Original Article

# FLEXIBILITY AND AGILITY AMONG CHILDREN AND ADOLESCENT ATHLETES: AN OBSERVATIONAL STUDY

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## ABSTRACT

**Introduction:** Flexibility and agility are two important parameters for selection of athletes for various competitions during preseason evaluation. Reduced flexibility makes the athletes prone for injury. Reduced agility affects the performance of the athletes. This study was pursued as there is paucity of literature understanding the relationship between flexibility and agility in children and adolescent athletes.
**Aims and Objective**: To study the relation between flexibility and agility in children and adolescent athlete.
**Materials and methods:** A correlational study was done on 50 athletes between the age group of 8-14 years who were recruited from RLS ground Belgaum, Karnataka. Hamstring, hip adductors and shoulder flexibility was assessed using inch tape and for agility, T- test was done using cones and stop watch.
**Result:** The results of the study demonstrated that there is no correlation between flexibility and agility.
**Discussion:** The result of the present study showed no correlation between flexibility and agility in the samples. An accurate comparison of this study to other studies is difficult due to lack of published literature related to the present study.
**KEYWORDS:** Flexibility, Agility, Correlation; T- test, Back scratch test.

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## INTRODUCTION

For high-level competition, it is necessary to have good fitness level. Flexibility and agility are two important parameters of fitness for athletes and for the selection of athletes for any competition. Flexibility is defined as the ability of the muscle to lengthened to the end of the ROM. It is influenced by muscles, tendons, ligaments, bones, and bony structures.[1] According to Giles R et al, aging leads to decrease in flexibility. Increase in flexibility is seen from birth to adolescence.[1,2] Adequate flexibility prevents soft tissue injuries.[3] According to Kieth, maximum flexibility of the spine is reached by the age of 8 or 9yrs.

Agility is commonly defined as an effective and quick coupling of braking, changing directions and accelerating while maintaining motor control in either a vertical or horizontal direction. An athlete who displays good agility will most likely possess other qualities such as, dynamic balance, spatial awareness, rhythm, as well as visual processing.[4] Developing agility in children is a process that continues over a long period of time. Basic methodology of agility training implies the learning of a basic walking technique, running technique, change of direction, jumps and landings (Wroble & Moxley, 2001).

Thus it is very essential to understand if any relation is present between flexibility and agility

to have more beneficial effect on athlete's performance. To our knowledge there is paucity in literature regarding the relation between flexibility and agility. Hence it was hypothesized in the present study that flexibility and agility would be positively correlated.

## METHODS

We used a randomized design and enrolled 50 participants (using thumb rule) in our study, using convenience sampling.

**Inclusion Criteria:** Participants playing any sport from the age group of 8-15yrs and athletes who were willing to participate in the study.

**Exclusion criteria**: Participants with any lower limb pathology, which will prevent them from performing hamstring and hip adductor stretch, pathology in and around shoulder which restricts shoulder movement, conditions during which running cannot be done and samples who did not wanted to participate.

### PROCEDURE:

After obtaining the approval for the study from institutional ethical committee, all the participants who were willing to participate in the study were asked to sign an informed consent.. 70 participants were screened, out of which 50 fulfilled the inclusion criteria and were enrolled in the study. Following tests were performed: T-test, hamstring stretch,back scratch test and hip adductor stretch.

### T-test

4 cones were used. 1 cone was placed perpendicular to the rest 3 cones at a distance of 10m and 3 cones were arranged in straight line at a distance of 5m. The subject were asked to start the run from the perpendicular cone to the centre cone, then towards right, come back to centre cone again, then run towards left cone, come back to centre and then to the perpendicular cone. The time was recorded from the start of the run till the end[5,11]

### HIP ADDUTOR STRETCH

Subjects were in sitting position with leg's in butterfly position, causing both the feet's to touch each other. Then the subject was asked to pull the feet together inside towards their body, as close as possible without getting any pain. Then the distance between the heel and the pelvic ring was measured using inch tape in centimeters.

### HAMSTRING STRETCH

Subjects were made to sit in long sitting with both the knees extended. They were asked to touch their toes without tilting the pelvis and over flexing the lumbar spine. If the subjects were able to touch, the measurement was taken as '0' and recorded as normal. If the subjects were not able to touch the toes, the lag distance was recorded and was given negative sign and was termed less than normal. Subjects able to cross their toes were termed as more than normal and the measurement was recorded. It was given positive sign[15].

### BACK SCRATCH TEST

Subjects were in standing position. They were asked to touch both their hands behind the back. The measurement was taken from the metacarpal head crease of the hands. If their middle finger was able to touch their metacarpal crease, they were given a value of '0' with normal. If they were not able to touch their crease then the lag distance was measured and negative sign was given. If the subjects crossed their metacarpal crease they were given positive sign and the value was recorded[15].

### STATISTICAL ANALYSIS:

The demographic data including age, sex, height and weight were analyzed using mean and standard deviation (Table 1). Analysis of the data was done using SPSS-12 Software. The variables in the data were analyzed using F test (shown in Table 2). The level of statistical significance was set at $p<.05$.

## TABLES

**Table 1:** Baseline Values**.**

F 2, 47 = 0.103 p = 0.903

Tables Showing the Demographic data that was analyzed using mean and standard deviation.

**Table 2:** Agility and Flexibility Correlation.

| Hamstring flexibility (cms) | Range | Mean |
|---|---|---|
| Normal ( 20) | 11.88 – 17.45 | 14.7± 1.66 |
| More than normal ( 6) | 12.9 – 17.4 | 15.1± 1.85 |
| Less than normal ( 24) | 11.87 – 18.75 | 14.9± 1.96 |

| Shoulder flexibility ( cms) | Range | Mean |
|---|---|---|
| Normal ( 22) | 11.87 – 18.75 | 14.87± 1.97 |
| More than normal ( 27) | 11.88 - 18.3 | 15.1± 1,81 |
| Less than normal | 12.95 - 15.3 | 14.3± 0.98 |

F2, 47 = 0.506 p = 0.606

| Hip adductor flexibility (cms) | Range | Mean |
|---|---|---|
| Normal ( 4) | 12.09 – 17.45 | 16.1± 2.17 |
| More than normal ( 4) | 13.29 – 17 | 14.6± 1.63 |
| Less than normal (42) | 11.87 – 18.75 | 14.8± 1.78 |

F2, 47 = 1.05 p = 0.357

**Table 3:** Age and Agility Correlation.

| Age (yrs) | Mean | Range |
|---|---|---|
| 8 (8) | 15.3± 1.26 | 13.25 – 17.4 |
| 9 (5) | 14.8± 1.88 | 12.72± 16.80 |
| 10 (9) | 15± 1.60 | 12.9 – 17.45 |
| 11 (6) | 15.1± 1.87 | 12.9 – 17.75 |
| 12 (9) | 15.7± 1.74 | 13.07 – 18.33 |
| 13-14 (1) | 13.8± 1.97 | 11.87 – 18.75 |

F5, 44 = 1.558 p = 0.183

Table showing values of hamstring, hip adductor and shoulder stretch.

Coefficient correlation between age and agility score

r = -0.209 p = 0.145

## RESULTS

The results of the present study showed no significant differences in relation to the demographic data. ICCs for all the selected tests was calculated at - 0.209. There were no statistically significant correlation found between flexibility and agility.

## DISCUSSION

The result of the present study showed no correlation between flexibility and agility amoung the samples. An accurate comparison of this study to other studies is difficult due to lack of published literature related to the present study. However the result of present study is consistent with the study done by Faigenbaum et al[11], in which they examined the acute effects of static stretching on agility. No significant difference was noted in the agility performance after the static stretching. Wallman et al studied effect of quadriceps stretching on agility in female soccer players. His study also showed no effect of stretching on agility. He used static stretching and contract relaxes stretching in his study. No difference was found among the treatment groups on agility performance. David G. Behm[10] studied effect of static stretching and dynamic stretching on performance of athletes. He found that, dynamic stretching has no effect on subsequent performance. Static stretching used in a separate training session can provide health related range of motion benefits. The results of present study showed no correlation between flexibility and agility, it may be because, flexibility is an unidirectional activity while agility is a multidirectional performance. Flexibility method used in this study was static, while agility is dynamic activity. One limitation of the study is that athletes of various sports were included and not any specific sports, as different sports demands different flexibility level in the athletes. This study includes athletes from,football, hockey, basketball, martial arts and skating. Second limitation was small sample size of 50 players.

Little research exists that investigates the acute effects of stretching on agility performance. Agility is a major component of many popular sports. Studies can be done using large sample and comparing with a control group to design specific exercise protocols and enhance performance during sports.

## CONCLUSION

The present study suggests that there is no correlation between flexibility and agility in children and adolescent athletes. Furthermore studies are needed to understand the complexity of this topic.

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