

## EFFECT OF SELECTED FLEXIBILITY EXERCISES ON AGILITY – AN EXPERIMENTAL STUDY

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### Abstract

*In today's sports scenario agility is termed as the most important factor that contributes to successful performance in the field. The purpose of the present study was to examine whether there is any casual relationship with agility performance on the degree of functional flexibility. In order to conduct the experiment, 26 male physical education students of Govind national College Narangwal Ludhiana were selected randomly to serve as subjects All the twenty six students were tested before they were once again assigned to two different groups i.e experimental and controlled one. The subjects in the treatment group were trained with five stretching exercises (both ballistic and static types) which were specially designed for the purpose for improving flexibility at trunk and hip. All the subjects of both control and experimental groups were tested for agility before the treatment. 'Illinois agility test (Getchell, 1979)' was used to measure the agility as it was considered to be the most reliable and valid agility test compared to any other. 'Sit and reach' test was used to measure the flexibility of the hip and trunk. Each subject was given three trials to do his best. The best trail was used for the analysis Analysis of Co –Variance (ANCOVA) was used to test the hypothesis. The pre test scores were used as (Covariate) control variable.*

**Keywords:** flexibility exercise, Sit and reach' and Agility performance

### Introduction

Recent research has clearly shown that physical activity is one of the most important factors related to maintaining good health Programmed physical activity (exercise) and sport are forms of human movement often used to achieve these positive health benefits. Human movement is not possible without a certain amount of the fitness component commonly called agility. There are visible characteristics of an agile athlete. These kinds of athletes possess some or all of the following capabilities : capable of changing directions in fast pace, possesses good flexibility, can adopt quickly to various situations in games, can easily perform twisting motions, capable of performing

sudden stop, can perform side-stepping beyond the average of a normal person, can perform back peddling at ease, can do more than one task at the same time, can coordinate his speed, agility, and power, has the ability to carry out a skill while maintaining balance . These are the characteristics that a coach or a team manager wants to see from his athlete. Agility is the ability to change direction quickly and to control body movements, skill requiring rapid movement of the entire body in different directions and in response to unexpected circumstances. In some activities, the ability to stop and start and to change direction accurately and quickly is much more important than in some others (Hockey, 1973). Agility in a general sense is one's ability to quickly adjust to changing environmental conditions. As related to competitive sports and motor movements, agility is defined as "the physical ability, which enables an individual to rapidly change body positions and directions in a précised manner" (Johnson and Nelson, 1979). In the context of human motor movements two types of agility viz, specific and general agility are recognized. Specific agility is concerned with movements of body segments (limbs) as in playing on video game or in controlling the volleyball. On the contrary, general agility refers to movement of the body as a whole, as in dodging the opponent or marking an opponent in football man to man defence in basketball. As far as the present investigation is concerned it is related with the general agility. To attain the required level of agility for any sports activity one must have sufficient amount of physical fitness. Fitness is a mean to an end, where end is the overall development of an individual. Productivity is directly related to human efficiency and it totally depends on physical proficiency which is attained through adequate laws of physical fitness. Further physical fitness is also essential for everyone to live a healthy life, thereby, emphasizing the individual values attached to being physically fit.

### Method

The purpose of the study was to analyse whether flexibility training has any positive influence on the agility performance. The experimental design adopted, the testing procedure and the statistical analysis involved to realize the purpose of the study are explained in the following sections.

### Subject and Sampling

Study was conducted with the cooperation of twenty six male students of MPed of Govind National College

Narangwal Ludhiana Punjab which were randomly selected for the above said purpose. All the twenty six students were tested before they were once again assigned to two experimental conditions viz, experimental and control group.

The subjects in the treatment condition were trained with specific stretching exercises three times a week on alternate days for four weeks before they were tested finally (post – test) . Prior to each training session, the subjects adequately warmed up. The subjects were given treatment with the help of following exercises:-

**Testing Procedure**

All the subjects of control group as well as experimental group were tested before (pre- test) and after the treatment (post – test) for agility performance (dependent / criterion variable) as well as flexibility. The testing procedure which was adopted was as follows:-

For the purpose of measuring performance in agility of the subjects, Illinois agility test (Getchell, 1979) was used to measure agility. The subject was asked to lie on their front (head to the start line) and hands by their shoulders. On the 'Go' command the subject gets up as quickly as possible and runs around the course in the direction indicated, without knocking the cones over, to the finish line. Each subject was allowed three trials and the best timing from starting signal to the time when the subject's chest crosses the finish line was taken as the score of the subject. Time was recorded to the nearest tenth of a second. For the purpose of measuring performance in flexibility of the subjects "Modified sit and Reach test" was used. The equipment used for this test is flexo measure case with yardstick and tape.

**Statistical Treatment**

Analysis of co-variance (ANCOVA) was used to test the stated hypothesis. Since the primary purpose of this type of analysis to provide an adjustment of post test scores for the difference existing among subjects before the start of the experiment, the pre test scores on agility performance was used as the (Co-Variate) control variable to adjust for chance difference among treatment groups ( Keppel, 1973). Campbell and Stanley (1963) have also recommended ANCOVA as more precise and highly desirable in such pre-test post-test control design.

**Results**

The purpose of the study was to see, whether the improvement in flexibility resulting from flexibility training helps in improvement of agility performance. In order to test the stated hypothesis, the data

collected after the treatment conditions (Post-test scores) was subjected to "Analysis of Co-Variance" (ANCOVA) with the test scores collected prior to treatment condition (pre-test scores) as the co Variate or the control variable. The results of statistical analysis and descriptive statistics are presented in the following sections. Table I shows the descriptive statistics of pre and post test scores of dependent (agility) and independent (flexibility) variables of control and treatment groups. Also presented in the table are the gain scores from pre test to post test which were obtained by subtracting pre test scores out of post test scores. The gain scores thus indicate change in scores from pre to post test situation which is the effect of different treatment conditions. Positive gain score in the case of flexibility indicates improvement in flexibility. Since the units of measure for agility is time, the negative gain scores in the case of agility indicates increments in agility performance.

**Table I**

Shows the Mean and Standard Deviations Scores of Agility and Flexibility Pre-test & Post –test

Var.		Control group			Experimental group		
		Pre	Post	Gain	Pre	Post	Gain
Agility	X	14.35	14.46	0.10	14.5	14.3	-0.18
	Sd	0.49	0.46	0.47	0.68	0.58	0.28
Flex.	X	11.15	12.92	1.76	8.33	14.6	6.33
	Sd	6.162	6.137	2.31	5.02	5.22	2.69

A cursory examination of the table I indicates that the control group became slower at the post test situation compared to pre test, while the flexibility training group improved in agility. Same trend can be observed in the case of flexibility.

**Table II**

Summary of Analysis of Covariance of Agility Post test Scores with Pre Test Scores as Co Variate

Source	SS	MSS	'F'
Treatment	0.317	0.317	2.256*
Co – variate	2.651	2.651	
Error	2.667	0.140	

\* Significant at 0.05 level of significance

Evidently, the improvement of performance in agility by the flexibility training group compared to that of the control group was not large enough to be statistically significant. This insignificant result raised doubt whether the flexibility of the experimental group did in fact increase as result of flexibility training. Therefore the flexibility post test scores were also subjected to ANCOVA with its pre test scores as the covariate or

control variable. The results of the ANCOVA of flexibility post test scores are summarized as follows:-

**Table III**

Summary of Analysis of Covariance of Flexibility Post test Scores with Pre Test Scores as Co Variate

Source	SS	MSS	'F'
Treatment	96.121	96.12	15.259*
Co – variate	577.32	577.32	
Error	119.68	6.29	

\* Significant at 0.05 level of significance

The results of the flexibility data analysis indicated that the treatment group did in fact become more flexible compared to control group as a result of flexibility training. Therefore, it was decided to cross check the results of ANCOVA for agility by the analysis of gain score. The ANCOVA of agility gain scores are presented in the table as follows:-

**Table IV**

Summary of Analysis of Variance of Agility Gain Scores

Source	SS	MSS	'F'
Treatment	0.466	0.466	2.789*
Error	3.338	0.167	

\* Significant at 0.05 level of significance

The results of ANOVA of agility gain scores also supported the results of ANCOVA (Table II). Therefore the Null hypothesis has been accepted and the alternate hypothesis has been rejected. In other words, under the conditions of present investigation improvement in flexibility did not significantly influence the performance in agility of physical education students.

**Discussion**

The results of the experimental investigation did not establish any casual relationship between flexibility and performance in agility and the stated hypothesis has been rejected. However, the experimental group did improve in agility more than control group though the difference did not reach the desired level of significance. The analysis of flexibility scores resulted in significant F- ratio showing the experimental group had in fact improved its flexibility significantly. Therefore, it was surprising to observe a result that contradicted the predicted hypothesis. This has raised a suspicion regarding the significant correlation between agility and flexibility.

**Conclusion**

Based on the discussion, it was concluded that the experimental investigation has resulted in conclusive evidence that flexibility is not casually related to agility. In other words, the performance in agility is independent of one's level of flexibility. If any correlation is observed between flexibility and agility, it may have been only incidental.

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