NORMS CONSTRUCTION AND GRADING OF MAXIMUM STRENGTH AND EXPLOSIVE STRENGTH OF BOTH HANDS AMONG PRE-ADOLESCENTS

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ABSTRACT

Talent identification and development programs need uniformly accepted theoretical framework to guide current practices. These norms can be used to grade the students based on physical fitness parameters. *The purpose of this study was to construct norms and grading of maximum strength and explosive strength of both hands among pre-adolescents. A total 2641 boys were determined as a sample of the study through the stratified random sampling procedure, from 36 schools in Mailaduthurai and Sirkalli educational districts in Nagapattinam revenue District (presently Mailaduthurai District), Tamil Nadu, India. The age of the selected subjects ranges between 10-13 years. On the basis of their initial bio-motor abilities, the norms were developed for maximum strength and explosive strength of both hands by using descriptive statistics and percentiles. Based on the norms, the students were classified into various grads and these grades are ranging from excellent to very poor on the five point scale (excellent, good, average, poor & very poor). In right hand maximum strength Test 50 percent of student's maximum strength below 4.50kg, 80 percent student's maximum strength below 5.46kg. In case of left hand maximum strength Test 50 percent of student's maximum strength below 3.44kg, 80 percent student's maximum strength below 5.69kg. In case of right hand explosive strength Test 50 percent of student's explosive strength below 34.26m, 80 percent student's right hand explosive strength below 45.84m. In case of left hand explosive strength Test 50 percent of student's explosive strength below 24.87m, 80 percent student's left hand explosive strength below 33.48m.*

Key Words: *Maximum strength and Explosive strength, Pre-adolescents*

INTRODUCTION

Successful and attractive interventions are necessary to encourage increased levels of physical activity (PA) during childhood and adolescence. Furthermore, the school has proven to be an ideal setting for the development of these interventions to promote PA (Van-de-Kop et al., 2019; Larouche et al., 2018; Villa-González et al., 2018; Pang, Kubacki & Rundle-Thiele, 2017; Kahn et al., 2002) for two main reasons: (a) the scholars' age is key to changing habits, and young people with high levels of PA are more likely to be active adults (Telama et al., 2014); and (b) schools provide compulsory academic training from childhood to adolescence that will ensure a universal education for every student.

A child's early development has an enormous and a decisive influence on the whole of his future life. Modern sciences such as psychology, physiology, genetics and pedagogy provide

concrete confirmation of this. The early years are considered to be the most impressionable and formative years of life. It is during these years that the foundation of habits are laid, behaviour patterns established and attitudes towards life developed. Recent researches in child development have led to a remarkable awareness of the crucial importance of early childhood years for the optimum development of the child. It has been held that the first few years of life are the critical years for personality development and the damages or impoverishment suffered at this stage are likely to be irreparable. Hence, Physical education is regarded an essential part of education at all levels. The University Grants Commission Committee on Physical Education has rightly pointed out that even in this country, where education has received inadequate attention, no state or educational authority should deny the need for physical education.

Norms have many advantages over other standards. First they are unaffected by the performance of the group or the class being evaluated. Another advantage is that the new performance standards need not be developed each year. Once norms are developed, they can usually be used for 2 to 5 years. Moreover, since the same standards are used to evaluate different groups or classes of students, the grades will have a high degree of consistency - a given grade indicating the same degree of ability for each group. The norm taken for the study identifies a person in relation to a given sample whose norm has been determined. Any judgment made about the norm is made by the person using the norm score. There are multivarious reasons why a physical educationist should attempt to construct norms in the existence of numerous tests. As change is the only permanent thing in this universe, the existing test may not give exactly what is necessary at the movement to the physical educator. Hence the attempt to construct norms is very useful in classifying the students in a particular activity according to their ability. Apart from that norms are widely used to diagnose the needs and weakness of the students and to grade the students.

METHODOLOGY

Sample Selection

A total 2641 pre-adolescent boys were determined as a sample of the study through the stratified random sampling procedure, from 36 schools in Mailaduthurai and Sirkalli educational districts in Nagapattinam revenue District (presently Mailaduthurai District), Tamil Nadu, India. The age of the selected subjects ranges between 10-13 years. It was rather difficult to administer the proposed tests on the total population of Tamilnadu school students. In order to make the sample

fully representative, the subjects were selected at random from rural and urban area schools in Mailaduthurai and Sirkalli educational districts on the basis of normal distribution from each educational district. Students from thirty six school enrolled during the academic year 2019-2020 from these two educational district, studying in 6^{th} and 7^{th} standards were chosen.

Dependent Variables and Tests

These chosen bio-motor abilities for the purpose of developing norms were assessed by using the following test items.

Table –I: Selection of Bio-Motor Variables and Tests

Bio motor Variables		Equipment / Test	Units
Strength	Maximum Strength (Grip Dynamometer)	Dynamometer	In kg (Kilogram)
	Explosive Strength (Throw for distance)	Cricket Ball	In m (Meters)

Statistical Procedure

On the basis of their initial bio-motor abilities, the norms were developed for strength of both right and left hands by using descriptive statistics and percentiles. Based on the norms, the students were classified into various grads and these grades are ranging from excellent to very poor on the five point scale (excellent, good, average, poor & very poor). The interpretation of data is as follows.

RESULT

To prepare norms, data were analyzed by using descriptive statistics and percentiles. The mean and standard deviation have been calculated for each of the test item. The mean and standard deviations calculated separately for all variables i.e. maximum strength and explosive strength of both Right and left hand are presented in Table -II & III.

Table 1: Descriptive Analysis of the Data on Strength (Maximum Strength AND Explosive Strength -Right and left) of Pre-adolescents

Variables	Mean	N	Std. Deviation	Std. Error Mean
Hand Screwing Co-ordination Right	4.4998	2641	.32004	.00623
Hand Screwing Co-ordination Left	3.4231	2641	.29861	.00581
Hand Peg Co-ordination Right	34.3019	2641	3.65239	.07107
Hand Peg	24.8804	2641	2.84047	.05527

Co-ordination Left				

The mean and standard deviation values of maximum strength of both Right and left hand are 4.50±0.32 and 3.42 ±0.30 respectively. Further, the mean and standard deviation values of explosive strength of both Right and left hand are 34.30±3.65 and 24.88 ±2.84 respectively. Then the norms were prepared using percentile scale and it is presented in Table -II.

Table -II: Norms for Physical Fitness Test Items by Using Percentile Scale

Score	Max. Strength Right	Max. Strength Left	Explosive Strength Right	Explosive Strength Left
0	2.90	-	14.96	10.52
10	3.22	0.44	18.82	13.39
20	3.54	1.19	22.68	16.26
30	3.86	1.94	26.54	19.13
40	4.18	2.69	30.40	22.00
50	4.50	3.44	34.26	24.87
60	4.82	4.19	38.12	27.74
70	5.14	4.94	41.98	30.61
80	5.46	5.69	45.84	33.48
90	5.78	6.44	49.70	36.35
100	6.10	7.19	53.56	39.22
Mean	4.50	3.44	34.26	24.87
SD	0.32	0.75	3.86	2.87

Table-II shows that physical fitness test result of pre-adolescent school students says, in the left hand maximum strength Test highest performance score was 6.10kg and lowest performance score was 2.90kg, in the right hand maximum strength Test highest performance scores were 7.19kg and lowest performance score was 0.44, in the right hand explosive strength Test highest performance score was 53.56m and lowest performance score was 14.96m, in the left hand explosive strength Test highest performance score was 39.22 and lowest performance score were 10.52m respectively.

It has been pointed out that in right hand maximum strength Test 50 percent of student's maximum strength below 4.50kg, 80 percent student's maximum strength below 5.46kg. In case of left hand maximum strength Test 50 percent of student's maximum strength below 3.44kg, 80 percent student's maximum strength below 5.69kg. In case of right hand explosive strength Test 50 percent of student's explosive strength below 34.26m, 80 percent student's right hand explosive strength below 45.84m. In case of left hand explosive strength Test 50 percent of

student's explosive strength below 24.87m, 80 percent student's left hand explosive strength below 33.48m.

On the basis of the above constructed table the subjects were given qualitative grading. The below table indicates the performance score and its respective grades. These grades are ranging from Excellent to very poor on the five point scale. The performance score of pre-adolescent boys are indicated in the score column, whereas the interpretation of the score is categorized as per the grade column.

Table -III: Qualitative Grading Based on the Hull Scale Norms for Strength

Grading	Max. Strength Right		Max. Strength Left		Explosive Strength Right		Explosive Strength Left	
Grading	%	No of students	%	No of students	%	No of students	%	No of students
Very poor	0	0	0	0	0	0	0	0
Poor	11.1	293	0.07	02	20.42	539	21.15	676
Average	68.83	1818	99.75	2634	64.59	1706	52.26	1380
Good	20.03	529	0.18	05	14.99	396	25.59	585
Excellent	0.04	1	0	0	0	0	0	0

As per data analysis, the data obtained under the selected fitness factor was in a normal range of normal probability curve. This study developed percentile norms for maximum strength and explosive strength of both Right and left hand from 0 to 100 scale, the lowest value 0 denotes the lowest performance score and the highest value of the percentile denotes the highest score of the student. The norms of each variable were graded as very poor, poor, average, good and excellent based on the grading system.

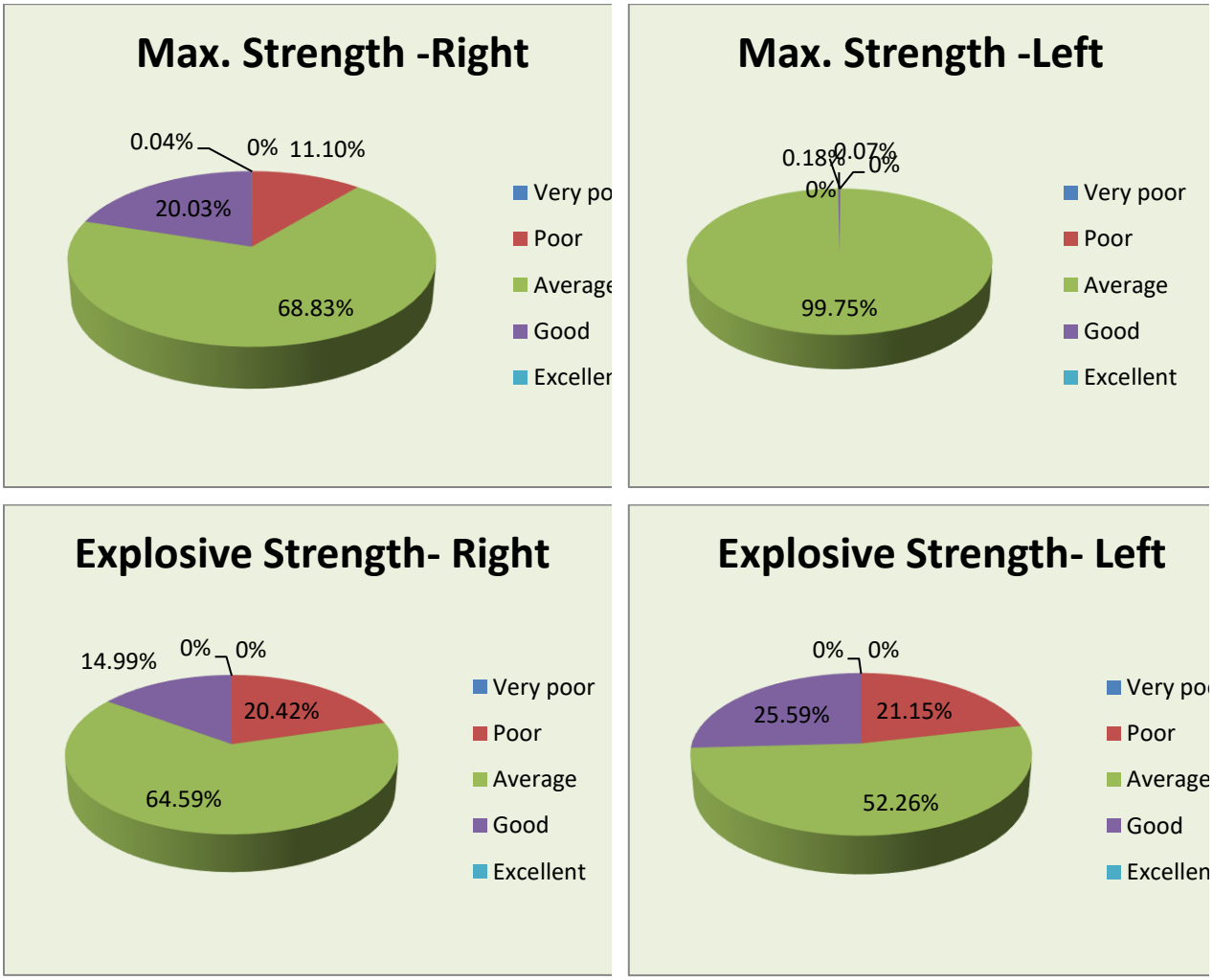
In 'maximum strength of Right hand' overall boys' performance was found Excellent as 0.04% (1 students), Good 20.03% (529 students), Average 68.83% (1818 students), poor 11.10% (293 students) and very Poor was 0% (no students).

In 'maximum strength of left hand' overall boys' performance was found Excellent as 0% (no students), Good 0.18% (5 students), Average 99.75% (2634 students), poor 0.07% (2 students) and very Poor was 0% (no students).

In 'explosive strength of Right hand' overall boys' performance was found Excellent as 0% (0 students), Good 14.99% (396 students), Average 64.59% (1706 students), poor 20.42% (539 students) and very Poor was 0 (no students).

In 'explosive strength of left hand' overall boys' performance was found Excellent as 0% (0 students), Good 25.59% (585 students), Average 52.26% (1380 students), poor 21.15% (676 students) and very Poor was 0% (no students).

Figure-I : Performance of Maximum Strength and Explosive Strength 0f Both Hands



DISCUSSION

There is consensus that regular physical activity (PA) can improve physical fitness (PF) and health and assist in the prevention of disease (Blair & Church, 2004). Several studies have shown that physically active adults are healthier and have a higher PF than inactive adults throughout different nations and populations groups (Kuh et al., 2005, Dionne et al., 2003). Physical activity is therefore promoted as part of a healthy lifestyle (WHO, 2010). There are more than fifteen battery tests for the assessment of the physical fitness of children and adolescents and several key components of physical fitness currently in use worldwide (Castro-

Pinero et al., 2010). Xiangli, Chang and Solmon (2016) examined the association between physical activity (PA), physical fitness, and health-related quality of life (HRQOL) among school-aged children. Results support the conclusion that enhancing children's physical fitness can facilitate positive outcomes including improved health related quality of life.

CONCLUSION

In right hand maximum strength Test 50 percent of student's maximum strength below 4.50kg, 80 percent student's maximum strength below 5.46kg. In case of left hand maximum strength Test 50 percent of student's maximum strength below 3.44kg, 80 percent student's maximum strength below 5.69kg. In case of right hand explosive strength Test 50 percent of student's explosive strength below 34.26m, 80 percent student's right hand explosive strength below 45.84m. In case of left hand explosive strength Test 50 percent of student's explosive strength below 24.87m, 80 percent student's left hand explosive strength below 33.48m. The study constructed standard norms for pre-adolescent boys. As it is standard norms it can be used to check the physical fitness status of the same grade students. The computed percentile scale for boys may be modified after few years depending upon the progress made by the physical fitness program in these physical fitness items.

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