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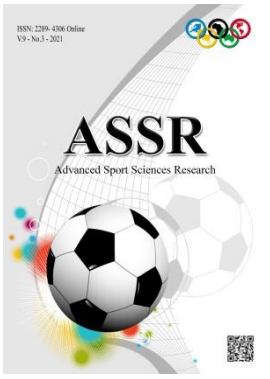

"Factorial study of some anthropometric measurements and physical and kinetic capabilities of fencing players"

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Abstract

There is no doubt that identifying the correlational structure of anthropometric measurements, physical and kinetic capabilities of fencing players, which constitutes the concluded factors and fits it as a measuring criterion. The researcher adopted the descriptive method on surveying a sample of (60) fencing players from the Sports Talent Center. The anthropometric measurements, physical and kinetic capabilities were determined. The obtained was statistically analyzed by using correlation analysis as one of the best and most reliable methods of advanced statistics. According to the results of the correlation analysis of anthropometric measurements (25 proposed measurements and tests), the four concluded factors were accepted, interpreted and named as (lengths, physical capabilities, kinetic capabilities, transitional speed). The acceptance was due to the higher accumulated results which lead to the verification of the general objective of the study. These concluded factors of this study can be used for selecting fencing players. On the basis of the conditions set for the acceptance of the correlation, six factors were rejected for not meeting the conditions and hence, not representing the published criterion. According the results of this study, the use of physical measurements and physical and kinetic tests in training programs was recommended to determine the level of fencing players. Moreover, there is a need to conduct further studies to measure other parameters such as psychological, physiological and mental capabilities on the same group or the other age groups.

Keywords:Anthropometric measurements, Physical and kinetic capabilities, Fencing.

Introduction:

Talented individuals in any field of human activity, including sports, are a national wealth that must be discovered and nurturing it away from accidental chance, personal experiences and other unregulated methods and means. Therefore, relying on the scientific fundamentals of research is one of the best means that contribute to enhancing scientific knowledge in different types of sports, including the discovery of sports talents in all types of sports, such as fencing. The field of study of anthropometric measurements is of particular importance; this is due to its practical significance in several fields. It is used in the sports field in order to determine the extent of suitability of an individual for the type of activity practiced, in addition to determine the extent to which he can reach a high level of technical performance in an activity (Jansson, 1998).

Research and studies have contributed to giving anthropometric measurements and physical and kinetic abilities a special importance in raising the level of performance of athletes, including the swordsmen, as it is one of the capabilities that reflects the image of the swordsman by developing appropriate and correct scientific methods, which aims mainly to raise the sport of fencing to the highest levels. Therefore, it is considered the cornerstone in selecting fencing players, and whatever the coaches' capabilities reached, they will not be able to prepare a champion without the availability of physical specifications and appropriate physical and kinetic capabilities to this sport. The knowledge of the trainers has led to overcome the difficulties and problems that delay the process of learning, training, selection, and achieving the goals set with minimal effort and time shortening.

Those who practice fencing sport need to have certain physical characteristics (capabilities) that have priority and preference over what other physical factors are habitual, as their importance comes after that in varying degrees" (Desouki, et al., 2001). That the sport of fencing requires physical effort and precision in performance, which requires the coach to develop good methods for preparing the player morally and technically, in order to face the most difficult circumstances, with proper behavior during training and competitions, following sound educational principles and goals.(Barth, M 1979. 96)

The fenccer must be characterized by some special kinetic abilities, including (speed of performance, reaction speed, force characterized by speed, muscle strength, endurance, agility, accuracy and compatibility). These abilities are required by the kinetic skills that constitute the nature of competition in the sport of fencing and help the competitors to achieve the best results (Hajaj and Al_Tanboli, 2007).

The importance of the research lies in the results that will be reached through the use of an advanced statistical method represented by factorial analysis, which will benefit the specialists and workers in fencing in choosing the best players to represent the national teams in the future. Moreover, it will provide scientifically relative physical specifications and tests of physical and kinetic capabilities using the basic skills in their implementation. It has scientific foundations of importance for everyone working in this sport. In addition, it supports some aspects of the fencing measurement.

There is a clear dearth in the field of research and studies that used factor analysis as a statistical method to determine the distinctive physical measurements of fencing players, except the study of (Majeed, et al., 1990) and the study of (Latif, 2016). Especially the junior stage is one of the important stages in growth and genetic mutations, including the physical and noticeable movement. In addition, the selection processes are still to some extent dependent on the personal experiences of coaches, chance factors and many non-scientific reasons.

The research aims to identify the global construction of anthropometric measurements and the physical and kinetic capabilities of fencing players, which represent the concluded factors and are valid as criteria for them.

2- Research methodology and field procedures:

2-1 Research Methodology:

The descriptive method was used in the field survey as one of the most appropriate scientific approaches to suit his research problem and goals.

2-2 Research community and sample:

The research community included the players of the National Center for Sports Talent in Fencing in Baghdad and Diyala, which numbered (86) young players, ages (13-16 years). Out of them (60) players were selected as a sample for research, (40) players from Baghdad and (20) players from Diyala. In addition to (10) players from Diyala as a reconnaissance sample.

First: Determination of anthropometric measurements:

For the purpose of determining anthropometric measurements, the Arab and Iraqi sources and references on fencing sport, which highlighted the most important anthropometric measurements that must be available in fencing players. These measurements are (weight, stature, total leg length, thigh length, leg length, foot length, arm length, upper arm length, forearm length, palm length, shoulder breadth, palm breadth).

Second: Determination of the investigated physical and kinetic abilities and their tests

The physical and kinetic abilities agreed upon by the specialists in the field of fencing through their literature were abstracted (Appendix (3)), the most agreed capabilities were determined, and then specific tests were identified for each ability. In order to factorial analyze it, which measures what it was developed for and corresponds to the type of research study, as shown below:

N.	Ability	Test
1	Explosive power	One-time jump from standby position
2	Force marked with speed	Three times jump from standby position
3	the speed	20 meters ran
4	Endure strength	squat from standby position for (30) seconds
5	Flexibility	Open the legs as far as possible from the standing position
6	Compatibility	Thrust right and left for (30) seconds
7	Precision	Thrust a goal within circles (1-6)
8	Speed of thrust	Thrust speed for (10) seconds

N.	Ability	Test
9	Kinetic response	Speed test response by fencing
10	Forward transition speed	Forward transition speed on the fencing stadium (14) meters
11	Backward Transition speed	Backward Transition speed on the fencing stadium (14) m
12	Withstand speed in going forward and backward	Speed tolerance test in forward and backward on the fencing stadium (28) meters
13	Agility	Fitness test in fencing

2-4- Executing the main experiment

The main experiment was conducted on the research sample of (60) players from the Talent Sports Center in Fencing in Baghdad and Diyala, as the measurements and tests in question were implemented on the fencing hall in the Talent Sports Department in Baquba for a period of (5-8 / 7/2019) as for the players. Whereas in Baghdad, it was implemented on the fencing hall of the sports complex in the Ministry of Youth and Sports for the period from (13-18/7/2019), as it was implemented with the assistance of the auxiliary team as well as the cooperation of coaches of the Talent Sports Center in fencing.

2-5 Statistical means:

The Statistical Package for the Social Sciences (SPSS) were used to process the collected data and (mean, standard deviation, median, skewness coefficient, factor analysis and Pearson correlation coefficient were calculated.

3- Presenting, analyzing and discussing the results:

3-1 Presenting the results of the statistical estimates:

Factorial analysis has contributed to building many physical, kinetic , and skill criterion and indicators of physical capabilities, as Muhammad Subhi Hassanein, 1996 noted that "factorial analyzes in the field of physical and kinetic capabilities and anthropometric measurements mostly include a number of structural degrees, through a specific framework for the results factorial studies on physical and kinetic abilities and anthropometric measurements that could be found, as well as through the comprehensive logical development of a set of physical and kinetic abilities measures and anthropometric measurements in the field of physical education. (Hassanein, 1996)

Table (1) standard deviations of anthropometric measurements and physical and kinetic abilities tests

Variables	Unit	mean	standard deviation
Weight	Kg	52.8000	4.50912
Stature	cm	1.5807	.06431
Total Leg length	cm	78.6500	4.40656
Leg length	cm	40.2167	2.77453
Thigh length	cm	41.2500	2.41201
Foot length	cm	20.6000	2.39491
Arm length	cm	58.8667	5.14688

Variables	Unit	mean	standard deviation
Forearm length	cm	24.0625	2.19139
Upper arm length	cm	26.0207	2.60557
Palm length	cm	20.7667	2.15002
shoulder breadth	cm	43.7667	1.62988
Palm breadth	cm	12.6833	1.01667
Explosive power	cm	148.4667	24.39677
Force marked with speed	m	4.9525	.96022
20 meters ran	s	4.1810	.68776
Endure strength	Times number	30.6667	4.14429
Flexibility	cm	29.7333	8.16953
Compatibility	Times number	30.7167	2.92327
Precision	Times number	7.3667	1.07304
Speed of thrust	Times number	10.1202	1.24227
Kinetic response	s	1.7457	.26981
Forward transition speed	s	4.8917	.97428
Backward Transition speed	s	5.3710	1.08598
Withstand speed in going forward and backward	s	9.4660	.88799
Agility	s	18.2630	1.68148

3-2 Correlation coefficients matrix

Pearson's simple correlation coefficient was used to extract a matrix of correlation coefficients for anthropometric measurements and identified tests for analysis of (25) tests, as the matrix included (300) correlation coefficients, as shown in Appendix (1) and (2) and shows the existence of groups of tests with correlations high indicates the possibility of obtaining a number of independent factors, knowing that the significance levels of the correlation coefficient are significant if they are less than or equal to the level of significance (0.05) and are not significant if they are greater than (0.05). on the base of this, the procedures of factorial analysis can be started to explain the coefficients of positive correlations between the various variables. This is a mathematical process that aims to simplify the connections between the various variables involved in the analysis to the common factors that describe the relationship between these variables and their interpretation (Al-Ansari, 2007)

3-3 Initial factors before recycling:

The purpose of the factorial analysis is to explain the observed correlations between the variables in the light of the fewest possible factors, because not all factors that derive the factorial analysis using SPSS are of interest to the researcher. (Ibrahim, 2001, 35)

The method of the basic components of Hotelling has been used. It is characterized by the exhaustion of the maximum variance for each test. The results of the factorial analysis resulted in selecting of (10) factors. The factors whose sample values were greater than one were taken. This step is the first step to identify the factors extracted.

These factors are called direct factors, and it is difficult to interpret the direct factors psychologically until they are recycled, even though the original factorial construction is technically sound.

Table (2) shows the matrix of factors before recycling

Variables	Factors										Explanation variance
	1	2	3	4	5	6	7	8	9	10	
Weight	.387	.414	-.544	.252	-.092	-.078	.295	.054	-.079	.008	.792
Stature	.255	.558	.030	-.169	.355	.081	.213	.312	-.081	-.018	.687
Total Leg length	.187	-.506	-.280	.356	.129	-.189	.116	.016	.330	.064	.676
Leg length	.267	.299	-.461	.278	.253	.027	.058	.108	-.207	.443	.769
Thigh length	.470	.585	.244	-.033	.072	.366	-.031	-.078	.068	.067	.779
Foot length	-.093	.395	.273	-.144	-.536	.382	-.097	.132	-.184	-.008	.754
Arm length	-.671	-.158	-.076	-.060	.227	.242	-.275	-.074	.172	.197	.744
Forearm length	.185	.125	.372	-.548	-.080	-.076	.272	.097	-.130	.275	.676
Upper arm length	-.059	-.187	-.386	-.459	-.212	-.253	.015	.229	-.128	.449	.778
Palm length	-.448	.364	.096	.237	.268	.218	.119	.382	.358	.115	.819
shoulder breadth	.449	-.344	.591	.203	-.050	-.031	.140	-.066	-.152	-.110	.774
Palm breadth	-.166	.281	.120	-.524	.343	-.244	.246	-.156	.000	-.400	.818
Explosive power	.358	-.310	.474	.386	-.288	.122	-.143	.106	-.139	.169	.776
Force marked with speed	.598	.453	.148	.139	.061	-.251	.144	.115	.172	-.040	.736
20 meters ran	.254	-.647	.248	-.275	.263	.243	.091	.308	-.036	.055	.855
strength Endure	.356	.523	.044	.109	-.231	.141	-.250	-.119	.257	.078	.636
Flexibility	-.301	.484	.007	.273	-.003	-.427	-.478	-.051	-.133	-.013	.830
Compatibility	-.313	-.421	-.089	.491	.124	.295	.303	.035	-.246	-.062	.783
Precision	.672	-.098	-.044	.329	.223	.028	-.226	.247	.002	-.250	.796
Speed of thrust	.241	-.219	.551	-.072	.125	-.343	-.076	-.068	.473	.314	.880
Kinetic response	-.235	.210	.364	.352	.015	.029	.449	-.416	-.039	.236	.789
Forward transition speed	.440	-.080	-.369	-.125	-.013	.242	.165	-.594	.105	.103	.813
Backward Transition speed	.502	-.203	-.372	-.371	-.011	.487	-.176	-.041	.231	-.085	.900
Withstand speed in going forward and backward	.629	-.221	-.076	-.109	.264	-.247	-.270	-.163	-.346	.075	.818
Agility	-.135	.193	.278	-.022	.643	.250	-.305	-.206	-.261	.166	.840

Variables	Factors 1	2	3	4	5	6	7	8	9	10	Explanation variance
samples values	3.760	3.371	2.502	2.179	1.576	1.530	1.318	1.177	1.088	1.017	
Importance of factors%	15.038	13.484	10.009	8.716	6.305	6.119	**5.271**	**4.707**	4.353	4.069	
Cumulative contrast ratio%	15.038	28.522	38.531	47.247	53.552	59.671	**64.942**	**69.649**	74.003	78.072	

To highlight the importance of the factor and its acceptance, the following conditions were set based on the criteria for simple construction: (Faraj, 1980)

1 The number of acceptable satisfactions shall not be less than three in the factor.

2 The factors are interpreted in light of the maximum saturation (0.5).

3-4 Factors after recycling:

the deliberate rotation using the "Pharmax Lakers" method was used in this study, as it is one of the most popular methods of general analysis that maintains the independence of factors and aims to rotate the axes to make the variance saturate with each factor as large as possible. (Shoaib, 2016, 214)

After the factors were recycled using the (Farimax Lakers) method, the explanatory factors were determined based on the materials and factors. Saturation (0.30) was used as a minimum to accept the paragraphs and accept the factors in which three or more paragraphs were saturated and their saturations were (0.50) or more, Then test in which the saturation is greater than or equal to (0.30 - 0.50) was chosen. The factor whose saturation was three or more tests accepted after rotation. (Muhammad, Abd, 1999). By adopting this criterion, it was possible to accept (4) factors consisting of physical measurements and physical and motor abilities. It was noted that the explained variance values were constant before and after the rotation process. Table 3 shows that:

Table (3) shows the matrix of factors after rotation

Variables	Factors 1	2	3	4	5	6	7	8	9	10	Explanation variance
Weight	.673	-.252	-.125	.033	.028	-.349	.230	.034	-.140	-.248	.792
Stature	.672	.121	.199	-.162	-.299	-.025	-.079	-.071	-.025	.230	.687
Total Leg length	-.730	.116	-.013	-.006	.248	.055	.116	-.049	.021	-.218	.676
Leg length	.568	-.173	-.223	-.046	.237	-.271	.145	.049	-.355	.294	.769
Thigh length	.555	-.022	.444	-.064	.048	.190	.315	.011	.256	.255	.779
Foot length	-.001	-.061	.164	-.120	.830	-.079	-.032	.015	.027	-.108	.754
Arm length	-.591	-.087	-.089	.373	-.030	-.050	.014	-.022	-.128	-.468	.744
Forearm length	.186	.367	.413	.158	-.205	.358	-.054	.170	-.330	.004	.676
Upper arm length	-.840	.071	-.016	.095	-.015	.021	-.003	-.163	-.095	-.150	.778
Palm length	.138	-.040	-.003	-.833	-.023	-.003	-.243	.101	.083	.166	.819
shoulder breadth	.079	.317	.004	.458	.283	.247	-.141	.205	.419	-.068	.774
Palm breadth	.040	.040	.092	.050	-.879	.093	-.090	.056	.083	.066	.818
Explosive power	.011	.714	.119	.272	.228	.191	-.150	.083	.242	-.042	.776

Variables	Factors 1	2	3	4	5	6	7	8	9	10	Explanation variance
Force marked with speed	-.103	.749	.001	.098	-.021	.322	-.010	.006	.187	-.124	.736
20 meters ran	-.125	.834	-.128	.121	.114	.138	-.047	-.243	-.020	.140	.855
strength Endure	.366	-.484	.321	-.086	.205	.252	.317	-.094	.173	-.020	.636
Flexibility	.016	-.793	.060	.009	-.016	.032	-.398	.003	.018	.195	.830
Compatibility	-.239	.291	-.313	-.135	.259	-.567	-.126	.298	.172	.041	.783
Precision	-.005	.106	-.268	.252	.299	.458	-.010	-.448	.381	.061	.796
Speed of thrust	-.025	.156	-.205	.054	.108	.882	-.063	.108	.053	.037	.880
Kinetic response	.026	-.061	.043	-.123	.034	.853	.016	.037	.173	.089	.789
Forward transition speed	.091	.041	-.134	.255	-.030	-.048	.840	.097	-.030	-.017	.813
Backward Transition speed	.046	.286	.039	.057	.044	-.022	.691	-.576	-.010	-.016	.900
Withstand speed in going forward and backward	.219	.064	-.228	.110	.073	.117	.726	-.244	-.088	.296	.818
Agility	-.033	-.014	.086	-.017	-.098	.889	-.037	.086	.145	.021	.840
samples values	2.994	2.197	2.142	2.010	1.886	1.785	1.785	1.633	1.594	1.492	
Importance of factors%	11.977	8.789	8.566	8.039	7.546	7.140	7.139	6.531	6.375	5.969	
Cumulative contrast ratio%	11.977	20.766	29.332	37.372	44.918	52.057	59.197	65.728	72.103	78.072	22
maximum saturation	7	4	0	1	2	4	3	1	0	0	23
Medium saturation	1	3	4	2	0	4	3	1	4	1	205
Minor saturation	17	18	21	22	23	17	19	23	21	24	.792

It is clear that the number of major saturation has reached (22) saturation. While the medium saturation reached (23) saturation, while the minor saturation reached (205) saturation in all factors. The factors (1,2, 6 and 7) were accepted for their saturation by three or more factors, and the factors (3, 4, 5, 8, 9 and 10) were excluded due to their saturation with two variables on the factor, and this conflicts with the conditions set by the researcher, So it was neglected and excluded, and the factors that have been accepted are explained below.

3-5- Explanation of the extracted factors:

The factors should be interpreted after rotating the axes, as the total variance of the factorial matrix is distributed again based on of simple structure properties, which lead to distinguishing one variable with high saturation over another factor unless it expresses forms of variation that prominently distributed with many variables The matrix. (Bahi, 2002, 44). In order to give the factors those were gotten after the

orthogonal rotation, certain scientific support or more easy explanation were used. In order to determine the variables that are saturated with significant values for each factor on the base of the maximum saturations (0.5) with the use of mediums (0.30). According to Guilford's criterion, the factor with at least three significant variables is accepted. The factors are explained in the light of the results of rotating the columns, whether (orthogonal or oblique) according to the researcher's work. As confirmed by (Salman, 2015, 72). Variables with high saturations occurring were chosen from (0.50) or more, as this value is a high indication of acceptance of the saturation of factors, (Stevens, 1996) indicated that saturations that are greater than 0.30 are acceptable. While saturations which are greater than 0.40 and 0.50 considered important and essential respectively. With the adoption of this criterion, it is possible to accept (4). These factors will be reviewed.

First: Interpretation of the first factor

This factor saturated (7) maximum saturation at a rate of (28%) of the total number of subjected variables to analysis, and the saturation values ranged on this factor (0.672, 0.673, -0.730, 0.568, 0.555, -0.591 and -0.840), and this factor is for anthropometric measurements It is (weight, total length, leg length, leg length, thigh length, arm length and upper arm length) and the distinguishing characteristic of this factor is the lengths so it can be called by this name (length factor). This result is logical from the researcher's point of view. As the lengths are important physical measurements for fencing players, especially when performing all basic skills, whether to gain distance or escape from a competitor's attack or perform offensive skills that end with the stab movement from the appropriate distance. Because lengths are among the best measurements from a statistical point of view, these measurements are recommends as one of the bases for selecting and picking fencing players. This finding is agreed with (Ibrahim Nabil Abdulaziz, 2018, 47), who emphasized that "the fencing player as well as beginners who are selected to practice this sport should be characterized by anthropometric measurements, including (the length of each of the total body - arm - legs (bottom end) ... This is to ensure their superiority in that sport in the future due to the high correlation between the level of performance and the results of matches and among these anthropometric characteristics (measurements) according to the findings of many researches in this field. As for (Abdullah Salahuddin, 1980, 16), who pointed out that the sport of fencing requires graceful and strong legs because it integrates with perfection of the technical movements related to fencing. Accordingly, "The length is of great importance in many sports activities, whether it is the total length or the length of some ends of the body, such as the length of the arms or legs, and the consistency of the length of the limbs with each other is extremely important in the individual acquiring muscular nerve harmonics in most sports activities " (Abdel Fattah, and Hassanein, 1997).

Second: Interpretation of the second factor:

The number of saturations on this factor reached (4) saturation, at a rate of (16%) of the total number of variables subject to analysis. 20 meters, and flexibility), so it can be called a factor of (physical abilities). This result of physical capabilities is consistent with what he mentioned (Maleh, Al-Taie, 2015). As these capabilities are one of the main influences that affect the positive performance of fencing movements and therefore must be available in fencing players to ensure superiority and access to high levels. This due to, the sport of fencing requires the player to make a great effort at a specific time with the possibility of continuing to perform this effort at regular intervals for a day or two, depending on the number of participants in the competition.

Third: Interpretation of the sixth factor:

The number of saturations for this factor reached (4) saturations at a rate of (16%) of the total number of variables and their values ranged (-0.567, 0.882, 0.853 and 0.889), and the distinguishing feature of this factor is the kinetic capabilities which are (compatibility, speed of thrust, kinetic response, agility) so it can be called a factor (kinetic abilities). The results of this study with regard to kinetic abilities is consistent with (Khalaf, et al., 2014, 41) who mentioned that the kinetic requirements are the basic pillars of fencing because, behind the successful performance models of the different kinetic skills are special kinetic abilities related to the readiness of the potential fencing player. These abilities lead to perform the functions coherently and in a sequential context, which ultimately results in obtaining the correct successful movement, whether this movement is simple or complex. Mentions (Schmidt 2000, 127)" that the kinetic capabilities "capabilities are largely inherited, which is the basis for performing the movement skills of individuals, a description of them according to their number and nature and how they are evaluated, in order to help them in the classification of motor skills, and how individuals can choose specific activities, jobs, or sports based on their motor abilities.

While (Gabriel, et al., 2015, 191), mentioned that the kinetic capabilities help the fencer to achieve the best results, in addition to its direct impact on the private technical aspect and Without their availability become difficult to control the special technical skills and difficult to implement the planning aspects of the sport of fencing.

Fourth: Interpretation of Factor Seven:

The number of saturations for this factor reached (3) saturations, at a rate of (12%) of the total number of variables. Their values ranged (0.840, 0.691 and 0.726). The distinguishing feature of this factor is the transition speed, so it can be called a factor of (the transition speed). The result of transition speed is consistent with (Abdali, et al., 2011, 43) who mentioned the fact that the transition speed is one of the important capabilities of the fencing player, as it is used in the event of progress toward the competitor or retreating when avoiding competitor attacks. Therefore, the fencing player should have a high transition speed in cases of rapid attack against the competitor or in the case of defense and back to avoid his attacks.

4- Conclusion:

According to the results of the factorial analysis of anthropometric measurements and the selected tests (25) measurements and tests, the four extracted factors were accepted, interpreted, and named (lengths, physical abilities, kinetic abilities, and transitional speed), due to the highest saturations which achieved the general goal of this research . These extracted factors from this study will be as a basis in selecting and selecting fencing players. In light of the conditions set for the acceptance of the factor, six factors were rejected for not meeting the conditions of acceptance and then not representing the samples. The use of anthropometric measurements and physical and kinetic tests recommended in training programs to determine the level of fencing players. More researches and similar studies should be conducted to other capabilities (psychological, physiological, and mental) on the same or other age groups.

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Appendix (1) correlated Factors matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
N	1		.274	.025	.493	.140	.003	.003	-.120	.007	.014	-.207	-.129	-.146	.458	-.314	.206	.039	-.085	.233	-.291	.005	.308	.121	.157	-.249
	2			-.270	.199	.413	.069	.069	.171	-.040	.201	-.113	.221	-.166	.400	-.053	.229	-.007	-.211	.104	-.059	-.010	-.022	.011	.061	.215
	3				.182	-.218	-.449	-.449	-.190	-.010	-.182	.118	-.290	.022	-.063	.192	-.145	-.183	.255	.289	.158	-.096	.110	.104	.092	-.241
	4					.268	-.094	-.094	-.050	.084	.139	-.139	-.174	-.127	.124	-.175	.120	.127	-.028	.235	-.221	-.010	.178	.056	.199	.084
	5						.293	.293	.294	-.294	.047	.123	.088	.084	.448	-.104	.548	.039	-.307	.259	.008	.098	.184	.192	.017	.220
	6							.003	.223	-.139	.140	-.059	-.053	.127	-.034	-.151	.143	.117	-.249	-.186	-.170	.121	-.152	.019	-.225	-.052
	7								-.162	.076	.360	-.406	.008	-.183	-.470	-.002	-.291	.143	.200	-.279	-.094	.107	-.122	-.061	-.276	.226
	8									.158	-.137	.221	.218	-.071	.162	.188	.002	-.143	-.270	-.143	.217	-.036	-.003	-.028	.040	.014
	9										-.220	-.317	.019	-.079	-.137	.116	-.076	-.132	-.117	-.212	-.090	-.239	.020	.120	.089	-.244
	10											-.253	.051	-.188	.002	-.154	-.026	.160	.089	-.124	.006	.215	-.312	-.275	-.496	.143
	11												-.137	.499	.125	.367	.043	-.253	.118	.311	.367	.074	.031	-.090	.280	-.044
	12													-.446	.073	-.042	-.146	.043	-.304	-.140	-.038	.116	-.059	-.103	-.061	.130
	13														.176	.293	.048	-.144	.101	.404	.284	.189	-.039	-.028	.174	-.073
	14															-.107	.369	.113	-.305	.406	.226	.113	.068	.055	.227	-.067
	15																-.354	-.555	.174	.196	.287	-.237	.008	.342	.256	.073
	16																	.144	-.285	.123	.017	-.016	.086	.146	-.071	.081
	17																		-.154	-.076	-.076	.027	-.288	-.489	-.078	.156
	18																			-.053	-.305	.179	-.069	-.177	-.233	.058
	19																				.030	-.250	.106	.305	.466	-.064
	20																					.086	-.017	-.066	.219	.042
	21																						-.016	-.433	-.206	.143

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	22																							.503	.289	-.109
	23																								.310	-.101
	24																									.116
	25																									

Appendix (2) error ratio for the factors of correlative matrix

N	1																									
	2	.017																								
	3	.424	.018																							
	4	.000	.064	.082																						
	5	.143	.001	.047	.019																					
	6	.490	.300	.000	.238	.011																				
	7	.002	.025	.286	.100	.018	.361																			
	8	.180	.096	.073	.351	.011	.044	.108																		
	9	.478	.380	.470	.261	.011	.145	.281	.113																	
	10	.457	.062	.082	.144	.360	.144	.002	.148	.046																
	11	.056	.194	.184	.146	.175	.327	.001	.045	.007	.026															
	12	.164	.045	.012	.092	.252	.344	.476	.047	.444	.350	.148														
	13	.133	.103	.434	.167	.261	.166	.081	.294	.275	.075	.000	.000													
	14	.000	.001	.317	.173	.000	.397	.000	.108	.148	.494	.171	.289	.089												
	15	.007	.345	.070	.091	.214	.125	.494	.075	.188	.120	.002	.375	.012	.207											
	16	.057	.039	.135	.181	.000	.137	.012	.494	.282	.422	.371	.133	.358	.002	.003										
	17	.385	.480	.080	.167	.385	.186	.138	.137	.157	.110	.026	.373	.136	.195	.000	.137									
	18	.258	.053	.024	.416	.009	.028	.063	.018	.187	.249	.186	.009	.221	.009	.091	.014	.119								
	19	.037	.213	.012	.036	.023	.077	.015	.137	.052	.173	.008	.142	.001	.001	.067	.174	.283	.344							
	20	.012	.326	.114	.045	.477	.097	.239	.048	.247	.483	.002	.386	.014	.041	.013	.449	.283	.009	.410						
	21	.486	.470	.232	.471	.227	.178	.208	.392	.033	.050	.287	.189	.074	.195	.034	.450	.418	.086	.027	.256					
	22	.008	.434	.202	.087	.080	.124	.177	.492	.440	.008	.407	.328	.385	.303	.475	.257	.013	.301	.210	.448	.452				
	23	.178	.466	.214	.334	.071	.441	.323	.417	.180	.017	.248	.217	.415	.337	.004	.133	.000	.089	.009	.308	.000	.000			
	24	.115	.323	.242	.063	.450	.042	.016	.382	.249	.000	.015	.322	.091	.041	.024	.296	.277	.036	.000	.046	.057	.013	.008		
	25	.027	.049	.032	.262	.046	.345	.041	.456	.030	.138	.370	.161	.290	.306	.291	.269	.117	.329	.313	.374	.137	.204	.221	.189	

Appendix (3) the reference survey for the most important physical and kinetic abilities of the fencing players

No.	Name	Power	Flexibility	strength Endure	Speed Endure	Speed of performance	equilibrium	Reaction speed	Compatibility	Precision	Agility	Transition speed
1	Ibrahim Nabil Abdul Aziz	*	*			*		*	*	*		*
2	Hussein Hajaj	*	*	*	*	*		*		*	*	
3	Ramzi Al-Tanbouly	*		*	*	*		*	*	*	*	*
4	Jamal Zahir	*	*	*	*	*		*		*	*	*
5	Osama Abdel-Rahman	*		*	*	*		*	*	*		
6	Nabil Fawzy	*	*	*	*	*				*	*	*
7	Amr al-Sukkari	*				*		*		*	*	*
8	Ehab Mufrih	*	*		*	*		*	*	*	*	*
9	Alsayed Sami	*	*			*	*	*	*	*	*	*
10	Abbas Al-Ramly		*		*	*	*	*		*	*	*
11	Bayan Ali Abdali	*	*		*	*	*	*		*		
12	Abdul Karim Fadel and Abdul Hadi Hamid	*		*	*	*			*	*	*	
13	Abdel Nassif et.al	*		*	*	*	*		*	*	*	
14	Fatima Abdel-Maleh et.al.	*	*	*	*	*	*	*	*	*	*	*
15	Dhafer Namous et.al.	*	*	*	*	*		*	*	*	*	
16	Dhafer Namous and Fatima Abdel-Maleh	*	*	*	*	*		*	*	*	*	*
Number of opinions		**15**	**11**	**10**	**13**	**11**	**5**	**13**	**10**	**16**	**13**	**10**
percentage		**%94**	**69%**	**62.5%**	**81%**	**96%**	**31%**	**81%**	**62.5%**	**100%**	**81%**	**62%**
order		**second**	**Fourth**	**Fifth**	**Third**	**Fourth**	**sixth**	**Third**	**Fifth**	**First**	**Third**	**Fifth**