

“A COMPARATIVE STUDY OF DEVELOPMENT OF FLEXIBILITY IN NORMAL AND DEAF AND DUMB GIRLS BETWEEN 8 TO 14 YEARS”

**Dr. Aditya Joshi, Sports Teacher, Stepping Stone High School, Aurangabad, Maharashtra, India¹*

**Dr. Shatrunjay M. Kote, Asst. Prof., M. S. M's. College of Physical Education, Aurangabad, India²*

ABSTRACT

A comparative study of development of flexibility in normal and deaf and dumb girls between 8 to 14 years is administered on around 350 students of different schools who were taking formal education. Out of 350 students 175 were selected from normal category and 175 from physically challenged i.e., deaf and dumb category. In each 25 boys were selected (25 subjects in normal boys and in each age group i.e., 8, 9, 10, 11, 12, 13 & 14 years totaling to 175; 25 subjects in deaf and dumb in each age group i.e., 8, 9, 10, 11, 12, 13 & 14 years totaling to 175). These subjects were tested initially in Shoulder Flexibility, Trunk Flexibility and Hip Flexibility and the same subjects were exposed to the same tests after exactly one year without any formal sports training and the development in their flexibility was noted. After the statistical treatment of data by utilizing 't' test the following findings were noted: Flexibility in shoulder joint is found positively in deaf dumb girls, but it is found negative in normal girls. The trunk flexibility is found unevenly reducing at all age groups and in all variables as the age is advancing from 8th to 14th year. The development of hip joint flexibility is found maximum at 8th year and in 14th year in deaf dumb girls.

INTRODUCTION:

Motor development objectives are concerned with making physical movements, useful with as little expenditure of energy as possible. The term motor is derived from the relationship of a nerve or nerve fiber to the one that connects the Central Nervous System with muscles through their convections the movements' results. Effective motor movement can only results if there is harmonious working of the muscular and the nervous system. It helps in keeping a greater distance between fatigue and peak performance. The activities that involve hanging, jumping, dodging, leaping, kicking, bending, throwing will enable a person to perform his daily work much effectively without reaching a point of wearing out, so quickly.

A comprehensive list of components of motor ability for performance of various physical activities (including sports) include muscular strength, muscular endurance, muscular power, cardiovascular endurance (alternatively also known as cardiopulmonary endurance), agility, speed, balance, **flexibility**, reaction time, coordination (eye-foot coordination, eye-hand coordination, whole-body coordination). In addition, traits like simple motor response, reflexes, sensory input and awareness of space and tempo (characteristic speed and rhythm of movement) are also considered important in motor performance- ability especially during the early years of body development.

Stretchability and elasticity are the special qualities of the muscles and ligaments by which these can be stretched and can regain their normal length without any adverse effect on the concerned tissue. Suppleness denotes the ability of the muscle to remain in a state of low tension thereby allowing for smooth and easy movements of the limbs. Mobility pertains to the degree of movement possible in different planes at a joint. Stretchability, elasticity, mobility and suppleness, therefore, are a part and parcel of the flexibility as these represent different capacities which enable the person to execute movements with greater amplitude.

The need today is to search for some extraordinary talent in an individual for the laurels in international sports arena. In this case it becomes obvious that the search should not limit only to the normal. The qualities that an individual possesses should be innate and may be nurtured with good scientific platform, deaf dumb being no exception to it. Hence, the search to prove the innate qualities of the deaf and dumb and bring them to equal stature with normal is the prime objective of the researcher.

NEED OF THE STUDY:

The population of the normal mass is comparatively more than the deaf dumb resulting the opportunities designed are more for normal mass. But at the same time there is a society always struggling to uplift the physically challenged and trying to give them the best and equal opportunities so that the handicapped ability should not be the hurdle in normal and natural unfolding of an individual.

Considering the inability, which has the opportunity to be converted into compensatory ability for excelling in the sports arena the researcher, felt high need to evaluate the development of flexibility among the deaf dumb and compare with the normal, which is a performance prerequisite.

OBJECTIVES OF THE STUDY:

1. To find out, access and analyze the developments taking in flexibilities among normal girls and that of deaf dumb at particular age group.
2. To understand if any higher or compensatory ability among deaf dumb children is noticed when compared to the normal children.
3. To understand various parameters of flexibility in certain age group of certain physical abnormality.
4. To understand scientific base for methods of training physically challenged children.
5. To understand how the society would help its weak counterpart.

SIGNIFICANCE OF THE STUDY:

1. The study may reveal the physical and mental problems of deaf dumb children.

2. The study may also profound a training methodology and loading procedure in flexibility for physically challenged children in specific age group.
3. Results may also be helped to enhance sports terminology communication skills with physically challenged children.
4. Evaluation of development of flexibility may fetch platform for establishing training methodology for enhancing performance in specific sports.
5. The comparison of development of flexibility will give clear picture of the positive and negative aspects of flexibility, which in turn ensure the proper training.

DEFINITION OF THE TERMS:

DEVELOPMENT:

Development is a process of qualitative transformation, which brings about progressive changes towards maturity and functional improvement in the organism of human being.

GROWTH:

Growth is a process anatomical in nature involves structural changes and quantitative to measure.

FLEXIBILITY:

It is the ability to execute motor actions with greater amplitude or maximum range at a joint.

NORMAL CHILD:

Normal: typical; usual; healthy; according to the rule or standard. If a child is found to be disease free, exhibits proper growth and development according to the age in its physical, mental and social health and status, then he/she may be defined as a normal child.

DEAF AND DUMB:

Deaf: is unable to hear; hearing indistinctly; hard of hearing.

Dumb: is mute; speechless; unable to speak.

8 TO 14 YEARS (CHRONOLOGICAL AGE):

Chronological age is the number of years and days elapsed since birth.

REVIEW OF RELATED LITERATURE:

* From 1920 to 1930, one of the conclusions Piaget drew from watching his children grow was the conviction that thought sprang from actions, and not from other sources such as language.

* Newell C. Kephart was a clinical psychologist who, in several books, a series of 19 one-hour films, and several articles, has outlined a theory proposing that motor learning is the basis of all learning.

* Studies summarized by Bloom have pointed out the difficulty of predicting later intelligence by evaluating the perceptual-motor attributes of young children.

* Bayley, who in 1968 published a longitudinal study of 54 individuals from birth to 36 years of age, has found that an infant's abilities can be factored into six separate attributes by the age of 5 months; visual following, social responsiveness, perceptual interest, manual dexterities vocalizations, and object relations.

* Rutherford found that although the boys had motorically gained significantly, the girls had not. Kephart's rather carefully designed methods of motor training of neurologically impaired youngsters should prove of value when attempting to improve motor functions.

* Delacto's theory is based on a view of neural function which suggests that specific "layers" of the brain mediate discrete motor functions.

* Minerva selected one from each group (identical twins and fraternal twins) and gave them a six month period of motor training involving a variety of tasks. Minerva concluded that the more complex tasks are modifiable through training, but the more basic locomotors functions are not.

* In a 1972 study, based upon the observations of over 700 children over a seventeen year period, Emma Pikler adds further data to the controversy concerning whether or not various kinds of early environmental conditions will elicit marked changes in motor development.

* Werner recent data indicated that with consistent and sophisticated teaching, some kinds of motor competencies may be accelerated during early childhood.

* A study by Walters, present evidence that the child who engages in prolonged and vigorous pre-birth movements can be counted upon to be advanced motorically during the first few years of life.

* Hartman found that the hurdle jump scores when compared to other standard measures of motor ability then in use, such as the vertical jump, the standing broad jump, the baseball distance throw and the 35 yard dash, yielded 'rs' ranging from 0.4 to 0.56. Other investigators correlated the scores lead to more extensive investigations with an even wider variety of tests similar to those carried out with adult males.

* In 1940 Aileen Carpenter, using the Johnson test together with other measures, evaluated the abilities of 530 children and found that three separate factors emerged.

* In 1941 Carpenter investigated various measures of speed in children and found that again three separate factors were isolated. Running speed tests were related but were independent of tests in which strength was evaluated.

METHODOLOGY:

SAMPLE:

The samples of this study is randomly selected from different schools with their date of birth lying between 1999 to 1993 in normal subjects (girls) and deaf dumb subjects (girls). The selected age groups of the subjects were from 8 to 14 years. In each group 30 subjects were selected initially with a margin of ± 5 . All the selected subjects were non-sportsman staying either in school hostels or at their residence to ensure the untrained development in motor abilities. In all 350 subjects were tested initially and the same 350 subjects were tested finally after one academic year (12 months). The tests were conducted for two days for four hours on each group of 25 subjects approximately. In all 350 subjects were considered for obtaining the difference between development is evaluated by subtracting the initial test from the final test score. Every subject was allotted with a code and a separate self contained form for test results. The tests were selected in the aspects of growth and development. The tests are administered individually under standard conditions applicable for specific tests and the time period required between two tests is amply considered.

VARIABLES:

Dependent Variables: (1) Normal girls. (2) Deaf Dumb girls.

Independent Variables: Development of flexibility: (1) Shoulder Flexibility (2) Trunk Flexibility (3) Hip Joint Flexibility

Inter-weaning Variable: Age groups (8, 9, 10, 11, 12, 13 & 14)

TOOLS AND MEANS:

The research scholar has used some of the selected flexibility tests which are applicable to the selected age group and samples and are universally accepted and established standard tests for assessing development of motor abilities.

Flexibility tests:

1. **Shoulder flexibility:** Shoulder flexibility can be defined as the ability to execute movements with greater amplitude or range at shoulder joint (Inches).

2. **Trunk flexibility:** Trunk flexibility can be defined as the ability to execute movements with greater amplitude or range at trunk joint (Centimeters).
3. **Hip joint flexibility:** Hip joint flexibility can be defined as the ability to execute movements with greater amplitude or range at hip joint (Inches).

PROCEDURE:

The subjects were selected from different schools in normal category (girls) and deaf dumb schools (girls). In all 03 testes were selected for evaluating the development of flexibility of the subjects between 8 to 14 years. The tests were administered with all specified and standard conditions starting with warming up exercises, optimum active rest periods in between and cooling down at the end. The conditions of the subjects were observed normal and motivated to take part in the tests. An introductory talk regarding the initial day's workout is assessed for confirmation of tirelessness and recovered state.

STATISTICAL METHODS:

To analyze the collected data the scores are arranged according to the comparison and in sequential order so as to find out the statistical values. The following statistical variables are selected for comparing, analyzing and interpretation of numerical values and basing on which the findings are discussed.

(1) Mean is computed by adding all the scores and then dividing by the number of scores involved. The mean is used in the study to measure the average development.

(2) For testing the hypothesis for the difference between various sample means the t test is used at significance of .05 levels.

RESULTS AND DISCUSSIONS: Flexibility in shoulder joint is found positively in deaf dumb girls, but it is found negative in normal girls. The trunk flexibility is found unevenly reducing at all age groups and in all variables as the age is advancing from 8th to 14th year. The development of hip joint flexibility is found maximum at 8th year and in 14th year in deaf dumb girls.

RESULTS OF THE COMPARISON OF THE DEVELOPMENT OF SHOULDER FLEXIBILITY OF GIRLS (NORMAL AND DEAF-DUMB) BETWEEN 8 YEARS TO 14 YEARS (SHOULDER ROTATION TEST)

Normal girls:

1. The maximum mean of development of shoulder flexibility in normal girls was found at the age of 13th year, which is -2.2 and the minimum at 8th year, which is 0.56. The

average mean of development of shoulder flexibility in normal girls between 8 to 14 years is found to be -1.02.

2. The standard deviation of development of shoulder flexibility in normal girls is found maximum at the age of 14th year, which is 1.39 and minimum at the age of 9th year, which is 0.83. The average standard deviation of development of shoulder flexibility in normal girls between 8 to 14 years is found to be 1.19.
3. The correlation of development of shoulder flexibility in normal girls between 8 to 14 years of age groups is found as high as 0.93.

Deaf-dumb girls:

1. The maximum mean of development of shoulder flexibility in deaf-dumb girls was found at the age of 12th year, which is 1.44 and the minimum at 10th years, which is 0.48. The average mean of development of shoulder flexibility in deaf-dumb girls between 8 to 14 years is found to be 0.788.
2. The standard deviation of development of shoulder flexibility in deaf-dumb girls is found maximum at the age of 8th year, which is 1.35 and minimum at the age of 11th year, which is 0.99. The average standard deviation of development of shoulder flexibility in deaf-dumb girls between 8 to 14 years is found to be 1.16.
3. The correlation of development of shoulder flexibility in deaf-dumb girls between 8 to 14 years of age groups is found as high as 0.88.

COMPARISON OF GIRLS (Normal and deaf-dumb):

The average mean of development of shoulder flexibility of normal girls between 8 to 14 years is -1.02, which is more than 0.788 of the deaf-dumb girls between 8 to 14 years. The difference of mean of development of shoulder flexibility between normal girls and that in the deaf-dumb girls is -0.23, which is insignificant. The maximum mean of development of shoulder flexibility in normal girls is found at the age of 13th year, which is -2.2 and that in the deaf-dumb girls it is at the age of 12th year, which is 1.44.

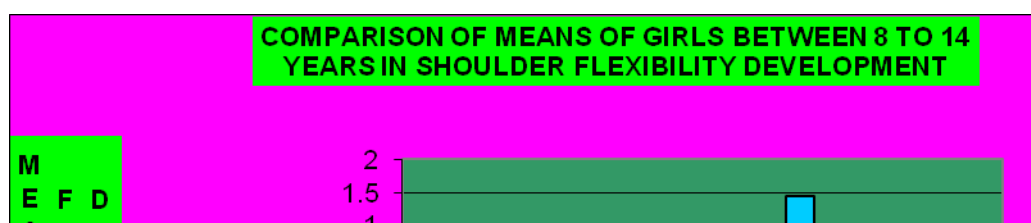
Table No. IV.1: evaluation of significance of development of shoulder flexibility in normal and deaf-dumb (girls) by using t-test and F-test.

GIRLS (NORMAL & DEAF-DUMB)	t-Test Results		

		F-Test Results	COMMENTS
08 NG & DDG	0.456	0.610	Insignificant
09 NG & DDG	0.38	0.458	Insignificant
10 NG & DDG	0.0008	0.123	Insignificant
11 NG & DDG	0.26	0.172	insignificant
12 NG & DDG	0.11	0.551	Insignificant
13 NG & DDG	0.73	0.913	Insignificant
14 NG & DDG	0.22	0.121	insignificant

* Significant at 0.05 level.

MEAN VALUES AND COMPARISON OF THE CATEGORY OF SUBJECTS: GIRLS (N & DD)	SHOULDER FLEX. INITIAL	SHOULDER FLEX. FINAL	SHOULDER FLEX. DEVELOPMENT
NORMAL GIRLS 08 YEARS	6.24	6.8	0.56
DEAF & DUMB GIRLS 08 YEARS	5.2	5.8	0.6
NORMAL GIRLS 09 YEARS	5.72	5.1	-0.62
DEAF & DUMB GIRLS 09 YEARS	4.12	4.76	0.64
NORMAL GIRLS 10 YEARS	6.04	5.48	-0.56
DEAF & DUMB GIRLS 10 YEARS	4.16	4.64	0.48
NORMAL GIRLS 11 YEARS	3.8	3	-0.8
DEAF & DUMB GIRLS 11 YEARS	2.96	3.88	0.92
NORMAL GIRLS 12 YEARS	4.72	3.2	-1.52
DEAF & DUMB GIRLS 12 YEARS	3.92	5.36	1.44
NORMAL GIRLS 13 YEARS	8.64	6.44	-2.2
DEAF & DUMB GIRLS 13 YEARS	3.96	4.52	0.56
NORMAL GIRLS 14 YEARS	9.72	7.68	-2.04
DEAF & DUMB GIRLS 14 YEARS	4.6	5.48	0.88



**RESULTS OF THE COMPARISON OF THE DEVELOPMENT OF TRUNK FLEXIBILITY OF
GIRLS (NORMAL AND DEAF-DUMB) BETWEEN 8 YEARS TO 14 YEARS (FORWARD BEND AND
REACH)**

Normal girls:

1. The maximum mean of development of trunk flexibility in normal girls was found at the age of 14th year, which is -1.12 and the minimum at 10th year, which is -0.18. The average mean of development of trunk flexibility in normal girls between 8 to 14 years is found to be -0.56.
2. The standard deviation of development of trunk flexibility in normal girls is found maximum at the age of 9th year, which is 1.5 and minimum at the age of 11th year, which is 0.76. The average standard deviation of development of trunk flexibility in normal girls between 8 to 14 years is found to be 1.09.
3. The correlation of development of trunk flexibility in normal girls between 8 to 14 years of age groups is found as high as 0.91.

Deaf-dumb girls:

1. The maximum mean of development of trunk flexibility in deaf-dumb girls was found at the age of 8th year, which is -1.12 and the minimum at 10th years, which is -0.08. The average mean of development of trunk flexibility in deaf-dumb girls between 8 to 14 years is found to be -0.13.

2. The standard deviation of development of trunk flexibility in deaf-dumb girls is found maximum at the age of 14th year, which is 1.63 and minimum at the age of 8th year, which is 0.83. The average standard deviation of development of trunk flexibility in deaf-dumb girls between 8 to 14 years is found to be 1.2.
3. The correlation of development of trunk flexibility in deaf-dumb girls between 8 to 14 years of age groups is found as high as 0.91.

COMPARISON OF GIRLS (Normal and deaf-dumb):

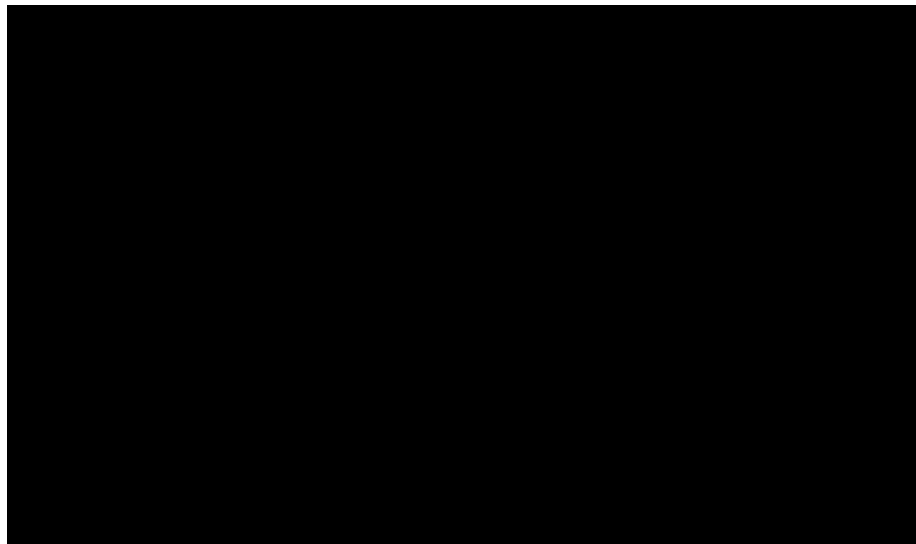
The average mean of development of trunk flexibility of normal girls between 8 to 14 years is -0.56, which is more than -0.13 of the deaf-dumb girls between 8 to 14 years. The difference of mean of development of trunk flexibility between normal girls and that in the deaf-dumb girls is -0.39, which is insignificant. The maximum mean of development of trunk flexibility in normal girls is found at the age of 14th year, which is -1.12 and that in the deaf-dumb girls it is at the age of 8th year, which is -1.12.

Table No. IV.2: evaluation of significance of development of trunk flexibility in normal and deaf-dumb (girls) by using t-test and F-test.

GIRLS (NORMAL & DEAF-DUMB)	t-Test Results	F-Test Results	COMMENTS
08 NG & DDG	0.02	0.895	Insignificant
09 NG & DDG	0.136	0.052	Insignificant
10 NG & DDG	0.35	0.765	Insignificant
11 NG & DDG	0.040	0.005	insignificant
12 NG & DDG	0.128	0.575	Insignificant
13 NG & DDG	0.108	0.994	Insignificant
14 NG & DDG	0.011	0.036	insignificant

* Significant at 0.05 level.

MEAN VALUES AND COMPARISON OF THE CATEGORY OF SUBJECTS: GIRLS (N & DD)	SIT BEND & REACH INITIAL	SIT BEND & REACH FINAL	SIT BEND & REACH DEVELOPMENT
NORMAL GIRLS 08 YEARS	3.04	2.4	-0.64
DEAF & DUMB GIRLS 08 YEARS	3.2	2.08	-1.12
NORMAL GIRLS 09 YEARS	1.68	1.48	-0.2
DEAF & DUMB GIRLS 09 YEARS	2.96	2.36	-0.6
NORMAL GIRLS 10 YEARS	1.04	0.86	-0.18
DEAF & DUMB GIRLS 10 YEARS	2.48	2.4	-0.08
NORMAL GIRLS 11 YEARS	1.08	0.68	-0.4
DEAF & DUMB GIRLS 11 YEARS	3.44	3.6	0.16
NORMAL GIRLS 12 YEARS	2	1.48	-0.52
DEAF & DUMB GIRLS 12 YEARS	4.6	4.48	-0.12
NORMAL GIRLS 13 YEARS	1.76	0.84	-0.92
DEAF & DUMB GIRLS 13 YEARS	4.32	3.92	-0.4
NORMAL GIRLS 14 YEARS	3.92	2.8	-1.12
DEAF & DUMB GIRLS 14 YEARS	6.44	6.24	-0.2



RESULTS OF THE COMPARISON OF THE DEVELOPMENT OF HIP JOINT FLEXIBILITY OF GIRLS (NORMAL AND DEAF-DUMB) BETWEEN 8 YEARS TO 14 YEARS (SIDE SPLIT TEST)

Normal girls:

1. The maximum mean of development of hip joint flexibility in normal girls was found at the age of 14th year, which is 1.12 and the minimum at 10th year, which is 0.60. The average mean of development of hip joint flexibility in normal girls between 8 to 14 years is found to be 0.86.
2. The standard deviation of development of hip joint flexibility in normal girls is found maximum at the age of 14th year, which is 1.58 and minimum at the age of 8th year, which is 0.81. The average standard deviation of development of hip joint flexibility in normal girls between 8 to 14 years is found to be 1.13.
3. The correlation of development of hip joint flexibility in normal girls between 8 to 14 years of age groups is found as high as 0.91.

Deaf-dumb girls:

1. The maximum mean of development of hip joint flexibility in deaf-dumb girls was found at the age of 12th year, which is 1.12 and the minimum at 8th years, which is 0.16. The average mean of development of hip joint flexibility in deaf-dumb girls between 8 to 14 years is found to be 0.65.
2. The standard deviation of development of hip joint flexibility in deaf-dumb girls is found maximum at the age of 8th year, which is 2.01 and minimum at the age of 10th year, which is 0.71. The average standard deviation of development of hip joint flexibility in deaf-dumb girls between 8 to 14 years is found to be 1.11.
3. The correlation of development of hip joint flexibility in deaf-dumb girls between 8 to 14 years of age groups is found as high as 0.81.

COMPARISON OF GIRLS (Normal and deaf-dumb):

The average mean of development of hip joint flexibility of normal girls between 8 to 14 years is 0.86, which is more than 0.65 of the deaf-dumb girls between 8 to 14 years. The difference of mean of development of hip joint flexibility between normal girls and that in the deaf-dumb girls is 0.21, which is insignificant. The maximum mean of development of

hip joint flexibility in normal girls is found at the age of 14th year, which is 1.12 and that in the deaf-dumb girls it is at the age of 12th year, which is 1.12.

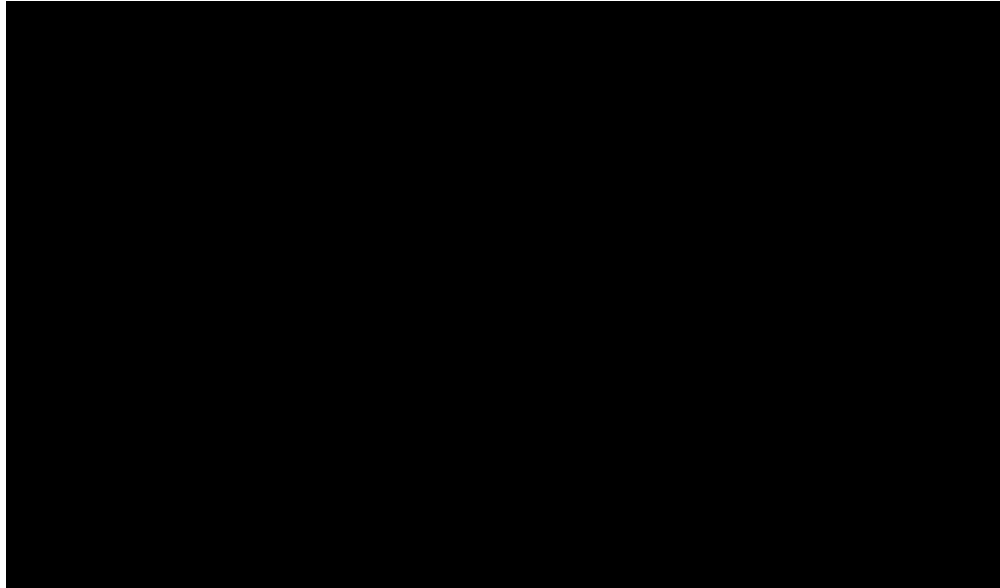
Table No. IV.3: evaluation of significance of development of hip joint flexibility in normal and deaf-dumb (girls) by using t-test and F-test.

GIRLS (NORMAL & DEAF-DUMB)	t-Test Results	F-Test Results	COMMENTS
08 NG & DDG	0.019	3.3E-05	Insignificant
09 NG & DDG	0.058	0.884	Insignificant
10 NG & DDG	0.239	0.343	Insignificant
11 NG & DDG	0.095	0.292	insignificant
12 NG & DDG	0.160	0.312	Insignificant
13 NG & DDG	0.134	0.057	Insignificant
14 NG & DDG	0.138	0.195	insignificant

* Significant at 0.05 level.

MEAN VALUES AND COMPARISON OF THE CATEGORY OF SUBJECTS: GIRLS (N & DD)	SIDE SPLIT INITIAL	SIDE SPLIT FINAL	SIDE SPLIT DEVELOPMENT
NORMAL GIRLS 08 YEARS	11.28	12.36	1.08
DEAF & DUMB GIRLS 08 YEARS	11.36	11.52	0.16
NORMAL GIRLS 09 YEARS	11.52	11.92	0.4
DEAF & DUMB GIRLS 09 YEARS	11.28	12.12	0.84
NORMAL GIRLS 10 YEARS	15.6	16.2	0.6
DEAF & DUMB GIRLS 10 YEARS	10.92	11.36	0.44
NORMAL GIRLS 11 YEARS	16.08	17.12	1.04
DEAF & DUMB GIRLS 11 YEARS	9.96	10.64	0.68
NORMAL GIRLS 12 YEARS	14.32	15.08	0.76
DEAF & DUMB GIRLS 12 YEARS	12.24	13.36	1.12
NORMAL GIRLS 13 YEARS	14.64	15.68	1.04
DEAF & DUMB GIRLS 13 YEARS	12.08	12.76	0.68

NORMAL GIRLS 14 YEARS	17.64	18.76	1.12
DEAF & DUMB GIRLS 14 YEARS	11.28	11.96	0.68



REFERENCES:

1. MALINA, R.M., "Growth and Maturation of Young Athletes: Biological and Social Considerations". Dans: F.L. Small, R.J., Magill, et. M. J. Ash (eds.), Children in Sport, 3rd ed., (1988), 83-101.
2. HAYWOOD, K.M., "Life Span Motor Development", (2nd ed.), Champaign, IL: Human Kinetics, (1993).
3. MARK HARRIES, CLYDE WILLIAMS, WILLIAMS D. STANISH, AND LYLE J. MICHELI, "Oxford Textbook of Sports Medicine," Oxford University Press, (1995), 2.
4. SKINNER, M. W., "Hearing Aid Evaluation," New York: Prentice Hall, (1988).
5. DAVIS, J. M. AND HARDICK, E. J., "Rehabilitative Audiology for Children and Adults," New York: Macmillan Publishing Company (1986).
6. CALVERT, S. R. and SILVERMAN, S. R., "Speech and Deafness: A Text for Learning and Teaching," Washington DC: Alexander Graham Bell Association, (1975).
7. ROSS, M., BRACKETT, D. and MAXON, A. B., "Assessment and Management of Mainstreamed Hearing-Impaired Children: Principles and Practices," Texas: Shoal Creek Boulevard, (1991).