

Effect of Specially Designed Physical Activity Program on Physical Fitness and Behaviour of Children with Autism of The Rewachand Bhojwani Academy, Pune

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ABSTRACT

The Rewachand Bhojwani Academy (RBA) in Pune is an educational institution that enrolls students from various backgrounds, including those with different abilities such as autism, slow learners, and spectrum disorder. RBA's physical education program aims to develop of all these types of students. The present research study aimed to explore the impact of a physical activity program on muscular strength, flexibility, coordination, and cardiovascular endurance of autistic students. The program was implemented three times a week for 8 weeks. For sample selection a purposive sampling method was used. The study utilized a pre-experimental research design with a single group pre-test and post-test. The findings of the study were analysed using SPSS software and the null hypothesis was rejected for the 600 yard test, while the alternative hypothesis was rejected for the hand grip test, sit and reach test, and ball-catching test at 0.05 significance level. It was concluded considerable intervention program was effective for 600 yard test and also positive behaviour changes which observed during the program.

Keywords : Physical activity, Behaviour, Autism, Impairment.

Introduction

Autism is a developmental disorder that affects a child's ability to communicate, socialize and interact with others. Physical activity has been shown to have a positive impact on the physical fitness and behaviour of children with autism. Firstly, it is essential to understand the individual needs of each child with autism. Some children

with autism may have difficulty with certain types of physical activities, while others may excel in certain areas. Therefore, it is important to assess each child's abilities and interests, and tailor the program accordingly. Secondly, the program should be designed in a way that is engaging and enjoyable for the children. This may involve incorporating activities that they enjoy such as music, games or incorporating visual aids to help them understand the activity. Thirdly, the program should be designed in a way that encourages social interaction and communication among the children. This may involve incorporating activities that require cooperation and teamwork or activities that involve turn-taking and sharing. So, it is important to have trained professionals who are knowledgeable about autism and the specific needs of children with autism to lead the program. These professionals should be able to modify the program as needed, based on the individual needs of each child.

Methodology :

Research methods are specific procedure for collecting and analysing data. As the researcher wanted to see effect of specially designed physical activity program on behaviour and physical fitness of children with autism in The Rewachand Bhojwani Academy Pune, as per the nature of study present research falls under experimental method.

Design of Research

In this study researcher used, Pre-experimental research design using purposive sampling used single group pre-test and post-test design.

This design provides some improvement over the first, for the effect of the treatment are judged by the difference between the pre-test and the post-test scores. However, no comparison with a control group is provided.

$$O_1 \times O_2$$

$$O_1 = \text{Pre-test } O_2 = \text{Post-test } X = \text{Experiment}$$

Variable of the study - In research, variables are many characteristics that can take on different value, such as height, age, temperature or test scores.

Independent Variable - Specially designed physical activity program

Variable that stands supposed to be responsible for bringing about changes in a phenomenon or situation. In this study specially designed physical activity program is independent variable.

Dependent variable - Autism behaviour and physical fitness

The variables outcome or changes brought about by introduction of an independent variable. In this study autism behaviour and physical fitness is dependent variable.

Extraneous variable – Students regularity or consistent

An extraneous variable is any variable that you're not investigating that can potentially affect the dependant variable. In this study students regularity or consistent is extraneous variable.

Method of study

The research study had an Experimental method, which was focus on answering research questions and examining the difference or outcome of designed program between pre-test and post-test. The chosen research method is of quantitative nature and it utilize physical fitness tests to collect data.

Population : The population of this study includes children with special needs in the Jacana Section, as well as the SCC Primary section in the mainstream, at The Rewachand Bhojwani Academy during the academic year of 2022-2023.

Sample : During the academic year of 2022-2023 at The Rewachand Bhojwani Academy, there were a total of 24 children with special needs in the Jacana Section, and 13 children in the SCC Primary section in the mainstream, making a population of 37 children. For this study, a purposive sampling technique was used to select 20 children out of the total population of 37.

Sampling Technique : In the present research, researcher selects the sample from Jacana section (autism) in the Rewachand Bhojwani Academy Pune using Non probability Purposive Sampling method.

Tools of Data Collection : The data required for the study was collected through semi structure interview and physical fitness test.

Table No 1.1 : Data collection tools

Sr. No.	Variables	Tool	Measures in
1	Muscular strength	Handgrip strength dynamometer	Kilogram
2	Flexibility	V sit and reach box	Centimetre
3	Co-ordination	Alternate hand and ball catching	Numbers
4	Cardio vascular endurance	600 yard run or walk test	Min/sec

Procedure of Research –

1. It is an experimental research which is going to be conducted with the purpose to find out the effect of 8 weeks physical activity program on autism students age between 8 to 12 year old.
2. The researcher selected 20 students from the Rewachand Bhojwani Academy in Pune conduct a pre-test. After the pre-test, the researcher implement a program for selected students with autism, which were conducted by the researcher during the week.
3. The researcher administer a pre-test and post-test using a testing tool.
4. After the completion of the training program, post-test will be conducted to the students.
5. The collected data was analysed statistically to determine the effects of an 8-week physical activity program.

Method of Analysis Data : For data analysis, the researcher utilized Microsoft Excel to calculate descriptive statistics such as mean, median, standard deviation, minimum, maximum, range and standard error of mean differences between pre-test and post-test. Additionally, SPSS software was used to conduct paired sample t-tests to determine statistical significance between the pre-test and post-test scores.

Data analysis and Discussion : Data analysis is involves statistical technique, software tools and visualizing methods to organise and interpret data.

Table No. 1.2 : Summary of descriptive statistics of Hand grip strength test

Statistics	Handgrip Strength Test	
	Pre-test	Post-test
Mean	9.68	9.85
SD	3.70	4.05
SEM	0.90	0.98
Correlation	0.996	
Mean Diff	-0.17	
t value	-1.39	
df	16.00	
Sig. (2-tailed)	0.18	

The data presented in Table 1.2 shows the descriptive statistics of pre and post hand grip test. The average strength of 17 subjects before the intervention was 9.68 kg, with a range between 19.90 kg for the strongest subject and 5.80 kg for the weakest subject. It was observed that 50% of the subjects had strength stronger than 8.01 kg, while the remaining subjects had weaker strength than 8.01 kg. The standard deviation was 3.70, and the standard error of the mean was .90, indicating that the selected subjects were in the weak zone as per norms.

After the intervention, the average strength of the same 17 subjects increased to 9.84 kg, with a range between 21.20 kg for the strongest subject and 5.60 kg for the weakest subject. It was observed that 50% of the subjects had strength stronger than 8.04 kg, while the remaining subjects had weaker strength than 8.04 kg. The standard deviation was 4.05, and the standard error of the mean was .98, indicating that the selected subjects were in the normal zone as per norms.

The degree of freedom was 16, and 't' value was -1.39, which is significant at the 0.05 level. Thus, it can be concluded that there was no significant difference between the pre-test and post-test of hand grip strength scores, and the alternative hypothesis ($H_1: M_1 \neq M_2$) is rejected.

Table No. 1.3 : Summary of descriptive statistics of Sit and reach test

Statistics	Sit and Reach Test	
	Pre-test	Post-test
Mean	7.18	8.46
SD	5.95	6.82
SEM	1.44	1.65
Correlation	.975	
Mean Diff	-1.28	
t value	-3.17	
df	16	
Sig. (2-tailed)	.006	

The data presented in Table 1.3 shows the descriptive statistics of pre and post sit and reach flexibility test. The average flexibility of the 17 subjects was 7.18 cm, with excellent performers achieving 20 cm and poor performers achieving 0 cm. 50% of the subjects had excellent flexibility (>6.05 cm), while the remaining subjects exhibited poor flexibility. The standard deviation of 5.95 and SEM of 1.44 suggest that the selected subjects were in the good zone as per norms.

After the intervention, the average flexibility was 8.46 cm, with excellent performers achieving 24.50 cm and poor performers achieving 0 cm. Again, 50% of the subjects had excellent flexibility (>6.05 cm), while the remaining subjects demonstrated poor flexibility. The standard deviation of 6.81 and SEM of 1.66 suggest that the selected subjects were in the good zone as per norms.

The degree of freedom of 16 and a significant t-value of -3.166 at the 0.05 level. The results suggest that there was no significant difference between the pre-test and post-test sit and reach flexibility scores, and the alternative hypothesis ($H_1: M_1 \neq M_2$) was rejected. Thus, it can be inferred that the intervention did not have a significant impact on the students sit and reach flexibility scores.

Table No. 1.4 : Summary of descriptive statistics of Alternate hand and ball catching test

Statistics	Alternate hand ball catching test	
	Pre-test	Post-test
Mean	4.47	5.82
SD	2.37	3.11
SEM	.58	.75
Correlation	0.893	
Mean Diff	-1.35	
t value	-3.83	
Df	16	
Sig. (2-tailed)	0.001	

The data presented in Table 1.4 shows the descriptive statistics of pre and post alternate hand ball catching test. The average alternate hand ball catching score of the 17 subjects before the intervention was 4.48, with a minimum score of 0 and a maximum score of 9. 50% of the subjects scored above 4, while the other 50% scored below 4. The standard deviation of the pre-intervention scores was 2.38, indicating a wide range of scores among the selected subjects. The standard error of the mean was 0.58, which suggests that the sample mean is likely to be a reliable estimate of the population mean.

After the intervention, the average hand-eye coordination score of the 17 subjects increased to 5.82, with a minimum score of 1 and a maximum score of 12. 50% of the subjects scored above 5, while the other 50% scored below 5. The standard deviation of the post-intervention scores was 3.11, which is higher than the standard deviation of the pre-intervention scores, suggesting that there was more variability in the scores after the intervention. The standard error of the mean for the post-intervention scores was 0.75, which suggests that the sample mean is still likely to be a reliable estimate of the population mean.

The results of the paired t-test showed that there was no significant difference between the pre-test and post-test scores of ball coordination performance, as the t-value of -3.833 was significant at the 0.05 level. Therefore, the alternative hypothesis ($H_1: M_1 \neq M_2$) is rejected.

It shows intervention did not result in a significant improvement in the alternate hand ball catching performance of the selected subjects. However, the post-intervention scores did show a higher average score and more variability than the pre-intervention scores. The sample of subjects selected for the study had poor hand-eye coordination to begin with, as indicated by their pre-intervention scores being below the norm.

Table No. 1.5 : Summary of descriptive statistics of 600 yard CV test

Statistics	600 yard CV Test	
	Pre-test	Post-test
Mean	5.68	5.13
SD	.80	.70
SEM	.19	.17
Correlation		0.88
Mean Diff		0.55
t value		5.90
Df		16
Sig. (2-tailed)		0

The data presented in Table 1.5 shows the descriptive statistics of pre and post 600 yard test. The average cardiovascular endurance of the 17 selected subjects was 5.68 seconds before the intervention, with a range of scores from 4.48 seconds for very poor performers to 7.20 seconds for superior performers. 50% of the subjects had superior cardiovascular endurance above 5.45 seconds, while the other 50% had very poor cardiovascular endurance below 5.45 seconds. The standard deviation of the pre-intervention scores was 0.80, indicating a moderate range of scores among the selected subjects. The standard error of the mean was 0.19, suggesting that the sample mean is likely to be a reliable estimate of the population mean.

After the intervention, the average cardiovascular endurance of the 17 subjects decreased to 5.13 seconds, with a range of scores from 4.40 seconds for very poor performers to 6.50 seconds for superior performers. 50% of the subjects had superior cardiovascular endurance above 5.02 seconds, while the other 50% had very poor cardiovascular endurance below 5.02 seconds. The standard deviation of the post-intervention scores was 0.70, which is lower than the standard deviation of the pre-intervention scores, indicating less variability in the scores after the intervention. The standard error of the mean for the post-intervention scores was 0.17, which

suggests that the sample mean is still likely to be a reliable estimate of the population mean. The results of the paired t-test for the 600 yard test showed that there was a significant difference between the pre-test and post-test scores of cardiovascular endurance, as the t-value of -5.902 was significant at the 0.05 level. Therefore, the null hypothesis ($H_0: M_1 \neq M_2$) is rejected.

The intervention resulted in a significant improvement in the cardiovascular endurance of the selected subjects, as indicated by the lower average post-intervention score and the significant difference in the paired t-test. The pre-intervention scores showed a moderate range of scores, while the post-intervention scores showed less variability in the scores.

Conclusion :

The specially designed physical activity program had a strong correlation with all fitness factors tested in children with autism at The Rewachand Bhojwani Academy, Pune. However, based on the pair sample t-test, the alternate ball and hand catching test, Sit and reach test, and hand grip strength test did not show significant differences due to the short duration of the physical activity program. In contrast, the 600-yard cardiovascular endurance test showed a significant difference, with the null hypothesis being rejected. Further research is needed to determine the long-term effectiveness of this physical activity program on children with autism.

Overall, a specially designed physical activity program can have a positive impact on the physical fitness and behaviour of children with autism at the Rewachand Bhojwani Academy in Pune. By considering the individual needs of each child, engaging activities, promoting social interaction, and having trained professionals lead the program, children with autism can benefit from the many positive effects of physical activity.

Recommendations :

Research topic that can contribute to the knowledge and understanding of how physical activity can positively impact the health and well-being of children with autism. Here are some recommendations for conducting this research:

- Further research is necessary to gain a better understanding of children with autism or any other disabilities, in order to acquire more knowledge.
- The physical fitness factors of children with autism students can be compared to various categories of children with special need, example – hearing impaired, visually impaired, deaf and dumb, learning disabilities etc.
- Researches based on various skills and morphological variables can be taken up for further study.
- Choose an appropriate study design to test the hypothesis. A randomized controlled trial or a quasi-experimental design with a control group can be suitable for this research.

- **Participants** : Select a sample of children with autism who are attending The Rewachand Bhojwani Academy Pune. Ensure that the sample size is appropriate for the study design.
- **Physical Activity Program** : Design and implement a physical activity program that is appropriate for the participants and addresses their specific needs. Consider factors such as the type and intensity of physical activity, duration of the program, and level of supervision required.
- **Medical History** : To obtain the medication history of children with autism before planning a fitness program to ensure safety and appropriateness of the exercise routine.
- **Outcome Measures** : Use validated measures of physical fitness such as cardiorespiratory fitness, muscular strength, coordination and flexibility. It may also be useful to collect data on other outcomes such as quality of life, behaviour, and academic performance.
- **Data Analysis** : Analysed the data using appropriate statistical methods to determine the effectiveness of the physical activity program.
- **Ethical Considerations** : Ensure that the study adheres to ethical guidelines for research involving human subjects and obtain informed consent from the participants and their parents/guardians.

Overall, this research can contribute to the development of evidence-based interventions that can improve the health and well-being of children with autism.

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