International Journal of Advanced Education and Research
ISSN: 2455-5746; Impact Factor: RJIF 5.34
Received: 03-08-2020; Accepted: 18-08-2020; Published: 04-09-2020
www.alleducationjournal.com
Volume 5; Issue 5; 2020; Page No. 11-13

Creation of percentile norms on hand reaction time of secondary girls' students

Suman Chandra Roy
Physical Instructor, Department of Physical Education, University of Kalyani, West Bengal, India

Abstract
Mastery over these skills totally builds upon some basic factors, such as reaction time, agility, speed, power, co-ordination etc. These components are playing an important role during sports activities. Norms are representative of any larger population. Norms must be based on a particular type of group that is well identified. Reaction time is specifying to the speed at which an athlete responds to an extraneous stimulus. In games and sports normally we measured simple reaction time. There were so many tests for measuring reaction time. The researcher here took Nelson's Reaction Time Ruler test to measure hand reaction time of the school girls' students. At present Covid-19 pandemic situation students can measure their reaction time level at home with minimum requirement of equipments. The researcher has tended himself to do this work for the following reason- 1. To construct norms on reaction time test of girls students, 2. To measure hand reaction time of school students. Total 800 samples ages between 9-13 years were collected from various schools and locality in West Bengal. After collection of data age wise a percentile norms were prepared for girls' students.

Keywords: norms, reaction time, percentile scale

1. Introduction
Fitness is a status through which we can earn sufficient energy to fend off fatigue and enjoy healthy life. Physical fitness has health (four) and skill-related (six) components. Skill related fitness involves specific skills that will enhance performance of the athlete or sports persons. Reaction time is the last one among six skill related components. A sports skill is a unit and when compounded with other units into a group, along with certain rules, as sports or athlete game results. These units are depends on some fundamental skills such as running, jumping or throwing etc. Mastery over these skills totally builds upon some basic factors, such as reaction time, agility, speed, power, co-ordination etc. These components are playing an important role during sports activities. Norms are representative of any larger population. Norms must be based on a particular type of group that is well identified. Reaction time ("RT") is the time that elapses between a person being presented with a stimulus and the person initiating a motor response to the stimulus (Wikipedia). It specify to the speed at which an athlete responds to an extraneous stimulus. In games and sports normally we measured simple reaction time. In statistics, percentile is used to indicate the value below which a given percentage of observations in a group of observations fall. In norm-reference tests, Percentile and percentile rank are often used in the reporting of scores. There were so many tests for measuring reaction time. The tests were: Tap Reaction time, SVT reaction test, Reaction time ruler test, Reaction stick timer, light board reaction timer, Reaction timer gadgets, Groningen Reaction time test, Batak Reaction Board test, Nelson hand Reaction Time test, Nelson foot reaction time test, Electronic Auditory reaction time test, Electronic hand reaction time test, Electronic Visual and Auditory foot reaction test etc. The researcher took Nelson's Reaction Time Ruler test to measure hand reaction time of the school girls' students. The researcher has made an attempt to construct a norms for school girls' students on hand reaction time. Students are unable to appear in school due to present Covid-19 pandemic situation. Students can measure their reaction time level at home any time with minimum application of equipments.

2. Objectives of the study
Objectives of the present study were
1. To construct norms on Reaction Time through Ruler Drop test of West Bengal school girls students,
2. To measure hand reaction time of girls students.

3. Method and Materials
3.1 Variable of the work: From skill related fitness, Reaction Time (hand) component was considered as variable for the present study.
3.2 Sample size: Total 800 girls' samples were collected from various schools and locality in West Bengal ages between 10-13 years. Selection of various schools from West Bengal purposive sampling method was followed.
3.3 Age group: 10 years (9.6 to10.6 years), 11 years (10.6 to 11.6 years), 12 years (11.6 to 12.6 years), 13 years (12.6 to 13.6 years).
3.4 Tools used: Nelson's Ruler drop test was used to measure hand reaction time of school students.
3.5 Test Administration procedure: There were so many tests for measuring reaction time. The tests were: Tap Reaction time, SVT reaction test, Reaction time ruler test, Reaction stick timer, light board reaction timer, Reaction timer gadgets, Groningen Reaction time test, Batak Reaction Board test, Nelson hand Reaction Time test, Nelson foot reaction time test, Electronic Auditory reaction time test, Electronic hand reaction time test, Electronic Visual and Auditory foot reaction test etc.
Among the above mentioned tests, the researcher has selected Reaction time ruler test for measuring hand reaction time. Because this test was very easy to administer for the children and minimum equipments requires. This test

item was also an established and valid test.

3.5.1 Equipments: 1 meter long ruler, calculator, chair, table or bench.

3.5.2 Procedure: The subjects were asked to stands or sits near the edge of the table resting their elbow on the table so that their wrist extends over the side. The subjects will hold the ruler vertically in the air between the thumb and index finger without touching each other. Keep scale's zero mark with the subjects' finger. Then the subject should indicate when they are ready without warning, release the ruler and let it drop – the subject must catch it quickly as soon as possible as they see it fall. Twenty trails were given. Each drop was anticipated by a preparatory command of 'ready".

3.5.3. Scoring: The score was read just above the upper edge of the thumb. The five slowest and the five fastest trails were rejected from twenty trials, and the average of middle ten trials was recorded as the final score. Score must be written to the nearest 5/1000 of a second. Thereafter, calculated distance would be convinced into time with the help of following formula:

"$t = \sqrt{2d/g}$"

[d = the distance the ruler fell in the meter]

[g = the acceleration of the gravity]

t = falling time of the ruler (seconds)]

After collection of raw scores age wise girls' separate percentile norms were prepared.

Fig 1: Hand R.T. (Personal collection)

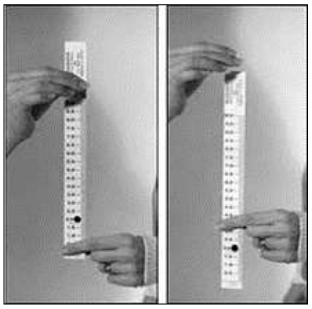

Fig 2: R.T. test (2020)

4. Analysis and Interpretations

Table 1: Age wise Mean and standard deviation of Reaction Time (RT) of girls' students

		Mean (sec)	Standard Deviation (sec)
Age (Year)	10	0.195	0.015
	11	0.202	0.019
	12	0.205	0.015
	13	0.196	0.016

The mean values were found 0.195, 0.202, 0.205 and 0.196 for 10 yrs, 11 yrs 12 yrs and 13 years respectively. Standard deviation values were found 0.015, 0.019, 0.015 and 0.016. It was also found from table no 1 that according to age mean time of hand reaction time were gradually increased except at the age of 13 years.

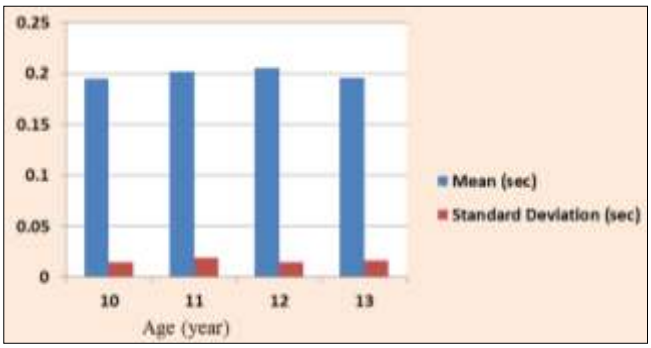

Fig 3: Age wise graphical representation of Mean and Standard deviation of RT

Table 2: Distribution of Normal probability of the girls' students (Shapiro-Wilk test of normality)

Age	Skewness	Excess Kurtosis	P-value
10 yr	-0.072 (potentially symmetrical)	-0.656 (potentially mesokurtic, normal like tails)	0.0821 (>.0.5)
11 yr	-0.067(potentially symmetrical)	-0.597 (potentially mesokurtic, normal like tails)	0.1248 (>.0.5)
12 yr	-0.007(potentially symmetrical)	-0.636 (potentially mesokurtic, normal like tails)	0.1728 (>.0.5)
13 yr	0.002(potentially symmetrical)	-0.535 (potentially mesokurtic, normal like tails)	0.3874 (>.0.5)

The researcher found from table no 2 that age wise all the data were normally distributed. For testing of normal distribution of the data, Shapiro-Wilk test of normality was applied (SPSS software version 21). It was also found in table no. 2 that, P-value is greater than Alpha level (0.05) and null hypothesis (that the data are from a normally distributed population) is accepted.

Table 3: Age Wise Percentiles Values of Hand Reaction Time of Girls' Students

	Age				
Percentile(th)	10 years	11 years	12 years	13 years	Percentile(th)
100	.160	.160	.170	.160	100
95	.169	.169	.179	.169	95
90	.173	.175	.183	.174	90
85	.177	.180	.187	.179	85
80	.181	.185	.190	.182	80

75	.184	.189	.193	.185	75
70	.187	.192	.196	.187	70
65	.190	.195	.198	.190	65
60	.192	.198	.200	.192	60
55	.193	.200	.203	.194	55
50	.195	.203	.205	.196	50
45	.197	.205	.207	.198	45
40	.200	.208	.209	.200	40
35	.202	.210	.212	.202	35
30	.205	.214	.214	.206	30
25	.208	.217	.216	.208	25
20	.210	.220	.218	.211	20
15	.214	.224	.223	.215	15
10	.217	.228	.226	.218	10
5	.221	.235	.230	.223	5
0	.229	.243	.239	.235	0

Age wise percentile scores of girls' students in reaction time test (sec.) were found from table no 3. 100th percentile score of 10, 11, 12 and 13 years girls were 0.160 sec, 0.160 sec, 0.170 sec and 0.160 sec respectively. 75th percentile score of 10, 11, 12 and 13 years girls were 0.184 sec, 0.189 sec, 0.193 sec and 0.185 sec. 50th percentile score of 10, 11, 12 and 13 years girls were 0.195 sec, 0.203 sec, 0.205 sec and 0.196 sec. 25th percentile score of 10, 11, 12 and 13 years girls were 0.208 sec, 0.217 sec, 0.216 sec and 0.208 sec. Zero percentile score of 10, 11, 12 and 13 years girls were 0.229 sec, 0.243 sec, 0.239 sec and 0.235 sec respectively.

5. Conclusion

On the basis of above analysis and interpretation the following conclusions were drawn:

100th percentiles value of 10, 11, 12 and 13 years girls' were found 0.160 sec, 0.160 sec, 0.170 sec and 0.160 sec.

75th percentiles value of 10, 11, 12 and 13 years girls' were found 0.184 sec, 0.189 sec, 0.193 sec and 0.185 sec.

50th percentiles value of 10, 11, 12 and 13 years girls' were found 0.195 sec, 0.203 sec, 0.205 sec and 0.196 sec.

25th percentiles value of 10, 11, 12 and 13 years girls' were found 0.208 sec, 0.217 sec, 0.216 sec and 0.208 sec.

0th percentiles value of 10, 11, 12 and 13 years girls' were found 0.229 sec, 0.243 sec, 0.239 sec and 0.235 sec.

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