

The Physical Abilities that Discriminate between Juniors in the National Field Hockey Project.

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Abstract

This study aimed to identify the most important physical abilities. So, we can discriminate between the discriminant and non-discriminant junior players of the National Project for Hockey by using these abilities. Also, it aimed to find a Discriminant Function in terms of physical abilities in order to predict the level of the Hockey Juniors. The sample was (62) junior players registered in the National Field Hockey Project at Alexandria Governorate (births 2001 and 2002). The sample was selected by the Random Method. Both researchers used the Descriptive Method in a survey manner. The results showed that the most important physical abilities that discriminate between juniors are (Agility through Barrow Test with the Stick, Maximum Static Power through the Test of the Strength of the Right Fist, Agility through Zigzag Run (measuring the ability of changing direction during running), Cardio Vascular Endurance through Endurance Test, Coordination through the Numbered Circles Test, Flexibility through Bent the Trunk forward from the Static Position, Flexibility by Sit and Reach Test). Both researchers found a Discriminant Function could be used to predict the level of the Hockey Junior Players according to the physical abilities. The success rate of this Function was 100%.

Keywords: *The Physical Abilities, Field Hockey, Discrimination Analysis*

Introduction:

The process of selection is one of the most important aspects covered by scientific research and studies in the field of sports. It aims to find the preparations and the distinctive features of the individual, and thus determine his abilities that suit the nature of the sport, which is chosen for him. In other words, it aims to predict his extent of validity for this sport. It has been agreed upon that the problem of selection is not an easy problem because of the multiplicity of determinants, and also because of its association with the prediction of what the player will be in the future.

A good selection process depends on identifying the physical demands required by the sports activity next to the rest of the other requirements; and then to know the physical abilities of the sportsman (which contribute substantially to direct him towards the best type of sports activity). The non-ability to make a proper selection from the beginning may be the cause of not reaching the upper levels of the sport later in time. (37: 189) (13: 131)

The physical abilities generally play an important role in various branches of sports. For each sports activity, there are specific physical requirements needed to implement the technique and tactical duties of any activity. (8: 143) (26: 87) (16: 128) (15:31)

In light of this, the access to the required performance level for doing any motor skill depends largely on the physical abilities (which are the basic elements and the important constituents for learning and acquiring motor skills), and for doing these skills successfully. (15:31)

Due to hockey being one of the team sports that requires physical capabilities (especially among its practitioners to be able to achieve a good performance level), the selection in the hockey field should be based on those abilities.

Both researchers think that the evolution of records and high athletic levels do not come by chance, but it must base on a scientific thoughtful of all the aspects forming the sportsman. The most important one is the physical ability. Due to the different physical abilities between players, the physical abilities must be studied in order to reach a best possible level for Hockey players.

The physical abilities are considered as one of the important elements for selecting individuals for hockey, in its early stages and the followed ones. Hockey requires physical and bodily distinguishing requirements that differ from the rest of the other team sports. This sport includes walking, running with the ball and without the ball in order to cover the area of the field during the game. So, the knowledge of these specifications helps the coach in the selection process of the juniors. Also, it helps in directing them commensurately with their own abilities,

kinetic, bodily and physical aptitudes. (3: 2) (29: 1094) (30: 341) (32: 632)

As well as the identification of those characteristics of juniors (physical) will help in selecting good players, as a primary stage, and taking care of them through the comprehensive training and preparation programs designed on a scientific basis in order to reach the best sports level as a specialist. (3: 3)

The athletic performance, in general, is characterized by a variety of characteristics, including complexity, combination and multiple dimensions of performance (23: 51, 54). This requires necessarily statistical treatments suiting for this purpose. So, the Multivariate Statistics are useful in studying a complex phenomenon and useful in access to new more accuracy results and suitable for the nature of the variables. (40: 255)

The Multivariate Statistics Method contains several different methods, including the Discriminant Analysis (which aims to analyze the discrimination between each group on the basis of several measurements). This Method is useful for distributing individuals into groups according to their capabilities differentiated from each peer to another. This method is a complex statistical method needing computers during its implementation. (34: 150)

The Discriminant Analysis Method depends on a linear combination of independent variables (which is considered as a basis of classifying individuals into groups according to the studied variables). (35: 75)

Although the lack use of this method (because of the difficulty of its procedures), but it is still the best method for the classification, diagnosis and prediction during the usage of the Discriminant Analysis. (34: 150)

A lot of studies used the Discriminant Analysis Method in the field of physical education and sport; for example, the study of (Polck et all (1980). (38), (Housh et all (1984). (33), Abdul Wahab Mohammed al-Najjar (1987) . (11) , (Van Der-Walt (1988). (41), (Mohammed Sabri Omar (1991) . (22) , (Maha Shafiq and Amal Ahmed Hassan al-Halabi (1996) . (27), (Hannam S.E. (1993) . (31), (Hosni Sayyid Ahmad and Adel Abdul Halim Haider (1993) . (5) , (Samir Abdel Hamid Ahmed and Amed Saad Eddin Mahmoud (1994) . (7) , (Amal Ahmed Hassan al-Halabi and Elsaid Elsaid Saad (1996) . (1) ,(Ezzat Ahmed Fadel Alhawary (1996) . (12) , (Ihab Mohammed Badawi (1997) . (4) , (fakraya Ahmed Kotb (2005) . (15), (Maraay Hussein Maraay and Mohammed Abdul Salam (2006) . (25), (Mohammed Hassan Mohammed (2009). (19), (Adel Abdel Hamid Elfady (2008) . (9) , (Ankebe Kruger (2010). (28), Saad Jamil (2013). (6),

There are no similar studies that used the Discriminant Analysis Method in the field of hockey (with regard to the limits of physical abilities), according to the knowledge of both researchers. They concluded that after reviewing the books, the scientific references and the international information network (Internet).

So both researchers directed towards this study trying to identify the most important physical abilities which discriminate between different levels of Hockey juniors. Also, they tried to find a discriminant function to predict the level of Hockey juniors to reach the upper levels.

Research Objectives:

- Identifying the most important physical abilities. So, we can discriminate between the discriminant and non- discriminant junior players of the National Project for Hockey by using these abilities.
- Finding a Discriminant Function in terms of physical abilities in order to predict the level of the Hockey Juniors.

Research Hypotheses:

- There is a variance between the discriminant and non- discriminant juniors of the National Project of Hockey in some physical abilities under discussion.
- The Discriminant Function has a high ability to predict the level of the Hockey Juniors.

Previous studies:

1 - The study of "Ali salama Ali" (1986) (14) entitled "Physical Measurements and Fitness Characteristics for the Field Hockey Players " The study aimed to identify the most important physical specifications and physical attributes for the National Hockey players The researcher used the descriptive method in a survey manner, and the sample included (23) international players, first class. The sample has been chosen by the Propulsive Sampling Technique method. the most important results were that; 1) the physical and fitness measurements contribute in the level of performance. 2) There is a function ratio between the level of performance and all of precision, ability, the back muscles and strength of the right and the left fist. 3) There is an inverse function between the level of performance and all of speed, endurance, agility and reaction speed.

2 – The Study of " , Ayman Ahmed Basti " (1990) (2) entitled " The Physical Measurements and Fitness Characteristics Contributing in the Performance Level of Some of the Attacking Skills for the Hockey Players ," the

study aimed to identify the contribution percentage of the physical measurements and fitness characteristics in the level of performance of some attacking skills in Hockey. The researcher used the Descriptive Method in a survey manner. The sample included (58) players, first class, and they has been chosen by the Propulsive Sampling Technique (Nonprobability sampling). The most important results were; The physical variables contributing in the level of performance are the strength of the right and left fist , stability long jump, sprinting 45.70 m , running 400 m .

3 – The Study of " , Ayman Ahmed Basti " (1995) (3) , entitled "Determinants of Juniors Selection in Hockey Sport " The study aimed to identify the determinants of physical - fitness - skills - physiological - psychological for the Hockey juniors (which can be the basis of juniors selection). The researcher used the Descriptive Method in a survey manner. The sample included (170) juniors. The most important results were; 1) the researcher made a model for the best selection for juniors. 2) the length of the forearm is 38 cm, upper arm circumference is 23 cm, the skin folds thickness of the back upper arm is 1.2 mm , chest width is 23 cm. 3) the total strength of the right and the left fist is 42 kg , running 45.70 m , skill of stopping ball is 9.38 Seconds , the skill of pushing ball is 5.10 Seconds, IQ photos Test is 130 degrees and the personality test is 87 degrees.

4 – The Study of " Mareey Hussein Mareey and Mohamed Abdel Salam Ibrahim " (2006) (25) entitled "Analysis of Discriminant Biomechanical Indicators Between the High and Least Level of the Players of the National Egyptian Hockey Team in the Pass Skill with Drag to Enter the Ball into the Corner of Penal " The aim of the study was to identify the discriminant function and the possibility of use it in predicting the biomechanical indicators discriminating between the high and least level of the players of the National Egyptian Hockey Team. Both researchers used the Descriptive Method in a survey manner. The sample included (10) players of the National Egyptian Hockey Team. It was chosen by the Purposive Sampling Technique (Nonprobability Sampling). The most important results were; reaching to a discriminant function that can be used to predict the biomechanical discriminant indicators between the high and lower level of the players of the National Egyptian Hockey team.

5 – The Study of " Carolina F. Nieuwenhuis, et act" (2002 m) (36) entitled " A Predictive Function for Identifying Talented Hockey Juniors (Female) under 15 Years Old " The study aimed to identify the anthropometric , physical, psychological and skills variables that are special and discriminant for the sport of Hockey for the age of players

under 15 years old. The researchers used the Descriptive Method. The sample included (52) players (female) of the participating ones in the National Hockey League in South Africa. The most important results were; identifying the most important determinants of anthropometric and physical, psychological and skills among hockey juniors. As well as, they reached a discriminant function to be used in the prediction.

Research Procedures:

Research Methodology:

Both researchers used the Descriptive Method in a survey manner because of its suitability for the nature and the purpose of the research.

Research Fields:

- Research Community:

The sample was selected by the Random Method from the Hockey Juniors of Alexandria's centers (Talaat Harb, Zahran, Lycée Al-Horreya, Mamdouh El-Sardy) and from the players of the National Hockey Project (births 2001 and 2002). The sample size is (62) juniors from the total (80). (18) Juniors were eliminated because of non-attendance in doing research measurements. The sample was divided into two equal groups, each is (31) juniors. This procedure was done in accordance with the standard degrees of the physical abilities. Attachment (1)

- Study Place:

The Measurements were applied inside the training places of each of the centers mentioned above.

- Study Time:

The measurements and tests of the research were implemented during the time period from Sunday 02/09/2012 to Monday 01/10/2012.

- Measurements and Tests Used in the Research:

Firstly/Initial Measurements

- [Age rounded to the nearest (month) - Weight rounded to the nearest Weight (kg) - Body mass index (kg / m²) - Length rounded to the nearest (cm)]

Secondly / Physical Variables:

A – Determining the Physical Variables:

Both researchers made a review literature for the references and researches in order to reach the physical abilities. So, after reviewing, both researchers extracted a set of physical abilities involved in a form of an Experts

Opinion Poll. This Form included (13) physical variables, attachment (2).

After the preparation of the Form in its final shape, both researchers showed it on (6) experts (the selected experts work in the field of physical education, they obtained a

PhD degree in physical education and they taught or trained for a period not less than (10) years). Attachment (3)

The following table illustrates the results of the Poll Form after the Experts showed their opinions:

No.	Physical Variables	Percentage	No.	Physical Variables	Percentage
1	Cardio Vascular Endurance	% 100	8	Speed Endurance	% 83
2	Muscular Endurance	% 50	9	Agility	% 100
3	Flexibility	% 83	10	Coordination	%66.5
4	Sprint	% 100	11	Muscular Power	%66.5
5	Speed of Performance	% 100	12	Maximum Strength	% 77
6	Speed of Reaction	% 83	13	Balance	%16.5
7	Accuracy	% 33			

It's clear from the above Percentage Table of the special physical abilities of hockey that Cardio Vascular Endurance, sprint the transition, Speed of performance and agility came in the first level as a percentage of 100% while the balance in the last place by a percentage of 16.5% . Both researchers agreed upon 50% is the minimum percentage to accept abilities and represent them in the research. The physical abilities less than 50% were deleted such as balance and accuracy.

B – Identifying the Tests Measuring the Selected Physical Abilities:

Both researchers made a review literature for tests used in measuring the physical abilities under study. These tests were involved in a form of an Opinion Poll to be reviewed by the Experts to determine the fittest tests to measure the research's physical abilities. Attachment (5)

The table below illustrates the proposed tests by the Experts:

No.	Physical Ability	Test	Unit
1	Endurance	Running with Field Hockey ball (puck) and stick on the field's lines. It was designed by the two researchers. Attachment 4	second
2	Static Maximum Strength	Strength of Back muscles with dynamometer(18 : 32)	newton
3	Static Maximum Strength	Strength of legs muscles with dynamometer(18 :33)	newton
4	Static Maximum Strength	Strength of the right fist in newton(18 : 34)	newton
5	Static Maximum Strength	Strength of the left fist in newton(18 : 34)	newton
6	Static Maximum Strength	The average of fist strength in newton	newton
7	Flexibility	Bent the trunk forward from the static position(18 : 341)	cm
8	Sprint	Very fast sprint for 30 m with the stick(10 : 120)	second
9	Speed of Performance	Running for 30 m with stick and puck(17 : 325)	second
10	Speed of Reaction	Speed of reaction(24 : 140)	second
11	Endurance of Speed	Running with the stick 20m for 6 times(24 : 141)	second
12	Agility	Barrow for agility with the stick(10 : 123) (17 : 223)	second
13	Agility	Zigzag run(measuring the ability of changing direction during running) (142 : 24)	second
14	Coordination	Numbered circles(10: 122) (17 : 226)	second
15	Coordination	Dribbling the puck from stability on the flat surface (24 : 154)	number
16	Muscular Ability of Legs	Long jump from stability (18 : 93)	cm
17	Power of Upper Part	Through the hockey puck for the farthest distance (10: 125)	meter

No.	Physical Ability	Test	Unit
		(17 : 228)	
18	Dynamic Maximum Strength	Sit up test	number
19	Power of Pushing Ball	Measuring the strength of pushing ball(17 : 329) (3 : 163)	meter
20	Muscular Endurance of Arms	Test of bending the arms(17 : 218)	number

Scientific Variables of the Research: -

Firstly: - Validity: -

Both researchers used the following to reach the validity of the used tests: -

1 - Logical Validity: -Both researchers reviewed the previous studies and analyzed the documents of the studies and references (which related to the subject matter and dealt with hockey in general and the physical abilities, in particular) so as to ensure that these tests are honest, valid for measuring and they actually measure what they put for.

2 – Self- Validity: Both researchers extracted the Self-Validity for each test in order to ascertain the extent of their suitability to be applied on the research sample (by calculating the square root of the stability of each test), as shown in Table 3.

Second: - Reliability: -

Both researchers calculated the Reliability of tests by the test-retest method after a period of 7 days on a sample of (10 juniors) of the National Project Field Hockey. The Table (4) illustrates the Reliability of all tests with a high degree at significant level (0.05).

Table (3)

illustrates Standard deviation, Mean and the (T) Value between the upper and lower quarter and the validity of tests under study.

Statistics Variables	Unit	Higher Quartile No. = 10		Lower Quartile No. = 10		T value	Validity Coefficient
		Mean	Standard Deviation	Mean	Standard Deviation		
Strength of Back Muscles (x1)	Newton	67.15	0.93	62.34	1.73	*7.72	0.88
Strength of Legs Muscles (x2)	Newton	77.54	1.48	67.16	2.67	*10.75	0.93
Strength of the Right Grip (x3)	Newton	23.50	0.88	21.15	0.41	*7.64	0.87
Strength of the Left Grip (x4)	Newton	23.00	1.25	20.00	0.00	*7.61	0.87
The Average of Grip Strength (x5)	Newton	23.18	0.86	20.63	0.38	*8.60	0.90
Bent the Trunk forward from the Static Position (x6)	Cm	6.80	0.42	5.60	0.70	*4.65	0.74
Dribbling the Puck from Stability on the Flat Surface (x7)	number	34.70	0.95	29.80	0.79	*12.56	0.95
Long Jump from Stability (x8)	M	1.66	0.02	1.46	0.06	*9.78	0.92
Through the Hockey Puck for the Farthest Distance (x9)	M	22.50	0.67	20.25	0.59	*8.00	0.88
Sit up Test (x10)	number	30.20	0.63	27.60	0.70	*8.72	0.90
The Strength of Pushing the Ball (x11)	M	25.60	0.70	23.60	0.52	*7.28	0.86
Test of Bending the Arms (x12)	number	28.20	1.03	24.50	0.71	*9.35	0.91
Endurance Test (x13)	Minute	1.87	0.10	2.11	0.05	*7.19	0.86
Sprint for 30 m with the Stick (x14)	Second	5.24	0.06	5.47	0.04	*9.39	0.91
Running for 30 m with the Stick and Puck (x15)	Second	5.63	0.12	6.70	0.17	*16.27	0.97
Speed of Reaction (x16)	Second	2.12	0.03	2.30	0.05	*10.43	0.93
Running with the Stick 20m for 6 times (x17)	Second	38.01	0.24	39.88	0.16	*20.55	0.98
Barrow for Agility with the Stick (x18)	Second	16.28	0.19	17.68	0.27	*13.52	0.95
Zigzag Run Test (x19)	Second	7.32	0.17	7.98	0.02	*12.06	0.94
Numbered Circles (x20)	Second	4.99	0.25	5.80	0.03	*10.29	0.92

It's clear from the above table" Standard deviation, Mean, the (T) Value between the upper and lower quarter and the validity of tests under study. The value of the calculated (T) was greater than the value of the Tabulated (T) at the

level (0.05) for all tests indicating that tests have the ability to discriminate between different levels. Also, the value of Validity Coefficient came between (0.74, 0.98).

Table (4)

(Correlation Factor and Self-Validity between the First and Second Implementation for the Study's tests)

Statistics Variables	Unit	First Implementation		Second Implementation		Validity Value	Significant Level
		Mean	St.D	Mean	St.D		
x1	Newton	62.88	6.78	62.43	5.48	0.962	0.000
x2	Newton	76.69	12.43	75.70	11.75	0.962	0.000
x3	Newton	23.40	4.92	22.75	4.32	0.922	0.000
x4	Newton	23.10	4.82	23.10	3.73	0.693	0.026
x5	Newton	23.25	4.80	23.65	3.68	0.796	0.006
x6	Cm	6.20	1.14	6.20	0.92	0.703	0.023
x7	Number	32.10	6.47	32.90	4.53	0.955	0.000
x8	M	1.55	0.24	1.58	0.18	0.805	0.005
x9	M	21.30	4.50	22.40	3.35	0.923	0.000
x10	Number	31.70	2.75	32.20	2.15	0.763	0.010
x11	M	26.10	4.25	27.00	3.46	0.875	0.001
x12	Number	26.80	5.07	28.60	5.25	0.918	0.000
x13		1.74	0.25	1.76	0.20	0.892	0.001
x14	Second	5.34	0.21	5.42	0.28	0.779	0.008
x15	Second	6.10	0.72	5.99	0.69	0.786	0.007
x16	Second	2.19	0.22	2.20	0.22	0.752	0.012
x17	Second	38.81	2.37	39.45	2.24	0.693	0.026
x18	Second	15.84	0.87	15.74	1.15	0.644	0.045
x19	Second	7.42	0.63	7.21	0.58	0.899	0.000
x20	Second	4.82	0.72	4.65	0.61	0.922	0.000

It is clear from the above table that the correlation factor between the first and second implementation for the study's tests is ranged between (0.644 - 0.962), so from that we can say that the all used physical tests have high reliability factors.

Instruments and Tools Used in the Research:

- [Legal Hockey field. - Field Hockey sticks. - Field Hockey balls. - Measuring tapes. - calibrated Medical Balance. - Cones. - Lime]

- In addition to the Instruments and tools used in the implementation of research's tests.

Statistical Treatments:

Both researchers used some statistical treatments to achieve the objectives of the research; the statistical program (SPss) was used. Also, the following statistical treatments were used:

- [Mean - Standard deviation - Range - Coefficient of Skewness - Coefficient of Kurtosis - Coefficient of Variation - T- Test for variances - Validity Coefficient - Correlation Coefficient- Discriminant Analysis].

Presenting and Discussing the Results:

Firstly: The Results:

Table (5)

is the statistical description of the research's sample in variables (Age, Weight, Height and Body Mass Index)

Statistics	Unit	Mean	St.D	Range	Skewness	Kurtosis	Variation
Variables							
Age	years	11.45	0.33	1.00	0.26	1.19-	2.88
Weight	kg	43.05	3.45	16.00	0.97-	1.71	8.01
Height	cm	142.98	3.04	12.50	0.17	0.72-	2.13
BMI	Kg/m ²	21.07	1.78	7.83	0.68-	0.48	8.43

Table (5) shows the Mean , Standard Deviation, Range , Coefficient of Skewness, Coefficient of Kurtosis and coefficient of Variation of the sample in variables (age, weight, height, body mass index). It indicates the results to the moderate of the values of these variables for the sample overall, where the values of Coefficient of

Skewness and Coefficient of Kurtosis came close to zero and between (± 3) which shows the moderation of values distribution , and also the values of the coefficient of variation came between (2.13, 8.43%) which is less than 20%, which indicates that the homogeneity of the sample's elements in these variables.

Table (6)

significance of variances between the discriminant and non-discriminant groups in variables (age, weight, height, body mass index)

Statistics	The discriminant group		The non-discriminant group		variances between Means	T-Value	Significant Level
	Mean1	Standard Deviation	Mean2	Standard Deviation			
Age	11.39	0.33	11.50	0.33	0.11-	1.32	0.19
Weight	42.35	3.92	43.74	2.79	1.39-	1.61	0.11
Height	142.69	3.16	143.27	2.93	0.58-	0.75	0.46
BMI	20.81	1.92	21.34	1.61	0.53-	1.17	0.25

It's clear from the table (6) (significance of variances between the discriminant and non-discriminant groups in variables (age, weight, height, body mass index)) that

there aren't significant variances between the two groups. The calculated value (T) is less than the Tabulated value (T) at the level (0.05), so this means that the two groups are equal in these variables.

Table (7)

Statistical description of the research's sample in physical abilities under discussion

Statistics	Unit	Mean	Standard Deviation	Range	Skewness	Kurtosis	Variation
Variables							
x1	Newton	62.93	7.63	33.55	0.29-	0.33-	12.13
x2	Newton	70.12	13.46	49.24	0.13	1.04-	19.20
x3	Newton	22.12	3.66	16.00	0.36	0.37-	16.55
x4	Newton	21.24	3.78	20.00	0.39	0.29	17.79
x5	newton	21.68	3.65	18.00	0.38	0.03-	16.85
x6	Cm	6.31	1.21	4.00	0.16-	0.98-	19.17
x7	number	31.03	6.13	22.00	0.07	1.00-	19.75
x8	M	1.50	0.25	0.95	0.16-	1.05-	16.58
x9	M	21.02	3.44	14.75	0.48	0.29-	16.35
x10	number	28.26	3.87	15.00	0.14	0.68-	13.68
x11	M	24.03	3.77	16.00	0.19	0.14-	15.70
x12	number	26.37	4.30	18.00	0.44	0.57-	16.31
x13	M	2.08	0.39	1.32	0.14	0.99-	18.88
x14	second	5.44	0.31	1.10	0.24	0.91-	5.66
x15	second	6.23	0.84	2.91	0.23-	1.39-	13.55
x16	second	2.26	0.24	1.01	0.12	0.48-	10.68
x17	second	39.32	2.10	6.94	0.19-	1.06-	5.34

Statistics	Unit	Mean	Standard Deviation	Range	Skewness	Kurtosis	Variation
Variables							
x18	second	17.17	1.38	4.83	0.29-	1.05-	8.05
x19	second	7.69	0.93	3.91	0.50-	0.21-	12.03
x20	second	5.52	1.04	4.04	0.25-	0.81-	18.81

Table (7) shows the mean, standard deviation, range, Coefficient of skewness, Coefficient of Kurtosis and coefficient of variation of the sample in variables (age, weight, height, body mass index). It indicated that the results are at the moderate of the values of these variables for the sample overall. The values of Coefficient of

Skewness and Coefficient of Kurtosis came close to zero and between (± 3). It shows the moderation of values distribution, and also the values of the coefficient of variation came between (19.75, 5.34%) which is less than 20%, which indicates that the homogeneity of the sample's elements in these variables.

Table (8)

(significance of variances between the discriminant and non-discriminant groups in variables (age, weight, height, body mass index))

Statistics	The Discriminant Group		The Non-Discriminant Group		variances between Means	T-Value	Significant Level
	Mean1	Standard Deviation	Mean2	Standard Deviation			
x1	65.98	7.21	59.87	6.88	6.10	3.41	0.00
x2	75.47	12.96	64.76	11.89	10.71	3.39	0.00
x3	23.60	3.97	20.65	2.65	2.95	3.45	0.00
x4	22.77	4.09	19.71	2.73	3.06	3.47	0.00
x5	23.19	3.93	20.18	2.65	3.01	3.54	0.00
x6	6.61	1.15	6.00	1.21	0.61	2.05	0.05
x7	33.61	5.82	28.45	5.70	5.16	3.53	0.00
x8	1.61	0.22	1.39	0.22	0.23	4.05	0.00
x9	21.87	3.79	20.18	2.87	1.69	1.99	0.05
x10	30.87	3.02	25.65	2.68	5.23	7.21	0.00
x11	25.32	3.76	22.74	3.37	2.58	2.85	0.01
x12	28.68	4.38	24.06	2.72	4.61	4.98	0.00
x13	1.80	0.26	2.36	0.29	0.56-	7.93	0.00
x14	5.39	0.33	5.49	0.29	0.11-	1.37	0.18
x15	5.84	0.71	6.62	0.80	0.78-	4.08	0.00
x16	2.15	0.23	2.37	0.20	0.21-	3.89	0.00
x17	38.56	2.14	40.07	1.79	1.51-	3.01	0.00
x18	16.01	0.87	18.32	0.61	2.31-	12.13	0.00
x19	7.41	0.91	7.97	0.87	0.55-	2.45	0.02
x20	4.73	0.77	6.31	0.55	1.58-	9.31	0.00

It's clear from the table (8) (significance of variances between the discriminant and non-discriminant groups in variables (age, weight, height, body mass index)) that there are significant differences between the two groups.

The calculated value (T) is more than the Tabulated value (T) at the level (0.05) for all variables except very fast sprint 30m with stick which didn't record any significant variances.

Table (9)

the Mean, Deviation, Wilks' Lambda Value and the value of (F) in the physical abilities to compare between the discriminant and non-discriminant groups in the national field hockey project.

Statistical	The discriminant Group No. = 31		The Non-Discriminant Group No. = 31		The Total Sample No. =62		Wilks' Lambda test	(F) Test	Significant level
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation			
x1	65.98	7.21	59.87	6.88	62.93	7.63	0.84	11.64	0.00
x2	75.47	12.96	64.76	11.89	70.12	13.46	0.84	11.49	0.00
x3	23.60	3.97	20.65	2.65	22.12	3.66	0.84	11.88	0.00
x4	22.77	4.09	19.71	2.73	21.24	3.78	0.83	12.03	0.00

Statistical Variables	The discriminant Group No. = 31		The Non-Discriminant Group No. = 31		The Total Sample No. =62		Wilks' Lambda test	(F) Test	Signifi cant level
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation			
x5	23.19	3.93	20.18	2.65	21.68	3.65	0.83	12.49	0.00
x6	6.61	1.15	6.00	1.21	6.31	1.21	0.94	4.19	0.05
x7	33.61	5.82	28.45	5.70	31.03	6.28	0.83	12.44	0.00
x8	1.61	0.22	1.39	0.22	1.50	0.25	0.79	16.42	0.00
x9	21.87	3.79	20.18	2.87	21.02	3.44	0.94	3.95	0.05
x10	30.87	3.02	25.65	2.68	28.26	3.87	0.54	51.98	0.00
x11	25.32	3.76	22.74	3.37	24.03	3.77	0.88	8.10	0.01
x12	28.68	4.38	24.06	2.72	26.37	4.30	0.71	24.78	0.00
x13	1.80	0.26	2.36	0.29	2.08	0.39	0.49	62.85	0.00
x14	5.39	0.33	5.49	0.29	5.44	0.31	0.97	1.87	0.18
x15	5.84	0.71	6.62	0.80	6.23	0.84	0.78	16.64	0.00
x16	2.15	0.23	2.37	0.20	2.26	0.24	0.80	15.10	0.00
x17	38.56	2.14	40.07	1.79	39.32	2.10	0.87	9.08	0.00
x18	16.01	0.87	18.32	0.61	17.17	1.38	0.29	147.13	0.00
x19	7.41	0.91	7.97	0.87	7.69	0.93	0.91	6.01	0.02
x20	4.73	0.77	6.31	0.55	5.52	1.04	0.41	86.64	0.00

It's clear from the Table (9) that the Mean, deviation, Wilks' lambda value and the value of (F) discriminate

between the discriminant and non-discriminant groups in physical abilities under study by using Wilks' lambda test, F-test for variances between groups.

Table (10)

(the arrangement of entering the physical abilities to compare between the discriminant and non-discriminant groups equation for the Discriminant Equation, direction, and the test value of Wilks' lambda and the value of (F).

Statistics Variables	Wilks' lambda test	(F) test value	Significance level
Barrow for Agility with the Stick	0.29	147.13	0.00
Strength of the Right Fist	0.19	126.84	0.00
Zigzag Run Test	0.12	148.94	0.00
Endurance Test	0.10	124.12	0.00
Numbered Circles	0.09	114.60	0.00
Bent the Trunk forward from the Static Position	0.08	102.71	0.00

- Eigen Value 11.204
- The resultant variance Ratio 100%
- Collective Correlation 0.958
- Chi-squared test's equivalent value 142.603
- Wilks' lambda Test 0.082

It's clear from the table (10) of the incremental analysis that this table illustrate the physical abilities in order of their importance in the entry also shows the direction and value of the test Wilks' lambda and the level of significance of the multiple incremental regression through the use of entering variables in stages with

applying Wilks' lambda test to control the physical capacities' entering stages and to find the best combination of measurements with statistical significance and whether the insulation equation achieved or not, if it achieves insulation conditions, it will be isolated and like that with the chosen variable and then with the selected variables. By looking at the table, the most physical abilities were illustrated, they are, (Barrow for agility with the stick, Strength of the right fist, Zigzag run (measuring the ability of changing direction during running), endurance test, Numbered circles, Bent the trunk forward from the static position) and It is clear that the collective correlation coefficient has reached 0.958, indicating a high potential for classification using these variables.

Table (11)

Standardized and Non- Standardized Discriminant Functional Coefficients and constants values of physical abilities to compare between the Discriminant and Non- Discriminant groups according to the entering order

Statistics Variables	Coefficient of the Standardized function	Coefficient of the non- standardized function
Strength of the Right Fist	4.56-	6.11-
Bent the Trunk Forward from the Static Position	0.47	1.233-
Endurance Test	29.77	40.67
Barrow for Agility with the Stick	53.67	63.38
Zigzag Run (measuring the ability of changing direction during running)	33.25	38.76
Numbered Circles	9.17	13.08
Constant Value	549.83-	758.23-
Discriminant function value of the group's mean value with the non-standardized equation		
The Discriminant group	3.293	The non-Discriminant group 3.293

It's clear from the table (11) (Standardized and Non- Standardized Discriminant Functional Coefficients and constants values of physical abilities to compare between the Discriminant and Non- Discriminant groups)

Table (12)
(the results of using the discriminant function in reclassifying both of the Discriminant and Non- Discriminant groups of the research's sample

Group	Features	Correct classification	Wrong classification
Discriminant	Number of the sample	31	0
	Classification percentage	%100	%0
Non- Discriminant	Number of the sample	31	0
	Classification percentage	%100	%0

It's clear from the table (12) of the results of using the discriminant function in reclassifying both of the Discriminant and Non- Discriminant groups of the research's sample, that the correct classification of the discriminant group reached (31) rate of (100%) and the misclassification reached (zero) rate of 0%. with respect to the Non- Discriminant group, the correct classification of it reached (31) rate of (100%) and the misclassification was (zero) rate of 0%. And all that led to a success in selection and classification with rate 100%.

Secondly, Discussing the Results:

It is clear from Table (5) of statistical description for the research's sample in variables (age, weight, height, body mass index), including (the mean , standard deviation, range , Coefficient of skewness, Coefficient of Kurtosis and coefficient of variation, that the extracted results point to the moderate of the values of these variables for the sample overall, where the values of Coefficient of skewness and Coefficient of Kurtosis came close to zero and between (± 3) which shows the moderation of values distribution , and also the values of the coefficient of variation came between (2.13, 8.43%) which is less than 20%, which indicates that the homogeneity of the sample's elements in these variables.

It's clear from the table (6) of the significance of variances between the discriminant and non-discriminant groups in variables (age, weight, height, body mass index)) that

there aren't significant differences between the two groups, where the calculated value (T) is less than the Tabulated value (T) at the level (0.05) ,so this means that the two groups are equal in these variables which indicates that the two group have the same age with similarity in weight, height and body mass index measurements.

It's clear from the Table (7) of statistical description for the research's sample in physical abilities which shows the mean , standard deviation, range , Coefficient of skewness, Coefficient of Kurtosis and coefficient of variation of the sample in variables (age, weight, height, body mass index), that the extracted point to the moderate of the values of these variables for the sample overall, where the values of Coefficient of skewness and Coefficient of Kurtosis came close to zero and between (± 3) which shows the moderation of values distribution , and also the values of the coefficient of variation came between (19.75, 5.34%) which is less than 20%, which indicates that the homogeneity of the sample's elements in these variables.

It's clear from the table (8) of (significance of variances between the discriminant and non-discriminant groups in variables (age, weight, height, body mass index)) that there are significant differences between the two groups, where the calculated value (T) is more than the Tabulated value (T) at the level (0.05) for all variables except very fast sprint 30m with stick which didn't record any significant variances., and this is also confirmed by the

results of the table (9) of (the arithmetic mean, deviation, Wilks' lambda value and the value of (F) distinguish between the discriminant and non-discriminant groups in physical abilities under study, for the national field hockey juniors, where the results show primarily the superiority of the discriminant group over the Non-discriminant group in the physical abilities through comparing two groups by using Wilks' lambda test, F-test for variances between groups.

So, both researchers refers that to the high characteristics of the first group leading to their superiority, or that refers to the general characteristics of the sample without any impact on the excellence, or on the factors of the chance, or on the influence of variables on each other. The all previous cases don't lead to determine good bases of selection, in addition to these cases don't determine exactly the discriminant physical abilities for the field hockey's excellent juniors.

So, both researchers used in this research the multi statistical methods, the discriminant analysis, which is used effectively to find the best linear combination of set of variables which this combination have the ability to discriminate between two groups or more of individuals to the highest possible degree of accuracy, and also it is an important exploratory method to reach the best model of variables leading to the discriminate between the groups according to the specific test. (22:17) (35: 75)

The results of the table (10) ,of the incremental analysis, illustrate the physical abilities in order of their importance in the entry also shows the direction and value of the test Wilks' lambda and the level of significance of the multiple incremental regression through the use of entering variables in stages (Stepwise) with applying Wilks' lambda test to control the physical capacities' entering stages and to find the best combination of measurements with statistical significance and whether the insulation equation achieved or not, if it achieves insulation conditions, it will be isolated and like that with the chosen variable and then with the selected variables. By looking at the table, the most physical abilities were illustrated, they are, (Barrow for agility with the stick, Strength of the right fist, Zigzag run test, endurance test, Numbered circles, Bent the trunk forward from the static position) and It is clear that the collective correlation coefficient has reached 0.958, indicating a high potential for classification using these variables.

These results point to the ability of those extracted abilities to discriminate between the discriminant and non-discriminant juniors of the National Project of field hockey, which came consistent with the studies that reported the importance of these abilities for field Hockey

juniors where the scientific references indicate the field Hockey juniors need a range of physical abilities required them from doing the required tactical and technical Hockey duties. (2: 8)

From the important physical abilities required in Hockey to meet the tactical and technical skills are (agility, flexibility, maximum strength, muscular power (speed), sprint, coordination, Cardio Vascular Endurance), which considered as especial for Hockey juniors. (17: 190)

According to the extracted results and the agreement with the scientific references, agility is considered as one of the important physical abilities, which occupies a prominent place in hockey because of its relation with strength and speed as well as motor skill, where it is required from the player from player to change his position and trends to perform other required movements according to the game conditions, as in the case of changing the position of the body to maneuver with the ball during the match. (24: 26)

Thus, agility is considered as one of the specific physical abilities for success in performing tactical skills in hockey, as a hockey player you can't run, control the ball and maneuver without the agility skill helping you in changing directions in fast time. (3: 3) (39: 135-142)

The Muscular ability is considered as one of the essential and important physical abilities to the practice the sports activity in general, where most sports activities depend upon this ability. And its availability is necessity to get the individual to the highest levels in a lot of sports activities. It is the basis of the physical performance, and it is really the most important pillars to practice sports. (20:17)

It should be noted that the hockey player must has strong muscles that protect him from the risk of being injured, and also the hockey player must have strong muscles to perform his skills more effectively under the pressure of the competitor during the game. And so the muscle ability is one of the physical abilities affecting on the performance level in hockey. (24: 31)

Also, cardio vascular endurance is one of the most important factors in the practice of many sports activities, as it is the first component in the activities that require continuing for long periods. A study was conducted to know the views of thirty scientists about the components of physical fitness; Twenty-four scientists agreed on that cardio vascular endurance s is considered as one of the basic abilities of physical fitness and mobility. (21: 243)

Cardio vascular endurance is considered as one of the basic abilities of physical fitness for the Hockey player, because hockey as a game collect multiplicity of skills and

also the large size of the field, in addition to the various tools used in this sport rather than the other sports, so the player needs this ability to be able to continue positively in the game as long as possible without falling of performance level or feeling tired. Cardio vascular endurance also effects on the performance of the tactical level throughout the game, so Cardio vascular endurance is one of the most important physical abilities that effect on the level of hockey player performance. (24: 31)

Cardio vascular endurance may be the trump card and the key to win in the games, especially those games where the players' abilities are equal. (21: 297)

hockey needs the availability of coordination ability because of its importance in the practice of hockey, where hockey is a sport that requires from the player to combine between many different skills to be done in a good and sleek performance, and this coordination appears in the coordination between the upper limb and the lower limb movements and all that with the eyes.

Also, the skill of Neuromuscular-Coordination between the eye, the stick and the ball in many motor skills in the sport of hockey, when performing skills like shooting, passing, sprinting, handling and maneuver, the player will need a high degree of this ability to control the skills performance to achieve their goals. (17: 214)

Also, the scientific references say that flexibility is one of the most important physical abilities in the sport of hockey, where hockey need a flexible spine and arms because most of hockey skill are performed in a lean position to forward, and therefore there is an urgent need for the availability of flexibility especially for the hockey player because the player always takes a ready permanent position during performing the skills, so the flexibility ability is very important to do the required muscular performance, the insufficient flexibility leads to increase the difficulty of doing skills and increase the slow performance of skills, as well as increase the likelihood of exposure of injury risk, especially if the skills are associated with force or speed. (17: 202) (24: 33)

According to the extracted results and the previous, the importance of physical abilities for Hockey juniors appear, where it is clear that the collective correlation coefficient has reached 0.958, indicating a high potential for classification using these variables.

Thereby, we have answered the first question.

It is clear from Table (11) of (Standardized and Non-Standardized Discriminant Functional Coefficients and constants values of physical abilities of two Discriminant and Non- Discriminant groups according to the entered

order of the current situation of the hockey juniors, and the amount of excellence in physical abilities, where we can add information about the physical abilities of the high level junior in the sport of hockey. and that can be considered as a scientific basis for the selection of players in the sport of hockey and also we can through this study the training modifications and as an indicator of the training loads and also as an organizer and a director for hockey players and improving the national level of the sport of hockey at and achieving the world tournaments, all that in the light of these abilities that are based on the comparison between the juniors and on this basis also the level of their physical status appear.

The results from the table (12), of the results of using the discriminant function in reclassifying both of the Discriminant and Non- Discriminant groups of the research's sample of the discriminant and non-discriminant juniors in the national project of field hockey, show the success in selection and classification with rate 100%.

Thereby, we have answered the second question.

- Conclusions and Recommendations: -

Firstly: - Conclusions: -

Within the limits of the study's objective, the research's sample and its characteristics, the used procedures, and the results that extracted from the statistical treatment of the data, the two researchers reached the following conclusions: -

1 – There are significant variances between the discriminant and non- discriminant players of the national project of field hockey , and the most important physical abilities that discriminate between them are (agility through Barrow test with the stick, maximum static power through the test of the strength of the right fist, agility through Zigzag run(measuring the ability of changing direction during running), cardio vascular endurance through endurance test, coordination through the numbered circles test, flexibility through Bent the trunk forward from the static position).

2 – It was possible to use the discriminant function for the classification of the juniors of the National Project of Hockey with a success rate of 100%. This shows the possibility of the use of standardized and non-standardized discriminant function, after converting the normal grades to standardized grades, in order to predict juniors of the high level in hockey in the light of their discriminant physical abilities.

Secondly: Recommendations: -

In light of the extracted results from the research, both researchers recommended the following: -

- The Need to focus on the physical abilities that has been extracted as a primary method to select juniors of Field Hockey. These abilities are (agility through Barrow test with the stick, maximum static power through the test of the strength of the right fist, agility through Zigzag run (measuring the ability of changing direction during running), cardio vascular endurance through endurance test, coordination through the numbered circles test, flexibility through Bent the trunk forward from the static position). Thus, these results may be considered as a scientific basis for: -
- The Selection based on the correct scientific bases in Hockey.
- Selecting the appropriate players in Hockey in light of the physical abilities of discriminatory significance between the different levels.
- Organizing and directing special training programs for the Hockey juniors and improving Hockey at the national level.
- Making further scientific studies on physical, fitness, abilities and technical, tactical and mental abilities that discriminate between the different levels in Hockey and then taking advantage of them in a practical and theoretical way.

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