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Improving the Effectiveness of Individual ABA Therapy of Autistic Children Through Addition Foldable Table Top

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Abstract. Children with autism tend to have difficulty to sit still during therapy. This causes hindrance in the therapy process. Applied Behavioral Analysis (ABA) is one of the best proven ways to treat children with autism. ABA method usually uses a special table called ABA table. However, the ABA table still has some problems in its use. When autistic children throw a tantrum, they often push the therapy table. This makes the therapists have to hold the table with their feet and hurts the therapists feet makes therapy ineffective. This study aims to investigate the effect of oval curvature, base mat addition and alternative designs of a foldable table top addition on the ABA table. The results of this evaluation are expected to improve the effectiveness of ABA table as a therapeutic tool. Research method used observations were carried out using three types of tables. Namely Table A, which is commonly used in ABA therapy, with oval curvature on its edge and without a permanent base mat, and Table B, which is a table without oval curvature on its edge but with a permanent base mat and table C is equipped with a foldable table top and permanent base mat. Observations were carried out on therapy sessions of 15 children with autism (12 boys, 3 girls) The results of the second stage testing show that table C is the best recommendation for use in ABA therapy because it can help increase attention, overcome aggressive behavior and help train self-development in children with autism.

Keywords: Autism, ABA Table, Alternative Autism Therapeutic Table

1. Introduction

The word autism comes from the Greek word *auto* which means by itself [1]. Autistic people seem to be living in a world of their own. A child who has autism usually pays little attention to the surrounding environment and are unable to conduct their social interactions normally. They also commonly have difficulty speaking and developing their language [2]. Autistic children have several symptoms including less responsiveness and limited eye contact. Autistic children have their own interests and are sensitive to sound, and some of them are either hyperactive or very passive; they like to run, shout, and repeat certain movements [3]. The Applied Behavioral Analysis (ABA) method is an effective way to provide therapy for autistic children. The Lovaas / ABA method was invented by Professor DR. Ivar Lovaas from the University of California, Los Angles (UCLA), United

States. The basis of this method is the use of a behavioral theory approach, which emphasizes on control skills and building eye contact at the early intervention stage of children with autism. [4].

Autism, which was previously impossible to cure, can be treated using ABA method, especially in children at an early age (infantile autism) so that they can join formal school [1]. The ABA implementation technique uses individual approach. One child is treated by one therapist, and if needed, the therapy will be accompanied by a promting staff who helps the child to direct their behavior as instructed by the therapist. In its development, ABA therapy uses the principle of operant condioning and respondent condititioning. Desirable and undesirable behavior can be controlled and improved by a reward and punishment system [5]. The ABA method aims to minimize bad behavior and increase good behavior. ABA therapy which is done intensively on children shows an improvement of 89% [4]. In Indonesia, special table called the ABA table use method Applie Behavioral Analysis (ABA). The ABA table is a table that has an oval curvature on its side, oval curvature on its side to facilitate closer eye contact between autistic children and the therapists [6]. The use of ABA table in Indonesia still has several problems in theraphy. Autistic children often push the table during tantrums so that the therapist have to hold it with their legs. The pressure from the table often injures the therapist's leg.

In previous research, testing has been carried out. comparing the curved effect on the table. Using table A and table B. The results show that the table A autistic child gets therapy and the table that is easily pushed and use table B the child who has tantrum can easily get out of the table. From the results of the study, it resulted in a table design recommendation with a oval hole and foldable table that had not been tested called table C. So that oval hole table can be used if needed when a child with autistic tantrums. And can be folded when the child with autism is in good condition [7].

Table A **Table B**
Table C

Figure 1. (a) Table A is the real ABA table. (b) Table B is a ABA table which has been modified. (c) Table C is table with a permanent base and with a foldable table top

In this study, 3 types of tables were tested. Table A is a table commonly used during ABA therapy which has without a base mat and an oval curvature (8). Table B is an alternative design that was made with an addition of permanent base mat but without oval curvature on its side. Table C is a table with a permanent base that aims to prevent the

table from being pushed easily. Table C is also added with a foldable table top. The study compared the use of tables A, B and C to determine the effect of table curvature on ABA therapy for autistic children and to determine their effectiveness. The results of this study provide recommendations for the best therapy table so that it can be an effective therapeutic tool.

2. Participants

This study was conducted on 3 girls and 12 boys autistic children aged 6-12 years. The anthropometric data mean ± SD of all participants involved in this study were as follows: age: 8.3 ± 2.6 years; weight: 29.7 ± 8.9 kg; ; height: 128 ± 15.7 cm. The children's conditions varied from those who could be considered calm to those who were unable to sit still when paying attention to therapist directions.

3. Research Instrument

In this study, three types of tables were used, namely Table A, Table B and Table C. Table A is a table which is commonly used in children with autism therapy. It has oval curvature/ oval hole on its side but it does not have a base mat. Table B is an alternative design that was made by without an oval curvature on its side and adding a permanent base mat but. And Table C is a table with a permanent base mat to prevent the table from being pushed by the children and added with a foldable table top. Table A (w: 60; l: 66; h, 55,h: 24.5) has an oval curvature on one side. Table B is a table that has a different design as a test alternative (l: 104, h: 59 w: 49). This table has an additional base mat but does not have oval curvature on its side. Table B is a table which was designed using secondary data, namely data on the use of Table A in the therapy of children with autism for 6 months. Table C is a table with a permanent base mat, oval curvature on its side, and a foldable table top (l: 60, h: 59, w: 94).

4. Experimental Research

The observations were made in individual classrooms at the Autism Service Center in Surakarta, Indonesia. Observations were carried out directly by the therapists. Tables A, B and C were used for therapy for two years. In the first 6 months, observations were made using a video camera in individual rooms with table A and table B. The cameras were hidden at a height of 180cm from the floor to observe therapy sessions for children with autism. Observations were made at therapy sessions with durations of approximately two times 30 minutes. The success of video observation can be seen from whether the autistic children could follow the therapy well. If technical problems occured during documentation, another video would be taken on the next therapy session. In the second phase of the study, secondary data from therapy for children with autism was compared with data on the results of therapy for the previous 6 months using table A to see the development of children with autism when using the therapy table so that the data obtained was more accurate. The second stage of observation was carried out in a therapy rooms for children with autism with the same room conditions and with a longer duration.

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The second phase observations were made as in the first stage but without using a video camera. Observations were made directly by the therapist and progress was recorded after therapy was completed.

5. Measurement

Measurements were made by observing movements and eye contact of children with autism during therapy with a calculation of 8/10 from the video recordings and therapist's notes. The criteria for successful therapy was when the child could pay attention to the therapist and follow the directions given. The criteria for successful movement observation in therapy was when autistic children did not push, shift, hit or get out of the table, or make repetitive movements that interfere with the course of therapy without the direction of the therapist.

The method of calculating 8/10 is done by observing movement and eye contact on the video that has been recorded with the following calculations: The final score was calculated by the sum of all positive responses divided by all negative responses and positive responses without calculating the assistance and rewards given by the therapist. Eye contact and movements of children with autism were said to be successful if they score 80% or more [4]. Secondary data and Observational data were combined statistically analyzed using the Chi-square test on the IBM 20.0 version of the Statistical Package for the Social Sciences (SPSS).

6. Result

The results of the first phase study regarding the success rate of Table A, with secondary data taken from the results of therapy observation that had been carried out for 6 months, showed a low success rate of up to 16.7%. The use of table B after observation showed a better result of 75%. The addition of a base mat increased the success of the therapy. Table B with a base mat cannot be pushed by the children because it was held down by their own weight while sitting. The drawback of table B is that it does not have an oval curvature, which made it easy for the children to get out of the table and leave the therapist during tantrums. The percentage of eye contact during the use of table B without curvature on its side was not worse than that of using the ones with oval curvature on the side. Table B's success rate was 83.3%.

Table 1. The percentage of success rates for therapy tables A, B and C in the second phase of observation.

Indicator	**Table Types**					
	Table A		Table B		Table C	
	Eye contact (Number of children%)	Movement (Number of children%)	Eye contact (Number of children%)	Movement (Number of children%)	Eye contact (Number of children%)	Movement (Number of children%)
Successful	5%	40%	10%	50%	10%	70%
Unsuccessful	95%	60%	90%	50%	90%	30%
Number of children (%)	100%	100%	100%	100%	100%	100%

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The results of the second phase of the study for 1 years were observed directly by the therapists by comparing the use of Table A, Table B and Table C. The success rate of eye contact using Table A was 5% (Table 1). The observation of movement when using table A resulted in a low success percentage of 40% (Table 1). In using table A, autistic children could still push the table. The results of observing eye contact of children with autism when using table B obtained a success rate of 10%. The movement observation when using Table B with the addition of a base mat in the second stage obtained better percentage of 50% (Table 1). It was very helpful for therapists, because autistic children were no longer able to push the table. The results of observations using table C showed succes rate percentage of 10% (Table 1) for eye contact and 70% for movement (Table 1). The curvature of the autistic therapy tables had no effect on the success of the therapy. The oval curvature was useful for helping therapists handle children with autism during tantrums so they could be calmer and stay with the therapist.

Figure 2. Table C is table with a permanent base and with a foldable table top

Table 2. Effect of Table type on autism therapy

Function	Table Types		
	Table A	Table B	Table C
Between children and therapists with autism training eye contact	✓	✓	✓
Helping the therapist in overcoming the aggressive behavior of children with autism	✓	✓	✓
Improving concentration and attention of children with autism when completing tasks	✓	✓	✓
Supporting the Applied Behavior Analysis method applied by the therapist to children autism	✓	✓	✓
Facilitating children with autism to understand instructions from a therapist	✓	✓	✓
Helping to improve mild posture control	✓	-	✓
Training sitting quietly	✓	-	✓
Improving the self-development abilities of children with autism	-	-	✓
Helping therapists when children with autism tantrums	-	-	✓

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From the results of the observations second phase at the Autism Service Center using table A (Fugure 1) with an oval curve on its side, it was found that the curvature of the table keeps children seated and makes it dificult to get out of the table. The curvature also helps the therapy especially when children with autism throw tantrums. However, when using table A (Figure 1), autistic children can still push their table A. The use of table A in autism therapy can train the ability to do tasks (obedience), train concentration, attention and train receptive language skills. This supports the applied behavior analysis (ABA) method applied by therapists to help children with autism. Table A has the flexibility of table movement, making it easier for the therapist to do the blocking when dealing with children with autism who throw tantrums. Table A (Figure 1) can help therapists deal with aggressive behaviors of autistic children, such as when autistic children push the table, get out of the table or move the table without a therapist's direction. The curvature on the sides of table A (Figure 1) and table C (Fugure 2) can help improve posture control which is light in nature. With this curvature, it was easier for autistic children to be directed to sit upright. With the curvature that limits autistic children from the things around them, the children could focus more on the therapist.

The use of table B has disadvantages compared to the use of table A (Figure 1) and table C (Figure 2). Table B cannot help improve posture control which is light in nature, cannot train to sit quietly when children throw tantrums, cannot improve children's self-building abilities, and can only help the therapist overcome the behavior of children with autism who push the table, because table B has a permanent base mat. Table B has no curvature so it was easy for the children to run away from it.

Table C could be used better than table A and table B. Table C can serve to train eye contact between therapists and children with autism, help therapists in overcoming aggressive behavior of children with autism, increase concentration and attention of autistic children when completing tasks, support the applied behavior analysis (ABA) method which is applied by therapists to children, make it easier for children with autism to understand instructions from the therapist, help improve mild posture control, train quiet sitting, improve self-development abilities of autistic children, and help therapists when children with autism throw tantrums.

Table 3. Effect of Table type on autism therapy

Characteristics of Table Advantage		**Table Types**		
		Table A	Table B	Table C
Functionality	Light	✓	✓	✓
	Withsanding weight	✓	✓	✓
	Easy to clean	✓	✓	✓
Safety	No sharp edges	✓	✓	✓
Endurance	Strong structure	✓	✓	-
	Resistant to porous	✓	✓	✓
Aesthetics	Attractive design	-	-	-
	Color variations	-	-	-
Ergonomics (Comfort)	Standardized dimension	✓	✓	✓

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After a longer observation, the characteristics of each table advantages can be seen in five aspects consisting of functionality, safety, durability, aesthetics, and ergonomics. After the testing, table A and table B have the same advantages, namely light weight, can withstand loads, easy to clean, not having sharp corners, having a strong structure, porous resistant, and haing dimensions that comply with standards. Meanwhile, table C has a disadvantage after going through the experiment for a long period of time, namely the hinge of the foldable table top starts to woble. The retractable hinge began to woble. While the same drawbacks of the three design tables were less attractive designs and no color variations.

7. Discussion

The results of the first stage observation showed a significant difference in success rate as indicated by the level of eye contact and movement when using the therapy table. The low outcome was influenced by the length of time the autistic child get for therapy. The use of table A was good for children with low levels of autism. Autistic children at this level usually better obey the therapist's instructions and do not pushthe table so that the therapists do not have to hold it with their feet.

Autistic children are more focused when using table B. Autistic children have poor motor development, rough movements and are less flexible when compared to children of the same age [9]. The habit of pushing and flipping the table was reduced because there is a permanent base mat on table B. The oval curvature in table B was eliminated so that sometimes bored children did not push the table, but ran away from the table. Due to the absence of an oval curvature, there is nothing that keeps the child from leaving the table.

Table C uses a permanent base mat and a foldable table top. The addition of a mat makes the table cannot be pushed by autistic children. The foldable table top can be folded if not needed, so it can be used for children with mild to severe conditions. If children with autism throw tantrums, the foldable table top can be raised, and if the autistic children are not throwing a tantrum, the foldable table top does not need to be raised. Table C has better results for dealing with aggressive behavior of children with autism. The curvature in the foldable table top can also familiarize autistic children with using a table without curvature so that when autistic children get better at individual therapy, they will find it easier to adjust to continue therapy in the transition room. The transition room is a space to prepare children for entering public schools or special schools. But after a long-term observation, table C has a drawback, namely the hinge part of the foldable table top which becomes easy to shake. Therefore, the use of hinges needs to be replaced with other alternatives for further research to increase the effectiveness of therapy for children with autism.

8. Conclusion

Several conclusions can be drawn from the results of the two phase observation study. The first phase of the study showed that the removal of the oval curvature does not have a significant impact on the success of the therapy and that the addition of a base mat has a significant effect on the success of the therapy. It was found that each table can function

for certain conditions in children with autism. Table A, a table without a base mat with an oval hole on its side, can be used for mild to severe cases with moderate levels of aggression of children with autism. Table B, a table without oval hole on the side with a base mat, can be used for autistic children with mild cases without aggressive behavior. For children with mild cases of autism in children with relatively good self-development abilities can be use table C.

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