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PUZZLE STIMULATION THERAPY FOR DEVELOPMENTAL DISORDERS IN CHILDREN WITH DOWN SYNDROME

Zida Mutiara Mufidah [1] , Ratna Kurniawati [2] , Retno Lusmiati Anisah [3]

[1,2,3] Alkautsar Nursing Academy Temanggung, 56218, Indonesia
*Zida Mutiara Mufidah, Alkautsar Nursing Academy, Temanggung, 56218, Indonesia.
Email: zidamufida9@gmail.com

ABSTRACT

Down syndrome is the most common and easily recognized genetic disorder, characterized by an extra copy of chromosome 21. One of the common signs is delayed growth and development, both physically and mentally. One form of stimulation that can be provided to support development is puzzle therapy. This study aimed to improve growth and development in children with Down syndrome through the use of puzzle therapy. A case study was conducted involving two children with Down syndrome who met the inclusion criteria. The therapy was carried out over five consecutive days, with each session lasting 30 minutes. The results showed that after receiving puzzle therapy for five days in the morning, the children's growth and development disorders improved, as indicated by the evaluation of enhanced nursing outcomes. It can be concluded that puzzle therapy is effective in addressing growth and development delays, particularly in improving fine motor skills in children with Down syndrome.

Keywords : Down syndrome; growth; development disorders; puzzle

INTRODUCTION

Down syndrome is the most common and easily recognized genetic disorder. According to 2020 data from *the World Health Organization (WHO), approximately 3,000 to 5,000 children are born with Down syndrome* each year. Currently, an estimated 8 million people worldwide have *Down syndrome.* [1] . Indonesian Health Data (SKI) 2023, the incidence of *Down Syndrome* in Indonesia in 2023 was 0.25% of children aged 48 to 59 months who had abnormalities since birth. The incidence of *Down syndrome* in Central Java As many as 0.19% of children aged 48 to 59 months have had abnormalities since birth [2] *Down syndrome* occurs because there is an additional chromosome on chromosome 21. This additional chromosome causes an increase in the number of certain proteins, which disrupts normal body growth and causes changes in brain development, as well as delays in development in adaptive functions and interacting with the social environment [3] The causes that cause copies on chromosome 21 are *nondisjunction* or chromosome failure, namely pregnant women over the age of 35 years, viral infections, radiation, *anaphase lag.* namely the failure of chromosomes or chromatids to join one of the daughter nuclei formed during cell division [3]

Children *with Down syndrome* often experience a lack of coordination, weakness in fine and gross motor control, mouths that are always open, a reading position that is too close to the eyes, difficulty understanding, sensory disorders, speech delays [1] , poor coordination

between the hands and eyes, lack of muscle pressure, short and blunt fingers which cause fine motor disorders, motor disorders in children with *Down syndrome* are the most common. is difficulty coloring, drawing, building block towers, putting together *puzzles,* tying shoelaces, writing, putting on clothes [4] .

Management of children *with Down syndrome* includes physical therapy, speech therapy, occupational therapy, behavioral therapy, and play therapy [5] . Play therapy is an effort to change behavior and media for learning, one of the therapies given to children *with Down syndrome* is puzzle therapy. *Puzzles* are a type of game consisting of parts or pieces of pictures, shapes and numbers [6].

METHODS

This research uses a qualitative case study research method, the case study subjects are 2 children *with Down syndrome* who experience developmental disorders. Data collection methods used interviews using inclusion criteria sheets, developmental examinations using the Pre-Screening Questionnaire (KPSP) and the format of signs and symptoms of developmental disorders according to the Indonesian Demographic and Health Survey (IDHS), and observation. Evaluation of actions using the developmental status evaluation sheet according to the SLKI and KPSP. This *puzzle stimulation therapy* was carried out at SLB Djojonegoro Temanggung class 4c for 5 days in the morning for 30 minutes.

RESULT

The research was conducted from February 24, 2025 to February 28, 2025. Respondents in this research experienced developmental disorders, were unable to perform behavioral skills appropriate to their age, had impaired physical growth, limited eye contact, flat affect, and were easily angered [7]

Table. 1. Results of *Down syndrome assessment*

No	Criteria	An. A		An. R	
		Yes	No	Yes	No
1	At birth was there muscle weakness?	Yes		yes	
2.	The head shape is relatively small (*microcephaly*), and flat in the nape area.	Yes		Yes	
3.	The shape of the eyes is narrow with a fold in the middle (*epicanthal fold*).	Yes		Yes	
4.	The nose is small and the bridge of the nose is depressed inward	Yes		Yes	
5.	The tongue sticks out, sometimes *has fissures*	Yes		Yes	
6.	Hands and feet wide, short, blunt	Yes		Yes	
7.	*Hypotonic* mandible (pot belly, umbilical hernia)		No		No
8.	*Hyperflexible* and lax joints		No		No
9.	Simia line		No		No
10	Short head	Yes		Yes	

11	Short thick neck	Yes		Yes	
	Total	8	3	8	3

Based on table 1 [3], it can be concluded that both respondents had *Down syndrome.* The results of both respondents showed that 80% had problems in accordance with *Down syndrome symptoms.*

The next assessment is to examine the nursing problems of growth and development disorders according to major and minor signs, the results of the assessment can be seen in table 2 [7].

Table 2: Assessment of growth and development disorders

No	Signs & symptoms	An.a		An.r	
		Yes	**No**	**Yes**	**No**
1	Unable to perform age-appropriate behavioral skills	Yes		Yes	
2	Impaired physical growth	Yes		Yes	
3	Limited eye contact	Yes		Yes	
4	Flat affect	Yes			No
5	Easy to get angry	Yes		Yes	
6	Social response	Yes		Yes	
	Total	6	0	5	1

The results of the nursing problem assessment for both respondents can be concluded that both respondents experienced growth and development disorders, where both respondents were unable to perform age-appropriate skills, physical growth was disturbed, eye contact was limited, affect was flat in an. A while in an. R it was not, and they were easily angered.

After carrying out *puzzle stimulation therapy* , the two respondents were evaluated using nursing outcomes to measure the results of *puzzle therapy. The results of the evaluation of the level of development after carrying out puzzle* therapy are in table 3 [8] [9].

Table 3. Results of Development Status Outcome Evaluation

No	**characteristics**	**An. A**					**An. R**				
		H.1	H.2	H.3	H.4	H.5	H.1	H.2	H.3	H.4	H.5
1	Age-appropriate behavioral skills: Able to point out colors correctly	1	1	2	2	3	4	4	5	5	5
	Children are able to draw people and squares	1	1	1	1	1	3	3	3	3	4
	Able to dress yourself	3	3	3	3	3	4	4	4	4	4
	Able to jump on one leg without holding on	2	2	2	2	2	4	4	4	4	4

	Able to balance for 11 seconds	1	1	1	1	1	3	3	4	4	5
	Able to catch small / big balls	4	4	4	5	5	4	4	5	5	5
2	Social response	1	1	3	3	3	3	3	4	5	5
3	Eye contact	1	1	2	3	4	3	3	4	5	5
Description: 1 = decreased, 2 = decreased quite a bit, 3 = moderate, 4 = increased quite a bit, 5 = increased											
4	Anger	1	2	3	4	4	4	5	5	5	5
Description: 1 = increased, 2 = increased quite a bit, 3 = moderate, 4 = decreased quite a bit, 5 = decreased											
5	Affect	2	2	3	3	4	4	4	5	5	5
Description: 1 = increased, 2 = increased quite a bit, 3 = moderate, 4 = decreased quite a bit, 5 = decreased											

Table 3 shows an increase in developmental status after being given *puzzle therapy* : age-appropriate behavioral skills increased, social responses increased, eye contact increased, anger decreased, affect improved.

Figure 1. *Puzzle* used

DISCUSSION

The inability to perform skills or behaviors according to age such as motor skills and language in children *with Down syndrome* will experience delays such as aspects related to the child's ability to perform movements and body postures that involve certain body parts and require careful coordination such as observing something, holding a spoon, pinching, writing, aspects related to the child's ability to respond to sounds, speaking [10] . In both respondents, they were not yet able to perform skills according to their age, namely the age of 11 years where children should be able to draw, write, but respondent 1 was not yet able to do it, while respondent 2 was already able to do it but needed direction and examples.

Impaired physical growth, short stature is a characteristic of most children with *Down's disease. Syndrome* . The average height at most ages is around the second percentile of the general population. The primary cause of growth retardation is still unknown [3] . Both respondents experienced impaired physical growth, with both respondents experiencing delayed tooth growth and a small head shape. Flat affect is not a typical physical characteristic of children *with Down syndrome.* Flat affect due to a lack of appropriate emotional expression can be part of the behavioral deficit in individuals with *Down syndrome.* The ability to interact with others is known as social skills. *Puzzles* can not only be played individually, but can also be played in groups, which improves children's social interactions. Children in groups will respect each other, help each other, and talk to each other so that children's social responses will increase [11] . The design of *puzzles* used by children *with Down syndrome* is recommended to have a size, number of pieces and shape that is easy to hold, the number of pieces used ranges from 4-12 pieces and the shape of the curves that are easy to hold and recognize, use bright colors and avoid color similarities to make it easier to distinguish pieces because in general children *with Down syndrome* like bright colors [12] . Playing *puzzles* improves concentration, encourages problem solving, trains hand and eye coordination, and children can improve their visual perception by playing *puzzles* with various colors and shapes. They will learn to distinguish colors, shapes, and sizes of *puzzle parts* [13].

Puzzle stimulation therapy for developmental disorders In children with *Down syndrome* , both case study subjects experienced improvements, namely increased age-appropriate skills, increased social responses, increased eye contact, decreased anger, improved affect, which means that developmental status increased after being given therapy for 5 days with 30 minutes per meeting [4] , however, in case study subject 1 there was not much improvement so that a lot of practice and regular assistance were needed. Based on these achievements, it can be said that *puzzle stimulation therapy* is able to overcome developmental disorders in children *with Down syndrome* , especially in fine motor skills . The results of this study are in line with Rahmayanti's research., 2018 which showed an increase in fine motor skills in 16 respondents at SLB Negri Citeureup after being given *puzzle therapy,* with the data collection techniques used being observation sheets, and KPSP, from the results of her research showed that there was an increase in fine motor skills in children *with Down syndrome* [4] , while in Arianti's research, 2018 showed a significant increase in fine motor skills before and after being given therapy, which was carried out on 36 respondents at SKH Negri 1 Tangerang Regency [5] .

CONCLUSION

Down syndrome is a condition where there is the most common and most easily recognized genetic disorder, caused by the presence of an extra chromosome 21. Children with *Down syndrome* are characterized by a smaller and flatter head shape at the back of the head, slanted eyes, a flat nose, and loss of muscle tone. Developmental disorders in children can be at risk of experiencing an inability to grow and develop according to age. Factors that cause developmental disorders are environmental limitations due to physical disabilities, indifference, separation from parents, lack of stimulation.

The provision of puzzle stimulation therapy is the provision of stimulus in the form of *puzzle games* for 30 minutes in 5 consecutive days and carried out in the morning before learning is able to improve developmental status, because in the morning children are more focused and enthusiastic, *Puzzle stimulation therapy* is effective in improving child growth and development as evidenced by an increase in developmental status in both case study subjects. *The puzzle* used by researchers is D 'PUZZLO CERIA which is effective in improving fine motor skills and less effective for gross motor skills.

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