

Effectiveness of Coordination and Agility Exercises on the Performance of Basic Fencing Skills amongst University of Baghdad Students

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This study investigated the effectiveness of an intervention programme (agility and coordination exercises on the performance of basic fencing skills) amongst University of Baghdad students in Iraq. A total of 60 students participated in the study, which was conducted using a quasi-experimental research design with pre-test and post-test. Agility and coordination exercises were utilised as the independent variable, whilst basic fencing skills were the dependent variable. Fencing skill tests were administered to the students before and after a treatment process. The students were divided into two groups, namely, control and experimental. Each group consisted of 30 students who were taught by different lecturers. Results showed that after eight weeks of agility and coordination exercises, all the nine skills were significantly affected, with different effect sizes of small, moderate and large and in favour of the experimental group. This study is relevant as it presents substantial evidence that agility and coordination can significantly and positively affect the performance of basic fencing skills amongst University of Baghdad students.

Key words: *Agility, Coordination, Basic Fencing Skills, Quasi-Experimental, Traditional Method.*

Introduction

Fencing is one of the compulsory subjects in the curriculum of the Physical Education Faculty in University of Baghdad, Iraq. It was formerly taught only to freshmen and sophomore students but is currently taught only to third-year students (Fraidoon, 2008). Students learn to perform and master basic fencing skills and develop the corresponding level of related motor abilities, which are basically considered when calculating their marks and final evaluation (Abdullah, 2006). Students' evaluation in fencing class depends on the teachers' evaluation of the correct technical performance, wherein the teachers emphasise the right form of body positions when executing the basic skills (Falah, 2004).

Students consider fencing one of the most difficult practical subjects compared with other practical subjects taught for more than a year, such as football, volleyball and basketball (Khaliq, 2010). According to Rahman (2009), there are different reasons why fencing is one of the most difficult practical subjects. One, it is a new subject for the students, who have not seen it often in real life or even on television, as such it is an unfamiliar and unpopular sport. Another reason is that fencing includes three different weapons, which vary in their specifications, skills and rules. Fencing also requires multiple and compound skills, which are connected to one another, making the sport more complicated. Overall, fencing classes require students' commitment because if they miss one class, they will not be able to perform the skills correctly and accurately. This demand for commitment seems to be one of the obstacles faced by the students amidst the current situation of the country. All these reasons may lead to the poor performance skills of the students and, consequently, low marks, which is the main problem of this study.

Fadhil (2014) noted that students are only required to achieve minimum passing marks in their performance skills, which means a passing percentage of almost 60% and an average grade of 50%–60%. Previous studies (e.g. Rahman, 2009) have mentioned a weakness in the students' performance of basic fencing skills. Researchers have attempted to solve this problem in different ways, with some trying different teaching methods to impart the required skills, such as Fraidoon (2008). Meanwhile, other researchers (Zainab, 2008) have attempted applying training curricula to develop physical abilities. All these studies aimed to enhance the students' performance of the skills, but none have tried to develop the students' motor abilities. Therefore, the present study takes into consideration both the motor and physical abilities of the students to determine their effect on the performance of basic fencing skills.

Coordination

Coordination is considered as one of the basic components of physical performance in all sports. Coordination between the nervous system and muscles and between the nerve centre and internal organs of the body play an important role in enabling an athlete to reach top levels (Alkubasi, 2010). Coordination is the ability of a person to execute and control his/her movements, which is imperative in order to throw a ball, hit a home run or even kick a goal. In sports, this ability must exist between the eyes, hands and feet. An athlete's ability to perform multiple motor skills is firmly controlled by general coordination, regardless of the qualities of the practiced game or sport activity. Every athlete follows a multi-physical preparation and should efficiently adopt suitable general coordinative abilities. Multi-physical preparation should be practiced by talented athletes when they start performing different sport activities so as to develop a good understanding of general coordination before they reach the specialisation stage. Hence, acquiring general coordination will create a base for developing specialised coordination (Hassan, 2010).

Agility

Agility means conducting movements in a specific place and time with consistency and accuracy. Agility also includes the speed of change of direction. An agile individual is one who can change from one position to another at full speed and coordination (Brown & Ferrignom, 2005). The two types of agility are general and special agility. **General agility** refers to the ability to perform a motor task characterised by diversity and variation efficiently and accurately and with perfect timing; whereas **special agility** refers to the ability to perform a motor task identical to the motor characteristics, components and combinations of the competition tasks in specialised sports (Ibrahim, 2008).

Basic Fencing Skills

Fencing is an individual sport based on fast movements and high-energy mental action (intelligence). These qualities, in turn, require continuous training and vast participation in competitions to gain and increase the experience fundamentally needed to achieve records in fencing (Karim & Hadi, 2008). The traditional white sportswear of fencing and its protective and electronic equipment, such as mask, glove and three kinds of swords, give this sport a special advantage over other sports, and add uniqueness as well. It is a sport in which two competitors or fencers fight in a bout using attack and defence techniques to touch the body target with the endpoint of the weapon (epee), to thrust (foil) and to cut with the blade (sabre). In order to win, they should record five touches in three minutes within a group system and play each group according to the basic rules of fencing. The main features of this sport are accuracy, skilful performance, speed and endurance, as well as cognitive qualities

such as strong will, right thinking, readiness and awareness. Fencing likewise requires a comprehensive preparation in all physical, psychological, technical, tactical and mental aspects. Therefore, fencing depends on different sciences, including physiology, kinesiology and biomechanics.

General Adaptation Syndrome Theory

In this study, the authors investigated general adaptation syndrome (GAS) theory, which was proposed by Selye (1984) in *'The Stress of Life'*. GAS theory can be divided into three stages, namely, alarm reaction, resistance and exhaustion, which occur in the human body because of stress. The researcher selected GAS theory as this model is often referred to in many discussions on the monitoring of physiological stress. Training is necessary for providing a stimulus to improve performance and render a start point for investigating the effects of acute training stimuli. The main objective of the current study is to identify the effects of an intervention programme on the skill and performance of students during fencing.

Methodology

Participants

The study involved 60 secondary school students in Baghdad, divided into two groups (experimental and control) with 30 students in each group.

Research Design

This study used a quasi-experimental design (Creswell, 2014), which involves selecting groups where a variable is tested but without any random pre-selection processes. After this selection, the experiment proceeds in a similar way to any other experiment, with a variable being compared between different groups or over a period of time. In this study, the researchers tried to determine if agility and coordination could improve the basic fencing skills performance of students in fencing classes. Before carrying out the quasi-experimental study, the researcher considered particular concepts to obtain the actual effects of these exercises on the fencing performance of the students. The experimental and control groups were established for this research, where students in the control group were given general fencing activities for 2 hours every week, whilst students in the experimental group were given 10–15 minutes of agility and coordination exercises along with the general fencing activities. The researchers then compared the observations of both groups based on the results obtained from before and after eight weeks of conducting the experiment.

In this study, the component that was changed was the addition of agility and coordination exercises, which were conducted by qualified physical education and fencing lecturers with at

least 25 years of experience in the field. The classes were carried out once a week for a period of eight weeks, with each session lasting for 120 minutes. The two groups of students were informed of their designated training participation prior to the commencement of the study. They were briefed on the nature of the study, training schedules, and the general expectations and cooperation required from them. As fencing is a compulsory subject in the curriculum set by the Physical Education Faculty in University of Baghdad, Iraq, the students were informed of the importance of having complete attendance and the expectations of a high level of participation in the study of a health-related field for research purposes. All the subjects were encouraged to participate and give their full cooperation throughout the duration of the research.

Measurement

The researcher chose agility and coordination exercises that were based on the experts' recommendations and integrated these in the fencing skills training. The exercises selected were deemed by the experts as not too complex and well-suited for students as a means of ensuring that all would be able to perform the exercises well enough and without any difficulties. As for the agility and coordination elements, the researcher selected these based on the results from the questionnaires distributed to six fencing experts regarding the components of five motor abilities, with a scale ranging from 1 to 10. The results showed that agility and its components received a score of 90% and 100%, respectively, whilst the other abilities were rated less than 50%. For this reason, the last three components were omitted from the selection.

The lecturers observed the student's skills performance and gave them marks according to their performance based on their mastery of the nine basic fencing skills. The researcher identified the skills in question according to their relative importance and the practical test from the material on fencing for third-year students in their first semester. Then, the researcher used the evaluation form for each of the nine skills as recommended by the experts. The values of evaluation were ten (10) marks, including two (2) marks for the preparatory part of the movement, six (6) marks for the main part of the movement and another two (2) marks for the final part. The evaluation was specific to the sample of the study, which consisted of 60 students distributed equally into two groups, 30 each in the experimental group and the control group. To establish the evaluation mark for the practical material intended for the first semester (i.e. 15%), additional procedures were implemented in the light of the collected data as follows. (1) The evaluation marks for the nine skills for each student were collected. (2) The evaluation rate was extracted by dividing the total of the evaluation marks by nine. (3) The result (evaluation rate) was multiplied by 1.5 to transfer the mark from 10 into 15 marks for the practical material adopted in the first semester by the teacher and the researcher.

Table 1: Example of the evaluation form

Skill	Starting stance Prep. Part	Performing Main part	Ending stance Final part
Advance and Retreat	<u>(2 marks)</u> (on guard stance)	<u>(6 marks)</u> (2) Marks for the sword and free hands (2) Marks for the leading and rear legs (2) Marks for the overall shape of the body	<u>(2 marks)</u> (stability of the on-guard stance)
Straight defence and circular defence	As well	(3) Marks for the movement of the sword hand (3) Marks for the overall shape of the body	As well
Direct attack and indirect attack	"	(2) Marks for the sword hand (2) Marks for the movement of the forward leg (1) Marks for stretching the rear leg (1) Marks for the position of the free hand	"
One-two attack and circular attack	"	(3) Marks for the sword hand; the movement of change with stretch (3) Marks for the leading forward leg and the free hand	"
Riposte	"	(2) Marks for defence; repel the attack of the opponent (4) Marks for (3) the sword hand and leading leg and (1) the rear leg and free hand	"

Data Analysis

Analysis of Covariance (ANCOVA) was used to monitor the capacity of the agility and coordination exercises (independent variable) for developing basic fencing skills, such as advancing, circular attack, circular defence, compound attack, direct attack, indirect attack, retreating and riposte actions (interval dependent variables). ANCOVA is the preferred choice over Analysis of Variance (ANOVA) owing to the requirement for managing the effects derived from interval covariates (pre-test scores).

Result

Effect of Agility and Coordination Exercises on Forward Fencing Skill

ANCOVA was conducted to determine the effect of agility and coordination exercises on the advancing skills of students. Levene's test showed that the experimental and control groups are homogeneous ($F = .69, p > .05$). Table 2 shows a statistically significant difference in the mean of the post-test score in advancing skills between experimental and control groups ($F = 886.05, p < .05$). The large effect size ($\eta_p^2 = .64$) (Jacob, 1988) suggests that about 64% of the variance in post-test scores can be accounted for by the treatments in the experimental group. The advancing skill of the experimental group showed a mean of 9.20, while the adjusted mean score of post-test scores for the control group was 5.30. Table 2 illustrates that the mean score of post-test for the experimental group was higher than the adjusted mean of post-test score for the control group after treatment.

Table 2: Advancing skill tests of between subject's effect analyses

Source	<i>f</i>	<i>M</i> ²	<i>F</i>	<i>F</i>	η_p^2
Before	1	.78	2.89	.09	.04
Method	1	240.78	886.05	.00	.64
Error	57				
Total	60				

Effect of Agility and Coordination Exercises on the Dimension of Advancing Basic Skills

ANCOVA was employed to determine the effect of agility and coordination exercises on the dimension of advancing skills of students. Table 3 illustrates a statistically significant difference in the mean of the post-test score in circular attack skill ($F = 820.08, p < .05$), circular defence ($F = 233.44, p < .05$), compound attack ($F = 236.17, p < .05$), direct attack ($F = 233.48, p < .05$), indirect attack ($F = 230.94, p < .05$), defence skill ($F = 194.65, p < .05$), retreating ($F = 227.00, p < .05$), riposte ($F = 230.38, p < .05$) and fencing ($F = 41.94, p < .05$) between the experimental and control groups, with an effect size ranging from .29 to .91 (small to large). The mean score of post-test scores of the dimension of advancing skills for the experimental group was higher than that for the control group after treatment.

Table 3: Dimension of advancing basic skill test between subject's effect analysis

Dimension	Source	<i>df</i>	M^2	<i>F</i>	<i>P</i>	η_p^2
Circular attack	Before	1	.00	.03	.86	.00
	Method	1	228.19	820.08	.00	.48
	Error	57				
	Total	60				
Circular defence	Before	1	.01	.22	.63	.00
	Method	1	233.44	968.94	.00	.78
	Error	57				
	Total	60				
Compound attack	Before	1	.00	.05	.81	.00
	Method	1	236.17	985.21	.00	.89
	Error	57				
	Total	60				
Direct attack	Before	1	.00	.11	.73	.00
	Method	1	233.48	687.61	.00	.29
	Error	57				
	Total	60				
Indirect attack	Before	1	.00	.11	.74	.00
	Method	1	230.94	1267.97	.00	.91
	Error	57				
	Total	60				
Defence skill	Before	1	.05	.52	.47	.00
	Method	1	194.65	998.78	.00	.86
	Error	57				
	Total	60				
Retreating	Before	1	.03	.40	.52	.00
	Method	1	227.00	720.47	.00	.29
	Error	57				
	Total	60				
Riposte	Before	1	.01	.21	.64	.00
	Method	1	230.38	1123.50	.00	.88
	Error	57				
	Total	60				
Fencing	Before	1	.01	.14	.70	.00
	Method	1	41.94	517.44	.00	.90
	Error	57				
	Total	60				

Discussion

A statistically significant difference is observed in the mean score in advancing skill of the experimental group, which has a higher mean score than the control group. It can be posited that the performance of advancing skill improved in the experimental group more than in the control group after treatment. The intervention programme involved all the main big and small muscles of the human body and created an effect on the motor abilities in terms of general agility and coordination. This was the effect on the overall performance of the skills after eight weeks of 120 minutes of fencing lesson activities (Issa, 2016; Hasoon, 2015). The researcher also attributed this difference to the effectiveness of the exercise used in fencing lessons for the experimental group, which were directed to developing agility and coordination abilities and skills performance. Mohammed (2010) indicated that double reciprocal exercises to develop binary muscular coordination has a considerable size effect of 92% on advancing skill performance in the national women fencing team. The effect size was large because the sample comprised professional players, whilst in the current study, the effect size was moderate at 36% because the sample involved students and non-professional players. Another factor was the training time, which was 10–15 minutes for eight weeks along with a 120-minute session every week. By contrast, the professional players have considerably more time to train and master the skills. This intervention programme created stress in the big muscles of the human body and caused them to adjust the tissues in the body to perform the function, which detracted from their adaptability to new circumstances. The muscles are being forced to perform more than their usual amount of mechanical work, and this causes the muscles to adapt to the task and affect the students' or player's performance skills, as stated in the GAS theory by Selye (1984).

The agility and coordination exercises practiced for eight weeks by the University of Baghdad students increased the level and quality of their performance of the circular attack, circular defence, compound attack, direct attack, indirect attack, defence skill, retreating, riposte and fencing skills. These exercises involved a lot of physical movements and motor skills, such as arm exercises, leg exercises, leg and arm exercises, running drills, con zigzag running drills, change of direction drills, change of direction speed drills, change of direction speed, position drills and ladder drills. These agility and coordination exercises are the reason why the findings show significant differences between the experimental and control groups in the circular attack skill performance in favour of the experimental group; these exercises affected the students positively in terms of their level of skill performance, similar to the results in previous research by Ismail (2009), Ali (2015), Issa (2016), Hasoon (2015), Moneim and Jassem (2012), Abdulrazzaq (2011) and Mohammed (2010). These studies used different exercises but for the same reasons; specifically, enhancing and developing advancing skills performance by using coordination exercises only or with other exercises and determine their effects on the skills. In the present study, coordination and agility

exercises were utilised based on a questionnaire to determine what motor ability is more important to develop in fencing. The majority of experts selected agility and coordination, and the findings showed that coordination and agility exercises have a significant effect on basic fencing skills.

This study is important because it presents substantial evidence that agility and coordination exercises can significantly and positively affect the performance level of students in their Physical Education class. These results can help stakeholders draw specific implications and assist teachers and students in becoming more aware of the effects. The educators should practice the physical and motor exercises in their classrooms. They must apply the intervention programme (agility and coordination exercises) to motivate the students. In this manner, the teachers must help shape a good learning environment and be ready to offer help or feedback to the students. However, the educators must also realise that this type of student-centred teaching cannot be delivered in one-day workshops but instead requires a systematic, long-term development for enabling practice and for the lesson to be enjoyed. This study contributes towards the extension on studies related to all fencing skills and motor abilities and gives focus to nine skills and two motor abilities (agility and coordination). It contributes to the knowledge extension on the concept of using exercises to develop skills performance, which was found to be valid.

Conclusion

Lecturers from the Physical Education and Sport Science Colleges could plan an intervention programme that will give special emphasis on GAS theory. The intervention programme can give the appropriate stress on major muscles in the human body to cause physiological changes for adaptation after fencing lesson activities. The muscles will be forced to perform more than their usual amount of mechanical work, causing them to adapt to the task and enhance the students' overall performance. GAS theory considers the frequency, intensity, time and type of intervention programme being used to determine significant differences and help develop an ideal intervention programme. In this study, the researcher proved the ability of GAS theory to show that the effects of agility and coordination exercises improve the fencing skills performance of students of the Faculty of Physical Education in University of Baghdad.

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