Assessment of Dharwad rural normal children on peabody developmental motor scales, second edition (PDMS-2)

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Abstract:

Introduction: Many developmental scales are used to assess motor development. Primarily these scales are developed in western countries. The scales developed in India are also not widely accepted, due to cultural and ethnic differences. The Peabody developmental motor scale has not been used in rural population, hence study was undertaken to evaluate rural children in this part of India (Dharwad, Karnataka). **Objective**: Assessment of motor development scores of normal children in Dharwad (rural) on Peabody developmental motor scale second edition (PDMS-2). **Materials & Methods**: Total 180 children boys and girls of age 0-5 years were taken for assessment after parent consent and paediatricians declaration that the child was normal. All children were assessed on PDMS-2 and all the items used as per the instructions in the manual. One way ANOVA and student t-test was used for statistical analysis. **Results**: PDMS-2 is valid for 0-5 years of children. The boys of Dharwad (rural) population scored more than girls in object manipulation subtest (p<0.0142). Dharwad (rural) children scored lower than PDMS-2 scores in stationary, locomotion, object manipulation, grasping and visual-motor integration (p<0.05). There is significant change in Gross Motor Quotient (GMQ) Total Motor Quotient (TMQ) and Fine Motor Quotient (FMQ) as compared to PDMS-2 scores Interpretation. **Conclusion:** Item wise analysis with heterogeneous sample needs to be undertaken with PDMS-2 scale for its validity. Hence when using PDMS-2 and interpreting their scores in Dharwad (rural) children, examiner should be cautious.

Key words: Age of 0-5 years; Dharwad (rural); Normal children; PDMS-2

Introduction

The study of development is the study of how and why the human organism grows and changes throughout life. Development is defined as orderly and relatively enduring changes over time in physical and neurological structures, thought process and behaviour [1].

The term however is often used to refer to totality of physical change and as a result it becomes more inclusive and takes on the same meaning as development [2].

Cintas H.L.et al (1995) has observed that there is a difference in motor development among various ethnic groups. The cultural relevance of standardized developmental tests must be examined. Such a project is especially important because these tests are useful to determine whether a child is developing

typically or is in some way delayed, requiring special services [2].

A study by Phatak tested a large number of children longitudinally and cross-sectionally, these children belong to all socioeconomic classes and come from the urban settings as well as rural areas around Baroda. Research was undertaken mainly to gather normative data about the development of Indian babies and to compare their performance with Bailey norms in USA. A routine test is recommended for following the development of normal children as well as for following the development of normal children as well as for the screening from the community children with possibility of developmental delay. The influence of urban and rural environment, the patterns of differences amongst boys and girls seem to be different. The urban girls from upper socioeconomic

class score better continuously and often significantly than rural girls The term growth however is often used to refer to the totality of physical change, and as a result it becomes after the age of 5 months [4].

Native American children have not been widely represented in the normative samples of standardized tests assessing motor development. The study investigated the cultural relevance of the Peabody Developmental Motor Scale (PDMS) in 2-year-old Native American children who are typically developing. Scores were compared with those of the normative sample. The sample scored significantly lower than the normative sample (p < .001) on the Fine Motor Scale, and, when gender was taken into consideration, all but the older girls (30 months-35 months of age) had significantly lower scores. All but the younger girls (24 months-29 months of age) scored within the normal range on the Gross Motor Scale [5].

Peabody Developmental Motor Scales-2 (0-60 months) [6]

It contains 6 sub test: Reflex (8), Stationary (30), Locomotion (89), Object manipulation (24), Grasping (26), Visual motor (72)

Quotient: Gross Motor Quotient (Reflex, Stationary, Locomotion, Object manipulation), Fine Motor Quotient (Grasping, Visual motor), Total Motor Quotient.

It gives in depth assessment of gross and fine motor development so it was selected for the study.

Peabody Developmental Motor Scale second edition (PDMS-2) which is having normative from Western population is valid and reliable assessment scale, which assesses child through 0-60 months and provides in depth assessment of (Gross and Fine) motor development as compared to other norm referenced scales. In India there is no evidence of PDMS-2 norms for any part of Indian rural population. Due to environmental, cultural and ethnic group variations, examination of PDMS-2 on Indian rural children is necessary. Hence the purpose of this study is to use the Peabody Developmental Motor Scales, Second Edition (PDMS-2) for assessment of Motor Development of normal children in Dharwad (Rural).

Objective

1. Assessment of the Motor Development Scores of Normal Children in Dharwad (rural) on Peabody Developmental Motor Scale second edition (PDMS-2).

2. Comparison of PDMS-2 score of Dharwad (rural) children to that of PDMS-2 score given in the manual.

Materials & Methods

Source of data: Children (0-60 months) residing in Dharwad (Rural) were selected for study.

Peabody developmental motor scales, second edition (PDMS-2) were used with all items contained in it as per instruction in manual. Materials included in the PDMS-2 kit were used.

List of manuals:

1) Peabody Developmental Motor Scales, 2nd Edition, Examiner's Manual – M. Rhonda Folio, Rebecca R. Fewell [6].

2) Peabody Developmental Motor Scales, 2nd Edition, Guide to Item Administration – M. Rhonda Folio, Rebecca R. Fewell [7].

Inclusion criteria:

1. Children (0-60months) old of either sex.

2. Child otherwise normal and typically developing declared by paediatrician.

3. Children residing in rural areas in Dharwad.

Exclusion criteria:

1. Incomplete assessment on PDMS2 after inclusion.

2. Parents refusing or withdrawing for the assessment.

3. Non co-operative children after inclusion.

4. Any discomfort during testing.

Procedure:

Ethical Clearance was obtained from SDM college of Medical Science And Hospital. All the subjects from 0 to 60 months of age were included in the study. PDMS-2 was administered as per the guidelines given in the manual and the scores were interpreted.

As per the District Health and Family Welfare, Dharwad has 124 villages (rural) of which by using simple random method, rural areas were selected. After that from each rural area 30 children were taken from each village by door to door survey after obtaining the ethical clearance. They were assessed by paediatrician visiting to nearest primary health centre for subjective screening for administration of PDMS-2 Guide to Item Administration was used who provides complete description of every item, all illustration of the activity and scoring criteria. Scoring criteria are:

Table 1: Distribution of children by age groups (in months) and sex

Age (in months)	Boys	%	Girls	%	Total	%
<10	4	5.00	11	11.00	15	8.33
11--20	12	15.00	18	18.00	30	16.67
21-30	16	20.00	18	18.00	34	18.89
31-40	7	8.75	14	14.00	21	11.67
41-50	20	25.00	20	20.00	40	22.22
51-60	21	26.25	19	19.00	40	22.22
Total	80	100.00	100	100.00	180	100.00
Mean age	36.80		32.84		34.60	
SD age	16.47		16.21		16.40	

Above table shows the distribution of sample by age and sex and the mean age of boys is (36.80) with SD of (16.47), mean age of girls is (32.84) with a SDof(16.2)

Table 2: standard scores of PDMS-2 and frequency and percentage of children (numbers)

Std scores of PDMS2	Reflex	Stationary	Locomotion	Object manipulation	Grasping	Visual motor
17-20(Very superior)	0	0	0	0	1	0
15-16(Superior)	0	19	2	0	16	0
13-14(Above average)	0	23	0	5	22	2
8-12(Average)	13	132	111	110	132	108
6-7(Below average)	3	6	63	48	6	61
4-5(poor)	0	0	4	2	1	9
1-3(Very poor)	0	0	0	0	2	0
Total	16	180	180	165	180	180

2= the child performs the item according to the criteria specified for mastery

1= the child performance shows a clear resemblance to the item mastery criteria but does not fully meet the criteria

0= the child cannot or will not attempt the item or the attempt does not show that the skill is emerging.

For administration of PDMS-2 Guide to Item Administration was used.

Statistical analysis:

The data was tabulated and analyzed using SPSS-11.0 version. The tests used were descriptive analysis and Student t-test.

Table 3: standard scores of PDMS-2 and frequency and percentage of children (numbers)

Quotient scores	GMQ	%	FMQ	%	TMQ	%
131-165 (Very superior)	0	0.00	0	0.00	0	0.00
121-130 (Superior)	0	0.00	1	0.56	2	1.11
111-120 (Above average)	4	2.22	7	3.89	3	1.67
90-110 (Average)	129	71.67	129	71.67	131	72.78
80-89 (Below average)	44	24.44	36	20.00	41	22.78
70-79 (poor)	1	0.56	7	3.89	1	0.56
35-69 (Very poor)	2	1.11	0	0	2	1.11
Total	180	100.00	180	100.00	180	100.00

The above table explains the GMQ, FMQ and TMQ with quotient scores of PDMS-2.this shows that the maximum population falls in the category of average and below average.

Table 4: Comparison of present study with standard scores in different variables

Standard score	Present study		PDMS2		Z-value	p-value
	Mean	SD	Mean	SD		
Reflex	9.56	1.63	10.00	3.00	-1.3203	0. 18672
Stationary	11.12	2.23	10.00	3.00	2.5813	0.0098*
Locomotion	7.99	1.42	10.00	3.00	-6.7107	0.0000*
Object manipulation	8.56	1.75	10.00	3.00	-4.0797	0.0000*
Grasping	11.03	2.36	10.00	3.00	2.2576	0.0239*
Visual motor	7.93	1.55	10.00	3.00	-6.4630	0.0000*

*$p<0.05$

The above table depicts that there is a significant difference in subtest scores of standard scores when compared to PDMS-2 standard scores. The statistical difference is there in stationery locomotion, object

manipulation, grasping and visual motor integration where Dharwad (rural) children scored less than the PDMS-2 scores.

Table 5: Comparison of present study with PDMS2 with GMQ, FMQ and TMQ scores

Variable	Present study		PDMS2		t-value	p-value
	Mean	SD	Mean	SD		
GMQ	94.62	6.96	100.0	15.0	-5.8996	0.0000*
FMQ	95.76	8.57	100.0	15.0	-4.3039	0.0000*
TMQ	95.03	7.51	100.0	15.0	-5.3106	0.0000*

Discussion

The purpose of our study was to assess the motor development scores of normal children in Dharwad (rural) on Peabody Developmental Motor Scales, second edition (PDMS-2) and also compare the PDMS-2 scores of Dharwad (rural) children to that of PDMS-2 scores given in the manual.

In our study we have used t-test for the comparison and judging the significance of sample mean along with the significance of difference where p<0.05 between the means of two samples.

Table 4 and 5 explains the frequency and percentage of Dharwad (rural) children this shows that maximum population falls in the category of average and below average. Table 4 and 5 explains that the results of our study showed that there is significant difference between Dharwad (rural) children scores and PDMS-2 scores (standard scores).The subtests stationery and grasping in our study scored higher than standard scores of PDMS-2 compared to the other 4 subtests reflex, locomotion, object manipulation and grasping. Subtest reflex had a p>0.05 which was not statistically significant, the reason being less population in the age group of 0-10 months being subjected for the study.

In our study Dharwad (rural) children had scored less on GMQ, TMQ and FMQ as compared to the PDMS-2 scores .Items given in PDMS-2 are lacking in cultural variance, environmental factors, rural factors and biological factors of development would have contributed for these results.

Studies which are done at different places has also reported the difference in scores.10 A study done on Native American children have not been widely represented in the normative samples of standardized tests assessing motor development. This study investigated the cultural relevance of the Peabody Developmental Motor Scales (PDMS) in 2-year-old Native American children who are typically developing. The sample scored significantly lower than the normative sample on the Fine Motor Scale, and, when gender was taken into consideration, all but the older girls (30 months-35 months of age) had significantly lower scores. All but the younger girls (24 months-29 months of age) scored within the normal range on the Gross Motor Scale.

Limitations

1. 0-10 Months, 31 -40 months age group sample was less

2. In our study selection of the samples was done on the basis of paediatrician's assessment. No standard screening test has been taken into consideration.

3. Environmental factors, cultural factors of rearing in each group were not considered.

4. Each item attained by the Dharwad rural children as per the age was not analyzed.

5. The score at certain areas were high than the normative were not explored in the study.

Conclusion

The evaluation of 180(rural) normal children of 0-5 years of age group on PDMS-2 shows:

1. Most of the children were categorized in average and below average group as compared to PDMS-2 norms.

2. Boys of Dharwad (rural) population scored more than girls in object manipulation subtest.

Item wise analysis with heterogeneous sample needs to be undertaken with PDMS-2 scale. Hence when using PDMS-2 and interpreting their scores in Dharwad (rural) children, examiner should be cautious and also use of PDMS-2 on motor developmental delay on Indian population needs to be explored.

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