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RESEARCH ARTICLE

LITTLE GAME, BIG GAIN: AN ACTIVITY BASED INTERVENTIONAL PROGRAM TO ENHANCE PSYCHOMOTOR FUNCTIONAL ABILITY IN CHILDREN WITH DCD

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Abstract

Developmental coordination disorder (DCD) is considered as a disorder of children where they are unable to perform various skills which need fine motor coordination.Every child identified to have DCD shouldbe given interventions.This could be possible by simple games which makes them confident and moreover helps in improving their motor performance.Various interventional therapies have been identified to deal with the issue.

Introduction: Children are designed to acquire various skills in a step by step process during their growth and development. But sometimes these children fail to acquire certain skills when compared to their peer groups especially in areas of fine as well as gross motor movements. They face difficulty in handwriting, coordinating movements and are often labeled as clumsy and awkward. They even fail to tie their shoes, lacks in buttoning skills and is even considered as a walking disaster. These children are diagnosed to have neurodevelopmental disorder named as developmental coordination disorder (DCD). This condition is basically diagnosed by the four criteria of DSM V.

A. The acquisition and execution of coordinated motor skills is substantially below than expected given the individual's chronological age and opportunity for skill learning and use. Difficulties are manifested as clumsiness, dropping or bumping into objects, inaccuracy or slowness of performance of motor functions (eg: catching a ball, using scissors or cutlery, printing or hand writing riding a bicycle or participating in sports)

B. The motor skills deficit in "criteria A" significantly and persistently interferes with activities of daily living and impacts academic or school productivity, pre vocational skills, leisure activities and play .

C. The onset of symptoms is in the early developmental period

D. The motor skills deficits is not better explained by intellectual disability, visual impairment and or not attributable to a neurological condition affecting movement (eg: Cerebral Palsy, Muscular dystrophy, degenerative disorders)(1).

Early identification and management of this condition is vital as these children tend to face various complications in their near future, especially in their physical and psychosocial dimensions. As these children lacks ability in motor skills they usually avoid sports as well as various activities of games. As they are slow in their activities and have less attention/concentration they fail to do certain tasks within specified time and are considered to be lazy. This makes them self-isolated. Moreover these deficits may cause peer groups bullying them which makes

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them more anxious, depressed and may lead to lack of confidence.(2)

Literatures available indicate that, the major difficulty that every child with DCD face is with their motor function, especially becoming slow in performing tasks, difficulties with handwriting and even inability to concentrate or lack of attention which is collectively termed as psychomotor functional disability.(3) Various interventions are found to be effective in improving the psychomotor functional ability of children with DCD. While planning intervention, those interventions which are considered to improve the hand eye coordination, concentration and strength of the muscles with which the fine motor activities are performed is to be considered. The strategy is to be planned depends on the child's specific weakness.(4)

Every child diagnosed to have DCD has to be given intervention(5) .Simple forms of interventions in the form of fun games has been found to be effective in improving their psychomotor functional ability mainly in the areas of handwriting, hand eye coordination, manual dexterity, concentration and confidence. Many studies have proved the effect of various interventions in dealing with these issues.(6)(7). A combination of simple exercises in the form of games is found to have an effect on the psychomotor functional ability of these children. A widely accepted game among the children and the researchers is such a game known as sport stacking.

- **SPORT STACKING**

Sport stacking is an exciting, individual as well as a team sport where the participants stack and unstack paper or plastic cups in a predetermined sequence and complete for time either against another player or a team of members. Sequences are usually in the form of pyramids of three, six or ten cups. This game is generally named as cup stacking and has originated in the early 1980's in Southern California as a recreational activity. This was invented by Wayne Godinet who gave the name to the cup stack (Karango Cup stack).Promoters of this game claim that this activity results in many direct and indirect benefits.(8)

In a pretest post test study conducted by Uderman and colleagues to assess the effect of sport stacking among forty two second grade students with DCD showed a significant improvement in hand eye coordination and reaction time when compared to the control group. Various other studies have also proved the effect of sport stacking on reaction time and hand eye coordination when practiced for more than three weeks. Another study conducted by Liggin and colleagues asserted that, in their study the experimental group who participated in the sport stacking exercise program for a duration of 12 weeks had a significant improvement in reaction time when compared to the control group. The study also claimed that, sport stacking activity is considered to be easy to set up at any school settings and the children love and is welcomed very much to adapt to their practice.(9)

A study conducted by Hart and Biexy examined the electrical activity of the two hemispheres of the brain during sport stacking as measured by electroencephalogram. The participants took part in two practice sessions (30 minutes each) and one testing session. The results of the study illustrated that, sport stacking utilizes both sides of the brain and they needed to cross the midline if they wanted to play correctly. The study also supported that by making new connections at brain level and allowing right and left hemispheres to work together, aids in several important contribution to the cognitive domain mainly enhancing improvements in concentration, problem solving and general learning.(10)

Procedure

The children has to be seated in a comfortable position and to be given 15 paper cups and is asked to build a pyramid in a sequence of 5-4-3-2- and 1, as soon as possible, noting the time of start and the time of completion. Later the cups have to be down stacked in the same manner as the sequence of staked.(8)

Figure1: Sport Stacking

- **HAND THERAPY BALL EXERCISES**

Children with DCD face difficulty with handwriting. This may be due to various factors such as decreased hand strength, visual motor difficulty or impaired proprioception. These children may have difficulties with guiding the movements which is required for drawing or writing letters in a coordinated way leading to messy, smudged or illegible handwriting.(11). Another intervention formed is the use of hand therapy ball exercise/smiley balls. Hand therapy ball exercises have been proved to be an effective intervention to improve fine motor skills, especially in children with DCD. Providing children with these balls while writing, helps the children to equalize the pressure between the two sides of the body. This could be attained by asking the child to press too hard the ball held in the hand other than the writing hand while writing. Squeezing stress ball sends sensory signals that occupy one part of the child's brain, thereby making them attentive. Moreover the dexterity and hand strength improves as there is increased blood flow to the extremities and other parts of the body. When there is more blood flow to the hands, it enhances the growth of muscles resulting in former grip. Studies have also proved that those children using stress ball exercise have been shown to have heightened concentration. Consistent practice of these eight hand therapy ball exercises, simulate the brain thereby promoting itself in its activities. A set of at least 10 repetitions of each exercise is recommended per day to achieve the outcome.(12)

a. Power grip: squeezing the ball with fingers and thumbs as if making a fist

This exercise helps to strengthen the grip, thereby making easier to grasp objects. Grasping the ball targets the flexor muscles to improve strength for picking objects. While receiving the ball, the extensor muscles are targeted which allows the items to remain in.

Figure2: Power grip

b.Pinch: pinching the ball with finger and thumb extended for a greater amount of time. This helps to strengthen different muscles especially targeted by curled fingers.

Figure 3: Pinch

c. Thumb flexion and extension: The thumb plays a vital role in certain functions such as pinching and grasping. With the palm flat (flat as possible) the ball has to be placed on the palm with the thumb supporting the ball. Then with the help of thumb, roll the ball up and down the palm.

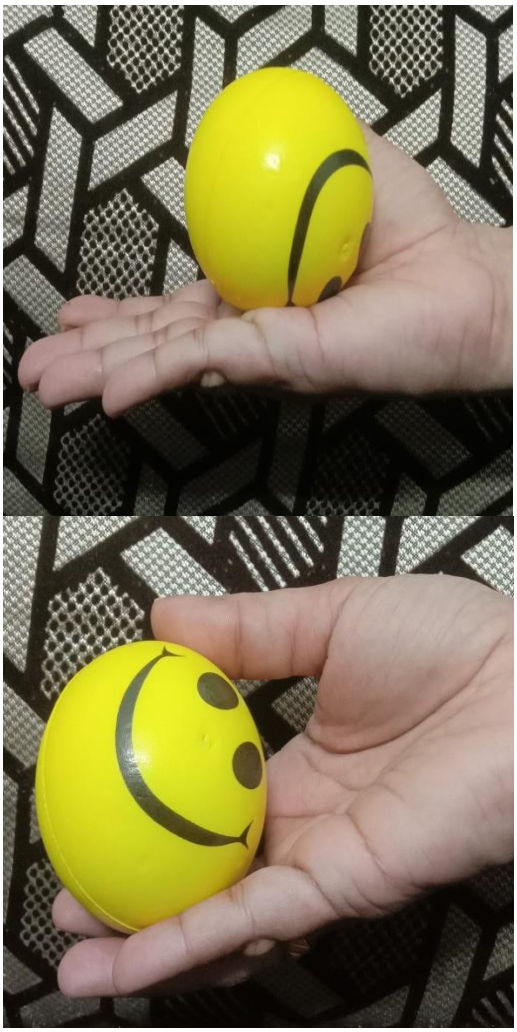

Figure 4: Thumb flexion and extension

d. Table roll: rolling of ball from tip of fingers to palm. Place the hand therapy ball on flat table and place the hands on top of it. While keeping a flat hand, roll the ball from the base of the palm up to the fingertips.

Figure 5: Table Roll

e. Finger Flexion: Pressing all the fingers except the thumb into the ball. This helps in strengthening the muscles that allow to bend the fingers.

Figure 6: Finger Flexion

f. Thumb roll: Rolling the ball in a circular motion with the thumb. This helps in entire range of motions of thumb, thereby preventing stiffness and improving the control. For this, the ball has to be placed on the palm. The palm has to be kept flat and by using the thumb, keep the ball in place.Then by using the thumb,roll the ball in a circle on the palm.

Figure 7: Thumb Roll

g. Finger squeeze: Squeezing the ball with two fingers.This helps in strengthening the finger adduction muscles.The therapy ball has to be placed in between two fingers and the fingesr has to be squeezed and released.This could be done between any combination of fingers and it has to be done in between all fingers.

Figure 8: Finger squeeze

h. Thumb opposition: Rolling ball from left to right side of palm with the thumb

This is similar to thumb roll by the ball to be rolled side to side instead o circles.The ball ahs to be kept on the palm and with the help of the thumb,the ball has to be kept in place.Furthur by using the thumb,the ball has to be moved from left to right.

- **RUBBER BAND EXERCISES**

Rubberband exercises are considered to be the best technique to build hand strength and fine motor skills among the children. Rubber bands are versatile and includes fun and is a much admirable creative way to build hand strength and fine motor skills. Children with DCD face difficulties while performing everyday fine motor tasks that require good hand and wrist muscle strength for coordination.(13)

1.Stretching a rubber band: for this one or more sturdy rubber bands are required.The rubber bands has to be grasped on each side between the tip of the forefinger and the thumb.The hands has to be moved part to stretch the rubber band as fas as it could be.These bands also help in childs posture,hand strength,trunk and core strength.Many times these children with DCD struggle to perform theses tasks,mainly difficulty in copying notes from the board,difficulty with handwriting and fine motor and often becomes clumpsy and lie down on the desk.Activities with rubber band exercises could strengthen those core mscles of the ody,trunk,hands and neck, thereby helps in improvement of all these areas.

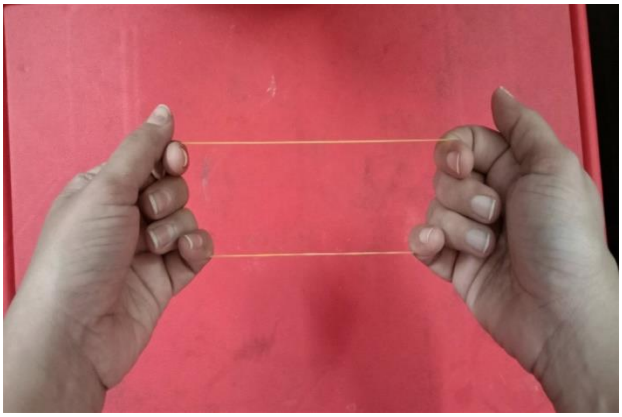

Figure 8: stretching of rubber bands

2. Creation of different shapes

Stretching rubber band into different shapes and holding it for 10 seconds and repeating each manipulations for a duration of 10 minutes enhances muscle strength and helps in coordination.

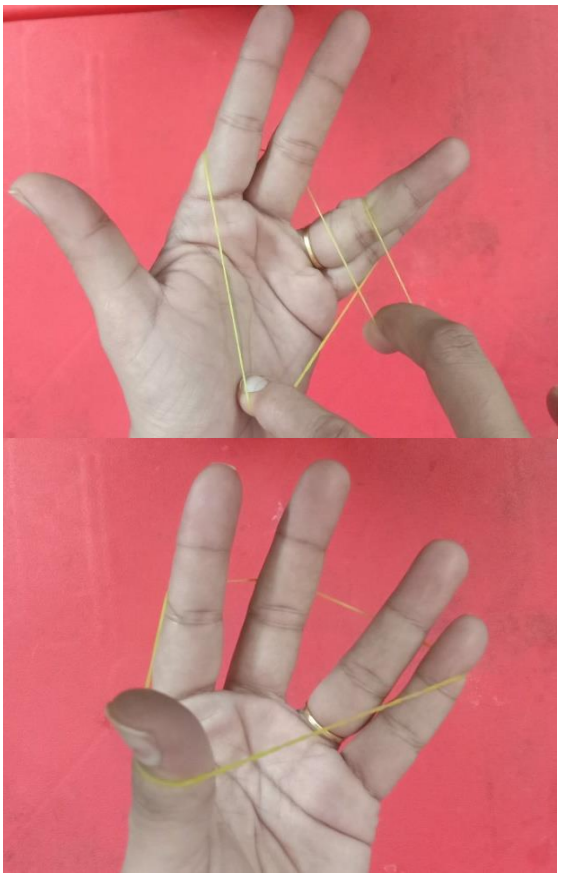

Figure 9: creation of different shapes

Conclusion

DCD is a condition, if diagnosed early and managed with selected intervention gives a good outcome.Simple games which has scientific evidence of improving coordination could be adapted inorder to help children struggling with this specific disorder.Early identification and intervention would contribute to a very good prognosis thereby helping them to achieve the best of their performance both academically and in the activities of daily living.

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