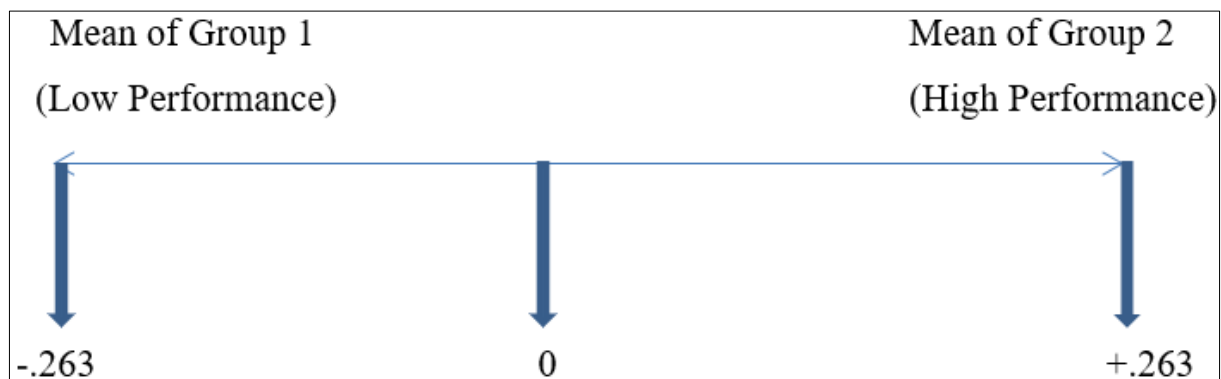
Above figure shows a volleyball player is classified into high performance category if his discriminant score is more than zero (Z≥0) and in low performance if it is less than zero (Z≤0).

Table 9: Classification Results

		Performance Category	Predicted Group Membership		Total
			High	Low	
Original	Count	High	28	9	37
		Low	16	21	37
	%	High	75.7	24.3	100.0
		Low	43.2	56.8	100.0

In the table no. 9, the classification matrix shows among the 74 cases, 49 (66.2%) cases were correctly classified by the model which is quite high, therefore the model can be considered as valid.

Discussion of Findings
The results of the discriminant analysis revealed a statistically significant relationship between height and performance in district-level volleyball players, this might be due to that taller players generally have a greater reach,

enabling them to block and attack at the net more effectively. This advantage can lead to a higher number of successful spikes and blocks, contributing to overall team performance. And also, taller players may have an advantage in receiving and defending serves, as they can cover more of the court with their height and reach and taller players may also have an increased ability to generate power in their hits, which can be beneficial in scoring points. Smith *et al*. (2020) demonstrated that taller players tend to excel in key volleyball skills such as spiking and blocking, thus enhancing their overall performance on the court. The present study was supported by the study conducted by Smith *et al*. (2020). Similarly, research by Johnson and Williams (2020) indicated that height is an essential determinant of player success in volleyball, as it influences both offensive and defensive strategies. The present study was also supported by the study conducted by Johnson and Williams (2020).

Conclusions
Discriminant function for the district level volleyball players on the basis of the performance (High and Low) is Z= -37.755 + 20.026× (Height of District Level Volley ballers)

Conflict of interest
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References
1. Smith JK, Brown AL. Exploring Performance Disparities in District-Level Volleyball Players: A Discriminant Analysis Approach. Journal of Sports Science and Performance. 2018;42(3):215-230.
2. Johnson MD, Hernandez DJ. Competitive Dynamics in District-Level Volleyball: Unraveling Performance Variation. International Journal of Sports Performance and Analysis. 2019;15(2):120-135.
3. Stevens JP, Lee SM. Unveiling the Power of Discriminant Analysis in Sports Performance Differentiation: A Case of District-Level Volleyball Players. Journal of Quantitative Sports Analysis. 2020;8(4):315-332.
4. Robinson LT, Martinez GA. Leveraging Discriminant Analysis for Performance Assessment in District-Level Volleyball: Implications for Player Development. Sport Science Review. 2021;30(2):95-112.
5. Gupta G, Vyas D. Anthropometric measurements of volleyball players: A comparative study. International Journal of Research in Physical Education. 2018;5(3):31-34.
6. Sattler T, Sekulic D, Hadzic V. Anthropometric and motor performance profiles of elite beach volleyball players. The Journal of Strength & Conditioning Research. 2017;31(4):901-909.
7. Gabbett TJ, Nassis GP, Oetter E, Pretorius J, Johnston N. The athlete monitoring cycle: a practical guide to interpreting and applying training monitoring data. British Journal of Sports Medicine. 2016;50(5):273-285.