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AN INTERPRETATION OF ACTUAL AND PERCEIVED RIGHT AND LEFT HAND ISOMETRIC GRIP STRENGTH OF UNSIGHTED AND HARD-OF-HEARING CHILDRENS

Dr. Nagaraja S., Assistant Professor
Department of Physical Education, Veterinary College, Karnataka, India
Dr. Gajanana Prabhu B. and Dr. Prakash S.M.
Department of Studies & Research in Physical Education
Kuvempu University, Shankaraghatta- 577451, Karnataka, India

Abstract

The present modern society we are seeing many people are suffering different type of disability. In this time need more reinforcement of physical, psychological and psychosocial development. Vision and hearing loss is not only a bundle of individual hardships during his early developing years and he also facing many problems and challenges to the responsible adults in his life. The reason of the current study was to measure the isometric left and right hand grip strength of unsighted and hard of hearing special going children of Karnataka state. Further the level of perception on isometric hand grip strength was also correlated with their actual status. The present study was conducted on four hundred and fourteen unsighted and hard of hearing school going children selected through purposive random sampling technique. The study included unsighted children (N=243) and hard of hearing impairment (N=171) in male category. All the subjects were residents of special schools within Karnataka state. Their age ranged between 13 to 18 years. The right and left hand isometric grip strength was done by following the standard procedure and level of perception on isometric grip strength of unsighted and hard of hearing school children was done using a 3 point likert scale. The right hand grip strength of 13 to 14 years with 19.60 ± 5.72; 2.75 ± 5.73 in 15 to 16 years; and 26.00 ± 5.31 in 17 to 18 years. The left hand grip strength was 18.16 ± 5.29 in 13 to 14 years; 22.34 ± 5.51 in 15 to 16 years; and 24.15 ± 5.39 in 17 to 18 years. On the basis of the findings of the present investigation it is concluded that the unsighted and hard of hearing school going children weak hand grip strength is an indication of low physical fitness level. Since unsighted and hard of hearing school going children need to perform their daily tasks at their own, it is imperative to have enough strength. Further, the unsighted and hard of hearing school children under investigation are unable to significantly moderate positive linear relationship their right and left hand grip strength precisely.

Keywords: Hand Grip Strength, Dynamometer, Disability, Assessment and Evaluation.

Introduction

The Persons with disabilities Act 1995 came into force to ensure equal opportunities, protection of rights, rehabilitation and employment to the people with disabilities and their participation in nation building. It also provides for education, vocational training, research, reservation, creation of barrier free environment and housing. Important provisions under the act are early detection and prevention

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of disabilities; Comprehensive and special education; Employment; Non discrimination in the society; Research and manpower development; Affirmative action; Social security and Grievance redressal. The majority of people's hand-grip strength slowly diminishes as they age. Hand grip strength levels maintaining by people to more readily total everyday living tasks and may help them stay alive longer.

Hand grip strength is used extensively in the evaluation of hand function. Hand grip strength is directly affected by the skeletal, neural, and muscular systems. Grip strength is used in the evaluation of patients with a great range of pathologies that impair the superior extremities, as well as rheumatoid stroke, tenosynovitis, muscular dystrophy, arthritis, osteoarthritis and congenital malformations. Hand grip strength evaluation also have an well-known role in determining action efficiency, such as in the measurement of various wrist orthoses, the effect of hand exercises in rheumatoid arthritis, and healing after trauma. They are used as an outcome measure after a lot of different surgical interventions. Hand grip strength evaluations provide a well established and objective score that is reflective of hand function and that is without difficulty and rapidly available range of various health professionals (Ploegmakers et. al., 2013). Subsequent biocultural evolution in the hominin lineage is morphology of the human hand and product of a long evolutionary history of primate arboreal adaptation. Human hand possesses together primitive features such as five self-governing rays that articulate with carpals among the two lengthy bones in the superior limb and derived features such as the relatively lengthy, opposable pollex(Gallup et. al., 2010). The hand grip strength was the single evaluation method recommended for the measurement of muscle strength, and was the simple technique for evaluation of muscle working function in clinical training. Longitudinal research studies prove that hand grip strength declines after midlife, with loss accelerating with increasing age and through old age. As an assessment measure hand grip strength has been exposed to have predictive validity and low values are correlated with impaired health-related quality of life, disability, falls and long-standing stay in hospital as well as enlarged mortality (Roberts et. al., 2011).

Methodology

Unsighted and hard-of-hearing school's 414 students of Karnataka state included in this present study through purposive random sampling technique. The present study selected unsighted (N=243) and hard-of-hearing (N=171) in male category. All the subjects were residents of differently abled school's within Karnataka state. The subjects age range interpolated in 13 to 18 years.

The test was performed as per standard procedure (Roberts et. al., 2011; and Shiratori, et. al., 2014) using Jamer hydraulic hand grip dynamometer. A total of three trials were performed on every individual with at least thirty seconds recovery between each effort included in the study and the average was taken for the analysis. The measurement was recorded in kilograms. The individual was made to sit on the chair with a straight body position and feet flat on the floor and keeping their arms at the right angles and elbow on either side of the body. The handle of the dynamometer was adjusted as per the palm size of an individual. The base of the dynamometer was made to rest on first metacarpal, while he handle should rest on middle of four fingers. Then, the individual was asked to squeeze the dynamometer with maximum isometric effort and to maintain for about five seconds without any body

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movement. The score was recorded in kilograms. Levels of perception on isometric hand grip strength of unsighted and as well as hard-of-hearing subjects was done using a three point likert scale. The subject was asked to rate his isometric hand grip strength on a questionnaire wherein he was given to tick one of the three options viz a) Higher than the normal b) Normal or c) lower than the normal. The response given by the subject was purely based on the perception of the subject under investigation (Rahmani-Nia, et al., 2011).The researcher gave a brief overview of isometric grip strength in order to make them familiar and express their levels of perception. The data from unsighted students was collected through dictation and response record method. Similarly, data from hard-of-hearing students was collected through sign language method with help of a skilled assistant. The data was collected at the residential schools with earlier intimation and permission. Pearson product moment correlation was used a statistical tool apart from descriptive statistics like mean and standard deviation.

Findings of the study

Interpretive analysis including mean and standard deviation were employed to the raw data collected on isometric hand grip strength of the subjects selected for the study. The results are provided in table 1.

TABLE 1.
INTERPRETATION OF RESULTS ON CHARACTERISTICS OF UNSIGHTED AND HARD-OF-HEARING CHILDRENS

Variable	13 to 14 years	15 to 16 years	17 to 18 years
	Mean ± S. D	Mean ± S. D	Mean ± S. D
N	128	176	110
Age	13.45 ± 0.50	15.45 ± 0.50	17.45 ± 0.50
Rt. Hand grip strength	19.60 ± 5.72	23.75 ± 5.73	26.00 ± 5.31
Lf. hand grip strength	18.16 ± 5.29	22.34 ± 5.51	24.15 ± 5.39

Table 1 reveals that the age of unsighted and hard-of-hearing children's under investigation was 13.45 ± 0.50 in (the first score indicates mean followed by standard deviation) 13 to 14 years; 15.45 ± 0.50 in 15 to 16 years and 17.45 ± 0.50 in 17 to 18 years. The right hand isometric grip strength was 19.60 ± 5.72 in 13 to 14 years; 23.75 ± 5.73 in 15 to 16 years; and 26.00 ± 5.31 in 17 to 18 years. The left hand isometric grip strength was 18.16 ± 5.29 in 13 to 14 years; 22.34 ± 5.51 in 15 to 16 years; and 24.15 ± 5.39 in 15 to 16 years. Table 2 provides results on right hand isometric grip strength of unsighted and hard-of-hearing school children's with reference to available norms.

TABLE 2.
NORMS BASED RESULTS ON RIGHT HAND GRIP STRENGTH OF UNSIGHTED AND HARD-OF-HEARING CHILDRENS

Normative values	Normative category	13 to 14 Years		15 to 16 Years		17 to 18 Years	
		F	%	F	%	F	%
40 & Above	Strong	0	0	2	1.14	0	0
33 to 39	Above Avg.	2	1.56	6	3.41	11	10
20 to 32	Average	64	50	126	71.59	87	79.09
14 to 19	Below average	42	32.81	33	18.75	9	8.18
13 & Below	Weak	20	15.63	9	5.11	3	2.73
TOTAL		128		176		110	

F= frequency, %=Percentage

Introspection of table 2 reveals that, as per available norms (Naik, 2018) the right hand grip strength in unsighted and hard-of-hearing children's of 13 to 14 years, 15.63 per cent were weak right hand grip strength; below average right hand grip strength 32.81 per cent; average right hand grip strength 50 per cent; above average right hand grip strength 01.56 per cent and none of the subjects was strong in right hand grip strength. In unsighted and hard-of-hearing children's of 15 to 16 years it is observed that 5.11 per cent were weak right hand grip strength; below average right hand grip strength 18.75 per cent; average right hand grip strength 71.59 per cent; above average right hand grip strength 03.41 per cent and

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strong right hand grip strength 01.14 per cent. Further, in unsighted and hard-of-hearing children's of 17 to 18 years it is found that 2.73 per cent were weak right hand grip strength; below average right hand grip strength 08.18 per cent; average right hand grip strength 79.09 per cent; above average right hand grip strength 10 per cent and none of the subjects was strong in right hand grip strength.

TABLE 3.
NORMS BASED RESULTS ON LEFT HAND GRIP STRENGTH OF UNSIGHTED AND HARD-OF-HEARING CHILDRENS

Normative values	Normative category	13 to 14 Years		15 to 16 Years		17 to 18 Years	
		F	%	F	%	F	%
36 & Above	Strong	0	0	3	1.70	3	2.73
29 to 35	Above average	2	1.56	15	8.52	17	15.45
16 to 28	Average	83	64.84	137	77.84	84	76.36
10 to 15	Below average	37	28.91	19	10.80	6	5.45
9 & Below	Weak	6	4.69	2	1.14	0	0
TOTAL		**128**		**176**		**110**	

Perusal of table 3 reveals that as per available norms (Naik, 2018) the left hand isometric grip strength in unsighted and hard-of-hearing children's of 13 to 14 years, 4.69 per cent were weak left hand grip strength; below average left hand grip strength 28.91 per cent; average left hand grip strength 64.84 per cent; above average left hand grip strength 1.56 per cent; and none of the subjects was left hand strong in grip strength. In unsighted and hard-of-hearing children's of 15 to 16 years it is observed that 1.14 per cent were weak left hand grip strength; below average left hand grip strength 10.80 per cent; average left hand grip strength 77.84 per cent; above average left hand grip strength 8.52 per cent and strong in left hand grip strength 1.70 per cent. Further, in unsighted and hard-of-hearing children's of 17 to 18 years it is found that none of the subjects was weak in left hand grip strength; below average left hand grip strength 5.45 per cent; average left hand grip strength 76.36 per cent; above average left hand grip strength 15.45 per cent and strong left hand grip strength 2.73 per cent.

Table 4
INTERRELATION BETWEEN ACTUAL AND PERCEIVED RIGHT AND LEFT ISOMETRIC HAND GRIP STRENGTH IN 13 TO 14 YEARS

Variables		Actual Rt. hand grip strength	Actual Lt. hand grip strength
Perceived Hand Grip Strength	Pearson Correlation	.431**	.385**
	Sig. (2-tailed)	.000	.000
	N	128	128

**Correlation is significant at the 0.01 level (2-tailed).

Table 4 reveals that the levels of perception on right and left hand isometric grip strength showed significantly moderate positive linear relationship when correlated with actual right and left hand isometric grip strength in unsighted and hard-of-hearing children's of age 13 to 14 years. Table 5 provides information on association between perceived and actual right and left hand isometric grip strength of unsighted and hard-of-hearing children's in the age group 15 to 16 years.

TABLE 5
INTERRELATION BETWEEN ACTUAL AND PERCEIVED RIGHT AND LEFT ISOMETRIC HAND GRIP STRENGTH IN 15 TO 16 YEARS

Variables		Actual Rt. hand grip strength	Actual Lt. hand grip strength
Perceived Hand Grip Strength	Pearson Correlation	.607**	.589**
	Sig. (2-tailed)	.000	.000
	N	176	176

**Correlation is significant at the 0.01 level (2-tailed).

It is clear from the table 5 that the levels of perception on right and left hand isometric grip strength showed significantly moderate positive linear relationship when correlated with actual right and left hand isometric grip strength in unsighted and hard-of-hearing children's of age 15 to 16 years. Table 6 provides information on association between perceived and actual right and left hand isometric grip strength of

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unsighted and hard-of-hearing children's in the age group 17 to 18 years.

TABLE 6.
INTERRELATION BETWEEN ACTUAL AND PERCEIVED RIGHT AND LEFT ISOMETRIC HAND GRIP STRENGTH IN 17 TO 18 YEARS

Variables		Actual Rt. hand grip strength	Actual Lt. hand grip strength
Perceived Hand Grip Strength	Pearson Correlation	.563**	.490**
	Sig. (2-tailed)	.000	.000
	N	110	110

**Correlation is significant at the 0.01 level (2-tailed).

Analysis of table 6 depicts that the levels of perception on right and left hand isometric grip strength showed significantly moderate positive linear relationship when correlated with actual right and left hand isometric grip strength in unsighted and hard-of-hearing children's of age 17 to 18 years.

Discussion

In 13 to 14 years, 15.63 per cent of unsighted and hard-of-hearing children's in Karnataka were weak in isometric hand grip strength; and 32.81 per cent were below average. In 15 to 16 years, 5.11 per cent were weak in isometric hand grip strength; and 18.75 per cent were below average; in 17 to 18 years, 2.73 per cent were weak in isometric hand grip strength; and 8.18 per cent were below average. Weak isometric hand grip strength is an indication of low physical fitness level. Since unsighted and hard-of-hearing children's need to perform their daily tasks at their own, it is imperative to have enough strength. If the low levels of hand grip strength are not addressed on the right time, it may lead to complications whereby the unsighted and hard-of-hearing children's will need to depend upon care takers. (Abdullah, et. al., 2015) studied the differences of fitness profile between students with hearing impairment and students with visual impairment at secondary schools. A fitness profile was determined to identify the fitness level between two types of disabilities. The findings showed that students who are visually impaired performed better in sit-up test, run test and sit and reach test and students with hearing impairment performed better in handgrip strength test, standing broad jump test and vertical jump test but with both groups showed similar strength in agility test. There was a significant difference in the sit-up test between two groups whereas other tests did not show much difference. (Fredriksen, et. al., 2018) described the natural course of handgrip strength development in primary school children and to establish a reference material to be used in future screening studies. (Ghosh, 2014) found in a study that the leg explosive strength was better in deaf and dumb than normal school boys of West Bengal. The unsighted and hard-of-hearing children's under investigation are quiet aware of their present status of isometric hand grip strength. In spite of this perception, the subjects under investigation have not taken any measures to improve upon. Suitable measures have to be taken by the concerned authorities to enhance their fitness in terms of isometric hand grip strength.

Conclusion

Unsighted and hard-of-hearing school children's of Karnataka State 48.44 per cent had low isometric hand grip strength. Further, the levels of perception on isometric hand grip strength showed that there was significantly moderate positive linear relationship between actual and perceived isometric hand grip strength in Karnataka state within the age group 13 to 14 years. 23.86 per cent had low isometric hand grip strength. Further, the levels of perception on isometric hand grip strength

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showed that there was significantly moderate positive linear relationship between actual and perceived isometric hand grip strength in Karnataka state within the age group 15 to 16 years. 10.91 per cent had low isometric hand grip strength. Further, the levels of perception on isometric hand grip strength showed that there was significantly moderate positive linear relationship between actual and perceived isometric hand grip strength in Karnataka state within the age group 17 to 18 years.

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