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EFFECT OF SELECTED PLAY ACTIVITIES ON ADAPTIVE SKILLS, AMONG CHILDREN WITH DOWN SYNDROME

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ABSTRACT

Play activities has been suggested as an intervention, to help children with Down syndrome, to strengthen their adaptive skills. **Aim:** evaluate the effect of selected play activities on adaptive skills, among children with Down syndrome.**Design:** One-group pre-posttest quasi-experimental research design was utilized.**Setting:** The genetic out-patient clinic in Cairo - University specialized pediatric hospital and the association for children with special needs. **Sample:**A purposeful sample of 30 children with Down syndrome, those had mild and moderate intellectual disability.**Tools of data collection:**three tools were utilized:a structured interview sheet, Vineland Adaptive Behavior Scale, and selected play activities check list sheet.**Results:** children's raw scores of Vineland adaptive behaviour scale improved significantly after application of selected play activities in areas of motor skills followed by daily living activities and socialization. **Conclusion:** the selected play activities had a positive effect on adaptive skills, especially fine motor skills and daily living activities among children with Down syndrome. **Recommendations:** booklet including play activities is needed, to improve down syndrome children's skills in different adaptive behaviors, and health education program must be designed and implemented, for caregivers about how to deal with their children, with Down syndrome for maximizing their children capabilities.

KEYWORDS: Adaptive Skills, Down Syndrome, Play Activities, Children

INTRODUCTION

Down Syndrome (DS) is a genetic disorder characterized, by a range of physical abnormalities and developmental delays in motor planning skills, language, and cognitive skills [1]. Each year, about 6000 babies born in the United States have DS, this means that DS occurs in about 1 out of every 700 babies [2]. The incidence of DS in Egypt varies between 1:555 and 1:770 and its screening, by triple test is becoming increasingly popular nowadays [3]. Down syndrome is a multi-system neurogenic disorder that impacts growth, development, and adaptive behavior throughout the life span [4]. Adaptive behavior includes the age-appropriate behaviors necessary, for people to live independently and to function safely and appropriately in daily life. Adaptive behaviors include life skills such as grooming, dressing, safety, food handling, working, money management, cleaning, making friends, social skills, and the personal responsibility expected of their age and social group [5]. The American Association on Intellectual and Developmental Disabilities (AAIDD) has defined an intellectual disability in a child, as a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills, which originates

before the age of 18 [6].

Adaptive skills are defined as practical and everyday skills needed to function and meet the demands of child's environment, including the skills necessary to effectively and independently, take care of one and to interact with other people. Adaptive skill areas are communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure, and work. Deficits in adaptive skills, in addition to sub-average intelligence, have been included as part of definitions of mental retardation, by the Diagnostic and Statistical Manual IV [6].

Daily living skills are often referred to, in the literature as adaptive behavior. These terms are used interchangeably and can be defined as the performance of daily living activities, required for personal and social sufficiency. These skills can be changed or modified, depending upon the interventions that, the individuals receive over time.Motor and daily living skills aredefined as observable and measurable behaviors that, promote independence, social acceptability, and quality of life. Motor skills are important area of development for typically developing children, as well as children with special needs, and DS has an effect on themotor development of children. When motor development of a child with DS, is compared with that of a typicallydeveloping child, a consistent delay is observed in the acquisition of both postural andvoluntary components of motor control. Physical, cognitive, and sensory integration problems decrease the functional ability of children in activities of daily living therefore, neurodevelopmental approaches, sensory integrative therapy, and vestibular stimulation have been used to improve function in children with DS [7].

The first few years of a child’s life seem spent almost exclusively in play. As a result of playing the child grows. Growth is the primary use of play and this is as true of intellectual growth as of physical [8]. Play provides a means of development in the areas of sensorimotor and intellectual progress, socialization, creativity, self-awareness, and moral behavior; it serves as a means for release of tension and expression of emotions [9]. Play is an important component in the child's plan of care [10]. Children, who are cognitively impaired, have the same needs for recreation and exercise as other children. Therefore, the nurse guides parents toward selection of suitable play and exercise activities. The type of play is based on the child’s developmental age, although the need for sensorimotor play may be prolonged for several years in those children. Parents should use every opportunity to expose the child to as many different sounds, sights, and sensations as possible. Suitable physical activity is based on the child’s size, coordination, physical fitness and maturity, motivation, and health. Intervention with the play of the infant, or preschooler may be directed toward developing adaptations that enhance exploratory and sensorimotor experiences [9].

Services early in life will often help children with DS, to improve their physical and intellectual abilities. Most of these services focus on helping children, with DS to develop their full potential. These services include speech, occupational, and physical therapy, and they are typically offered through early intervention programs [2]. There is recent evidence, that comprehensive early intervention programs (e.g., speech, visual, physical, and occupational therapy; psycho-therapy) enhance development. It is important to enroll children with DS in state-specific resources, as early as possible. Given the advances in medical care and early intervention programs, regular health supervision by family physicians can allow children, with DS to have healthy and productive lives [11].

Frequently, nurses are unfamiliar with children, who are cognitively impaired, and they may cope with their feelings of insecurity and fear by ignoring or isolating the child. Not only this is approach non-supportive, but it may also be destructive for the child’s sense of self-esteem and optimal development, and it may hamper the parents’ ability to cope

with the stress of the experience. One method that, successfully avoids this nontherapeutic approach is the use of the mutual participation model, in planning the child's care. Parents are encouraged to stay with their child but should not be made to feel, as if the responsibility is totally theirs [9]. Pediatric nurses play a pivotal, multifaceted role in assessment, providing support and education. This research could provide pediatric nurses, with an in-depth understanding related to this category of children, which could be reflected positively on their quality of life. Moreover, it is hoped that findings of this study might help in improving quality of DS children care and add to body of knowledge, in nursing research through evidence based practice study.

Aim of the study

The aim of this study is toevaluate the effect of selected play activities on adaptive skills, among children with DS.

Research Hypothesis

To fulfill the aim of the study the following research hypothesis were formulated:

Children with DS, who will receive the selected play activities, will have higher adaptive skills scores in posttest than in pretest.

- Children with DS, who will receive selected play activities, will have higher score in daily living skills in posttest than in pretest.
- Children with DS, who will receive xselected play activities, will have higher score in fine and gross motor skills in posttest than in pretest.

METHODS

Research Design

One-group pre-posttest quasi-experimental research design was utilized in the current study.

Subject

A purposeful sample of 30 children with DS who fulfill following inclusion criteria "Intellectual disability from mild (IQ 50–70) to moderate (IQ 35–50) range" and available at genetic clinic at outpatient clinics and disabled physically paralyzed children association, and their mothers were recruited for the purpose of the study.

Setting

The study was carried out in the genetic out-patient clinic in Cairo University Specialized Pediatric Hospital (CUSPH) and intervention sessions was done at recreational room that situated in the first floor to assure privacy, quiet setting and lessen distractorsduring play activities sessions. Another setting had available number of children with DS, it was the association for children with special needs named as (Disabled Physically Paralyzed Children Association) at Imbaba city, Giza governorate which affiliated to ministry of health. The two settings are governmental and introduce their services for free cost.

Tools

Data was collected through:-

- A structured Interview Sheet was utilized to fulfill demographic, personal and medical data about the child and their parents as age, level of education, and economic level, past and present medical history of children and their families.
- Vineland Adaptive Behavior Scale (VABS):-this scale was developed by [12]. This tool used to assess adaptive behavior skills in children through semi-structured interview based on a caregiver's report, in four broad domains: communication, daily living skills, socialization, and motor skills. The first domain was communication which consists of 67 items, the second domain was daily living skills which consists of 92 items, the third domain was socialization which consists of 66 items and fourth domain was motor skills which consist of 36 items. Arabic version of the scale done by [13] and this version adopted in this study.
- Selected play activities was developed by the researcher for children through twelve sessions with specific objectives, equipment's, time, and tasks. It was about 10 activities for improving fine and motor skills such as "transfer the sponge cubes by big forceps, pressure on the spongy ball, transfer large beads by hand fist" and for improve daily living activities such as "eating, dressing".
- Activities check list sheet prepared by research investigator that contains steps of each activity was performed with children and if was done or not done by child pre and post intervention sessions.

Scoring Systems

Scoring of Vineland adaptive behavior scale: The items of each of the four dimensions were scored 0, 1, and 2 for the responses "no, sometimes, and yes," respectively. For each dimension, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These raw scores were converted into standardized scores and the equivalent age was calculated using the related tables of the scale. The mean and median pre-post differences were then calculated. The equivalent ages of the four dimensions were summed-up and divided by four to calculate the equivalent age for the total scale. The difference between the actual and equivalent age was calculated at the pre and post-intervention phases.

Scoring of selected play activities: The items observed to be done were scored "1" and the items not done were scored "0". For each of the ten selected play activities.

Validity and Reliability

Content validity of study tools were been reviewed by threeexperts in pediatric nursing, child psychiatryand medicine. The experts agreed on the content of the tools, but recommended minor modifications.

Vineland Adaptive Behavior Scale (VABS) is standardized and translated into Arabic; its content validity and reliability was done by [13]. Reliability of the VABS was tested using Cronbach's Alpha, the alpha obtained was 0.765, indicating a high degree of internal consistency, and consequently high reliability.

PROCEDURE

The study tools were developed after extensive review of literature, after that an official permission was obtained from the director of Cairo University Specialized Pediatric Hospital (CUSPH) and the head of pediatric outpatient clinics; the researcher was introduce herself to children with DS and their mothers, written consent was obtained from mothers after complete description of the purpose and nature of the study, confidentiality was assured to each mother and her right to withdrawal from the study at any time.

At first session, structured interview sheet then, Vineland Adaptive Behavior Scale was administered by the researcher based on mothers' reports, and activities checklist sheet was administered as a pretest assessment.

Selected play activities was administered by the researcher for children and in presence of their mothers through 10 sessions with specific objectives, time, and tasks. The selected play activities was applied in the pediatric outpatient clinic (Genetic clinic) and at recreational room that situated in the first floor. Childrenwas exposed to the selected play activities individually and with their mothers. The researcher used demonstration technique to apply play activities with the child and his mother then the child was encouraged to do re-demonstration for many times. The period of the intervention took about three months for each child; one session per week; each session was approximately half an hour. The total number of sessions was thirteen sessions for each child including two sessions for pre/post-test. The mothers was attended with the researcher during sessions and encouraged to apply play activities for several times at home daily with her child to be effective and improve their adaptive skills.

At the last session, the post-test done for children to evaluate the effect of selected play activities on their adaptive skills through administered Vineland Adaptive Behavior Scale, and activities checklist sheet as a posttest assessment.

Pilot Study

A pilot study was carried out on 10% of the total sample to test study tools in terms of their clarity, applicability, time required to fill in them and accordingly no modifications were done. The sample of pilot study was included in the study.

Ethical Consideration

A primary ethical approval was obtained from the research ethical committee of the Faculty of Nursing, Cairo University. Permission was gained from the researcher who translate the VABS to Arabic version. All children's mothers were informed about the purpose of the study in order to obtain their acceptance to share in the study, the research investigator explained aim of the study, benefits, and duration of the study. Written consent obtained from children's mothers and they informed that participation in the current study was voluntary, the data collected was used only for research purpose, anonymity, confidentiality of each participant were assured and the mothershave the right to withdrawal from the study at any time without given reasons.

Statistical Analysis

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, means, standard deviations and medians for quantitative variables. Quantitative continuous data were compared using paired t-test for dependent

(pre-post) groups. The non-parametric Mann-Whitney and Kruskal-Wallis tests were used for comparing independent two means and more than two means, respectively. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of changes in Vineland scores, multiple linear regression analysis was used, and analysis of variance for the full regression models were done. Statistical significance was considered at p-value <0.05.

RESULTS

Table (1) reveals that there are a highly statistically significant differences toward improvements between pre and post children's mean scores in selected play activities of transfer sponge by forceps, pour water in vessel, cling clips, transfer water with sponge. There are a statistically significant differences toward improvements between pre and post children's mean scores in selected play activities of button clothes, spooning, transfer cubes by forceps, and transfer cubes by hand. Close bottles and open\close locks also improved post intervention but there statistically differences not reach the threshold of statistically significant differences (P= 0.06, 0.08) respectively.

Table (2) shows that there are a highly statistically significant difference toward improvement in children's raw scores of Vineland adaptive behaviour scale between pre and post application of SPA at four domains communication, daily living activities, socialization, and motor skills($t = 3.71, 4.24, 6.11$, and 5.29 respectively, $P < 0.001$). The DSC are improved in three domains with statistically significant differences in domain of motor skills ($t= 2.19$, $p=0.04$), followed by daily living activities ($t=2.35$, $p=0.03$), and socialization ($t=2.11$, $p=0.04$) but there are no a statistically significant difference in children's equivalent age pre and post sessions regarding domain of communication ($t= 1.00$, $P=0.33$).

Table (3) illustrates that there are a positive statistical correlation between children's Vineland adaptive behaviour scalescores of daily living activities domain and their scores of selected play activities ($r = 0.369$, $P < 0.05$).There are a positive statistical correlation between children's total Vineland adaptive behaviour scale scores and children's Vineland adaptive behaviour scalescores regarding daily living activities domain ($r = 0.589$, $P < 0.01$). There are a positive statistical correlation between children's total Vineland adaptive behaviour scalescores and children's Vineland adaptive behaviour scale scores of motor skills ($r = 0.383$, $P < 0.05$). The same table indicate that there are a negative correlations between children's equivalent age and children's total Vineland adaptive behaviour scale score, Vineland adaptive behaviour scalescores of daily living activities domain, and motor skills domain where ($r = -0.18, -0.20$,and -0.09 respectively, $P > 0.05$). There are a positive statistical correlation between children's total Vineland adaptive behaviour scale scores and their scores of selected play activities ($r = 0.26$, $P > 0.05$).

Table (4) shows that in multivariate analysis, the implementation of the selected play activities are the main statistically significant independent positive predictor of SPA scores improvement within the DSC ($t = 4.294$, $P < 0.001$).

Table 1: Comparison of Down Syndrome Children's Scores Of Selected Play Activities Pre And Post Selected Play Activities (SPA) (n=30)

Selected play activities	Pre	Post	Mann-Whitney Test	P-value
	Mean ±SD	Mean ±SD		
Button clothes	0.1±0.1	0.2±0.3	5.80	0.02*
Spooning	0.4±0.5	0.7±0.4	6.77	0.01*
Transfer sponge by forceps	0.1±0.3	0.4±0.5	7.82	0.005*
Pour water in vessel	0.2±0.3	0.5±0.4	13.24	<0.001*
Close bottles	0.2±0.4	0.4±0.5	3.55	0.06
Transfer cubes by forceps	0.1±0.3	0.4±0.5	5.86	0.02*
Transfer cubes by hand	0.8±0.4	1.0±0.0	6.56	0.01*
Cling clips	0.1±0.3	0.5±0.4	23.75	<0.001*
Open/close locks	0.1±0.3	0.3±0.5	3.03	0.08
Transfer water with sponge	0.4±0.3	0.8±0.3	16.08	<0.001*
Total selected play activities scores	0.2±0.2	0.5±0.3	15.31	<0.001*

Statistically significant at p<0.05

Table 2: Comparison between DSC' Scores of Vineland Adaptive Behavior Scale Pre And Post SPA (n=30)

Vineland Scale	Pre- post differences		Paired t-test	P-value
	Mean	SD		
Raw scores				
Communication	1.8	2.6	3.71	<0.001*
Daily living activities	3.5	4.5	4.24	<0.001*
Socialization	2.7	2.4	6.11	<0.001*
Motor skills	2.9	3.0	5.29	<0.001*
Total Vineland	11.1	8.2	7.45	<0.001*
Standardized scores				
Communication	-1.2	10.9	0.59	0.56
Daily living activities	-1.5	11.8	0.68	0.50
Socialization	0.5	9.6	0.30	0.76
Motor skills	2.2	10.2	1.20	0.24
Total Vineland	0.1	35.0	0.02	0.98
Equivalent age				
Communication	0.0	0.1	1.00	0.33
Daily living activities	0.2	0.5	2.35	0.03*
Socialization	0.1	0.3	2.11	0.04*
Motor skills	0.3	0.6	2.19	0.04*
Vineland (total)	0.2	8.5	0.13	0.90

Statistically significant at p<0.05

Table: 3: Correlation Matrix of Pre and Post SPA Differences In Selected Play Activities Scores and Vineland Adaptive Behavior Scale Scores

Scores	Spearman's rank correlation coefficient				
	Skills	Total Vineland	Equivalent age	Vineland (DLA)	Vineland (motor)
Skills					
Total Vineland	0.26				
Equivalent age	0.28	-0.18			
Vineland (DLA)	.369*	.589**	-0.20		
Vineland (motor)	0.04	.383*	-0.09	0.10	

Statistically significant at p<0.05 (**) statistically significant at p<0.01

Table 4: Best Fitting Multiple Linear Regression Model for the Selected Play Activities Score

	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error				Lower	Upper
Constant	-.98	.26		-3.752	<0.001	-1.50	-.46
Practicing selected play activities sessions	.28	.06	.45	4.294	<0.001	.15	.41
Female gender	.15	.07	.25	2.200	.032	.01	.29
Mother's education	.15	.07	.24	2.044	.046	.00	.29
Father's age	.01	.00	.30	2.751	.008	.00	.02

R-square=0.35 Model ANOVA: F=9.03, p<0.001

DISCUSSIONS

The study results revealed that the mean down syndrome children' equivalent age are improved post application of selected play activities in three adaptive behaviour skill domains which including (motor skills, followed by daily living activities, and socialization) with statistically significant differences, and the mean age of DS children was 3.7 years old, these results in line with the research done by [14] titled "the development of adaptive skills in young people with down syndrome" and reported that, children with DS acquire their adaptive skills at a slower pace and reach their ceiling scores at about the age of 12 years, and a substantially lower level than a reference group of typically developing children. Additionally, the study done by [15] titled "Profiles and development of adaptive behavior in children with Down syndrome" supported the current study results and reported that, one to 6-year-old children showed significant age-related gains in adaptive functioning, but older subjects showed no relation between age and adaptive behavior. While, these results contradicted with [16] in a study titled "growing up with down syndrome: development from 6 months to 10.7 years"who concluded that, there are no significant differences at the age of 24 months between participants and non-participants regarding to the mean adaptive functioning age (age equivalent). These study results support the main study hypothesis, children with DS who receive the selected play activities have higher adaptive skills scores in posttest than in pretest.

The study results revealed that there are a highly statistically significant improvement in DS children's raw scores of Vineland adaptive behaviour scale between pre and post application of selected play activities at daily living activities then motor skills, and socialization, these results not in accordance with [16]who illustrated that, socialization was a stronger adaptive skill than communication followed by daily living. Also, these results in line with [17] in a study titled "fine motor activities program to promote fine motor skills in a case study of down's syndrome" who mentioned that, the most improvement was in fine motor skills; including bilateral hand coordination, hand prehension, manual dexterity, in-hand manipulation, and hand muscle strength. Moreover, when considering the change of scores in bilateral hand coordination, hand prehension, manual dexterity, and in-hand manipulation skills, the in-hand manipulation score had the greatest change, while the hand prehension score had the least change.

The current study showed that there are a positive correlation between children's total Vineland adaptive behaviour scalescores and children's scores of motor skills, these results congruent with [18] in a study titled "motor control outcomes following nintendowii use by a child with down syndrome" who reported that, repeatedly practicing the skills involved in wii games, resulted in improvements in the child's postural stability, limits of stability, and Bruininks-

Oseretsky test of motor proficiency. So, Wii game used by a child with DS may elicit improvements in highly practiced motor skills and postural control, and balance.

The study results revealed that there are a positive correlation between children's total Vineland scores and their scores of selected play activities, these results supported with [19] in a study titled "effect of early multisensory massage intervention on visual functions in infants with down syndrome" who reported that, massaged group infants showed a significantly higher visual acuity at 6 months of age and an accelerated development up to at least 12 months; compared to controls. So, environmental enrichment, in the tested form of infant massage, seems to affect maturation of visual functions in human infants, also in the presence of a genetic disability, when applied during a period of high brain plasticity.These study results support the study hypotheses which stated that, children with DS who receive a selected play activities have higher score in daily living skills and fine and gross motor skills in posttest than in pretest. The current study results showed that, when children with DS practice any stimulating activities, it usually will had a positive effect on child's behaviour skills. So, those children must practice many activities in a fixed manner to maximize their abilities and improve their skills.

CONCLUSIONS

The current study concluded that,the selected play activities had a positive effect on adaptive skills especially fine motor skills and daily living activities among children with Down syndrome. There are a positive statistical correlation between children's Vineland adaptive behaviour scale scores of daily living activities domain and their scores of selected play activities. There are a positive statistical correlation between children's total Vineland adaptive behaviour scale scores and their scores of selected play activities.

RECOMMENDATIONS

The study recommends that a simplified and comprehensive booklet about many play activities needed to improve fine motor and daily living activities should be distributed to children caregivers and in health care services, health education program must designed and implemented for caregivers about how to deal with their children with Down syndrome for maximizing their children capabilities, ministry of health and mass media information should raise awareness of caregivers about importance of early intervention sessions for children with special needs, and replication of the current study on large sample and different hospitals settings to be able to generalize the results.

REFERENCES

1. Hickey F., Hickey E., & Summar K.L. "Medical Update for Children with Down syndrome for the Pediatrician and Family" *Practitioner Advances in pediatrics, 59 (1),* P.P 137–157, (2012).
2. Division of Birth Defects and Developmental Disabilities & Centers for Disease Control and Prevention, "Occurrence of Down syndrome", *Available at www.cdc.gov.* (2014).
3. Abou-Youssef, H., Kamal M., &Mehaney D.,"*Triple Test Screening for Down syndrome: An Egyptian-Tailored Study*" Ph.D. Publisheddissertation, Faculty of Medicine, Cairo University, (2014)Fiddler D., &Daunhauer L. "The Down syndrome Behavioral Phenotype: Implications for Practice and Research in Occupational TherapyOccupational Therapy*", In Health Care, 25 (1),*(2011).

4. Heward, W.,"Exceptional Children", *Available at www.amazon.com*. (2005).
5. Uyanik, M., Kayihan, H.,"Down syndrome: Sensory Integration, Vestibular Stimulation and Neurodevelopmental Therapy" Approaches for Children, *the Center for International Rehabilitation Research Information*, (2010).
6. Cardoso, A., Campos, A., Santos, M., Santos, D., & Rocha, N. "Motor Performance of Children With Down Syndrome And Typical Development At 2 To 4 And 26 Months" *Pediatric physical therapy, 27*, P.P. 135-141, (2015).
7. Gokhale, P., Solanki, P.V., and Agarwal, P.,"To Study The Effectiveness Of Play Based Therapy On Play Behavior Of Children With Down's Syndrome", *The Indian journal of occupational therapy, 46, (2):* 41-48, (2014).
8. Hockenberry, M. J. and Wilson, D. "*Essentials of Pediatric Nursing*", 9th ed., Mosby, P.P., 64-83, (2013).
9. Kyle, T. "*Essentials of Pediatric Nursing*", Philadelphia: Lippincott Company, P.P., 288-285,(2013).
10. Bunt, C.W., & Bunt, S.K.,"Role of the family physician in the care of children with Down syndrome", *Am Fam Physician, 15; 90 (12)*:P.P. 851-8, Dec (2014).
11. Sparrow, S., Balla, D., &Cicchetti, D.,"Vineland Adaptive Behavior Scale (VABs)",Washintgon (DC): American Guidance Service, (1984).
12. Elwan, F.,"Arabic Version of Vineland Adaptive Behavior Scale (VABs)", Egypt: Institute for the Psychological Studies, (2000).
13. Duijn G., Dijkxhoorn Y., Scholte E.M., Berckelaer-Onnes I.A., "The Development of Adaptive Skills in Young People with Down syndrome",*Journal of Intellectual Disability Research, 54(11):*943-54, Nov; (2010).
14. Dykens E., Hodapp R., and Evans D., "Profiles and development of adaptive behavior in children with Down syndrome" Down Syndrome Education International,*Available at www.down-syndrome.org*, (2017)
15. Amrita Kumari, Mita Singhal, et al., Effect of Adaptive Skills Training on Motor Development of Children with Down Syndrome, TJPRC:International Journal of General Pediatrics and Medicine (TJPRC: IJJGPM), Volume 1, Issue 1, July-December 2016, pp. 27-36
16. Marchal J., Maurice-Stam H., Houtzager B.A., Rozenburg-Marres S.L., Oostrom K.J., Grootenhuis M.A., &Trotsenburg A.S. "Growing up with Down syndrome: Development from 6 months to 10.7 years",*Research in developmental disabilities. Retrieved from: www. ScienceDirect.com.* Access on: 13/2/2017, (2016).
17. Lersilp,S., Putthinoi, S., &Panyo, K. "Fine motor activities program to promote fine motor skills in a case study of Down's syndrome",*Global journal of health science, 8(12)*, P.P. 60-67, (2016).
18. Berg P., Becker T., Martian A., Primrose K.D., Wingen J.,"Motor control outcomes following Nintendo Wii use by a child with Down syndrome",*Pediatr Phys Ther.24(1):*78-84, spring; (2012).
19. Purpura, G.,Tinelli, F.,Bargagna, S.,Bozza, M.,Bastiani, L., and Cioni, G.,"Effect of early multisensory massage intervention on visual functions in infants with Down syndrome", *Early Human Development, 90*, P.P. 809-813,(2014).