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Physiotherapy Modalities and its Effect on The Development of Functional Ability in Children with Cerebral Palsy

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ABSTRACT

In Indonesia, currently there are various physiotherapy intervention modalities for children with special needs, especially in cerebral palsy. The Bobath concept is a holistic approach to solving the problems of individuals with movement disorders and postural control as a result of lesions in the central nervous system. The purpose of this study was to determine the effect of physiotherapy modalities on functional abilities in children with cerebral palsy. This research was an experimental type that had a control variable with a nonequivalent control group design, but in this design the experimental group and the control group were not randomly selected, functional ability measuring tool used gross motor functional movement (GMFM). All respondents received treatment 16 times (2 times per week), measured as first post-test, followed by treatment 16 times (2 times per week) measured as second post-test. The first post-test (16 times) and the second post-test (32 times), these data were compared. The results of the repeated measured ANOVA test in the control group revealed that there was a significant difference in functional ability after the bobath concept treatment ($p=0.060$; $x_1=-0.714$; $x_2=-2.714$) and after the bobath concept and taping treatment ($p=0.027$; $x_1=-2.400$; $x_2=-6.000$). But, there was found not significant after the bobath concept and stretching treatment ($p=0.071$; $x_1=-0.333$; $x_2=-3.667$), and after the bobath concept and infrared treatment ($p=0.126$; $x_1=-1.000$; $x_2=-2.500$). The results of the Freadman test there was a significant difference in functional ability after the bobath concept and massage treatment ($p=0.023$). The conclusion, there was a significant difference in functional ability improvement after being given treatment by the bobath concept, bobath concept plus taping, and/or bobath concept plus massage.

Keywords: physiotherapy; children's functional abilities; cerebral palsy; bobath concept; taping; massage; stretching; and infrared.

Introduction

One of the most common disorders of growth and development in children and the number of occurrences is cerebral palsy [1]. Cerebral Palsy (CP) is the most common motor disability disorder in children with a prevalence of 2-3 per 1000 live births [2]–[4]. 50% of cases are mild, meaning that the patient can take care of himself, and 10% are classified as severe, meaning that the patient requires special services. 35% are accompanied by seizures and 50% have speech disorders, with an average of 70% spastic type, 10-20% athetotic type, 5-10% ataxia, and the rest are mixed type [5].

The term CP is defined as a group of permanent disorders of the development of movement and posture that cause limitations in activity, which occur because of non-progressive disturbances in the developing brain of the infant or fetus. Motor disturbances in CP are often accompanied by disturbances of sensation, perception, cognition, communication, behavior, epilepsy, and secondary disorders of the musculoskeletal system [6]. Disorders of CP can be caused by risk factors that occur during the prenatal, perinatal, and postnatal periods [7], [8].

Manifestations of motor or posture disorders can be spasticity, absence of primitive reflexes (in the early phase) or persistent primitive reflexes (in the advanced phase), and can result in delays in growth and development. These symptoms can occur by themselves or as a combination of these symptoms. Spasticity is a disorder of motor function with the form of spasticity depending on the location and magnitude of the damage, namely monoplegia/monoparesis, hemiplegia/hemiparesis, tetraplegia/tetraparesis, altered tone as in the form of athetosis and choreoathetosis, balance disturbance in the form of ataxia, and can also be in the form of tone decreased or hypotonic [9].

Cerebral trauma involving trauma of the middle cerebral artery is the most frequently encountered and confirmed pathological setting of patients with spastic hemiplegic CP using evaluation from computed tomography (CT) and magnetic resonance imaging (MRI). The assessment has demonstrated tissue loss (necrosis and atrophy) with or without gliosis. Obtained perinatal deficits or damage due to acute asphyxial events. At a time when blood circulation to the brain has resembled that of an adult brain, hypoperfusion will damage the watershed area of the cortex (the end zone of the major cerebral arteries), which in turn causes a spastic quadriplegia phenotype. The basal ganglia can also be affected in this condition, which in turn leads to extrapyramidal disorders (such as choreoathetoid or dystonic) [10].

According to Haenggeli & Suter-Stricker [10], that the neurological and functional development of children with CP will be impaired to varying degrees. The approach to rehabilitation of children with CP is comprehensive, in addition to medical and surgical applications; physiotherapy, occupational therapy, speech therapy, prosthetic orthotics and other adaptive devices, recreational activities, school and adaptation education and psychosocial support, are required in the rehabilitation approach. Physiotherapy plays a central role in managing this condition focusing on function, movement and optimal use of a child's potential. Physiotherapy uses a physical approach to promote, maintain and restore physical, psychological and social well-being. Physiotherapists focus on gross motor skills and functional mobility management for motor deficits in CP [12].

Positioning, sitting, transitions from sitting to standing, walking with or without assistive devices and assistive devices, use of wheelchairs and transfers, are areas that physiotherapists work

on. Exercise refers to planned structured activities involving repetitive movements of skeletal muscles resulting in energy expenditure and seeking to increase or maintain a level of physical fitness above the intensity of activities of daily living. Several types of exercise therapy are used to improve children's motor skills including passive stretching, manual stretching, static weight-bearing, strength training aim, functional exercises, hydrotherapy, bobath concept, training programs, and electrical stimulation [12].

The Bobath concept is a holistic approach to solving the problems of individuals with movement disorders and postural control as a result of lesions in the central nervous system [13]. Taping is adhesive tape which has its therapeutic effect, which determined by the extent tape stretched and shape application [14]. Stretching is physical exercise through the activity of lengthening muscles or muscle groups so as to increase their flexibility and elasticity [15]. Massage is a therapeutic technique that is carried out through the touch of the hand [16]. Infrared (IR) is therapy using the energy band of the electromagnetic spectrum [17].

Gross Motor Functional Measurement (GMFM) is a tool that has been developed to assess motor function in children with CP. The GMFM has 88 items each rated on a 4-point ordinal scale of 0 to 3. The 88 items are grouped into five dimensions: 1) supine and rolled over, 2) sitting, 3) crawling and kneeling, 4) standing, and 5) walking, run and jump. A maximum of three trials is allowed for each item and the best trial is recorded. The score for each dimension is expressed as a percentage of the maximum score for that dimension and the total score is obtained by averaging the percentage scores across the five dimensions [18].

Based on the above studies, the researchers formulated the problem, namely how the effect of several physiotherapy modalities on the functional abilities of children with cerebral palsy. The purpose of this study was to determine the effect of several physiotherapy modalities on functional abilities in children with cerebral palsy.

Methods

This type of research was experimental research. This design had a control variable to control external variables that affected the implementation of the experiment. The research design was a nonequivalent control group design. This design was almost the same as the pretest-posttest control group design, but in this design the

experimental group and the control group are not randomly selected.

The research was conducted in a community of parents with children with CP, namely the Bumiayu Great Parents Community, Brebes. Data collection was carried out in June-September 2022. The research subjects were children with CP who are members of the CP community. The inclusion criteria that must be met are children with a medical diagnosis of CP and aged 0-18 years. Exclusion criteria were children with accompanying medical diagnoses. Drop-out criteria are subjects who do not carry out informed consent.

In this study there were five groups, where one group was the control group and the other four groups were the experimental group. The control group received treatment in the form of a bobath concept. The second experimental group received treatment in the form of bobath concept and taping. The third experimental group received treatment in the form of bobath concept and stretching. The fourth experimental group received treatment in the form of bobath concept and massage. The fifth experimental group received treatment in the form of bobath concept and infrared.

Based on the data obtained, out of a total of 43 children with cerebral palsy who met the inclusion criteria, there were 17 children who dropped out because they did not participate in the research process until the end. The sample size of the respondents in this study was 26 respondents. In this study there were five groups, where one group was the control group and the other four groups were the experimental group. The control group received treatment in the form of a bobath concept, consisting of 7 children. The second experimental group received treatment in the form of bobath concept and taping, consisting of 5 children. The third experimental group received treatment in the form of bobath concept and stretching, consisting of 6 children. The fourth experimental group received treatment in the form of bobath concept and massage, consisting of 4 children. The fifth experimental group received treatment in the form

of bobath concept and infrared, consisting of 4 children.

The variables in this study include: (1) independent variables, namely several physiotherapy modalities, (2) dependent variable, namely the development of functional abilities of people with cerebral palsy, and (3) controlled variables, namely therapy and treatment schedules. Physiotherapy modalities that can be given to overcome aggravating factors for disability include neurodevelopmental treatment, hydrotherapy, taping, massage, and others. GMFM is used to evaluate the development of functional abilities of children with CP.

All respondents received treatment 16 times (2 times per week), measured as first post-test, followed by treatment 16 times (2 times per week) measured as second post-test. The first post-test (16 times) and the second post-test (32 times), these data were compared. The bobath concept was provided to stimulation and facilitation of child development. Tapping interventions was applied to areas or regions of the body that require facilitation or inhibition of muscle performance. Stretching was applied to joints or areas of the body that require lengthening to increase the range of motion. Massage was applied to the whole body. Infrared was applied to areas of the body that experience increased muscle tone.

The stages of conducting the research included: (1) pre-test, (2) first-stage intervention, (3) first-stage post-test, (4) second-stage intervention, (5) second stage post-test, and (6) processing of research data. As for the ethical clearance of this research, it is registered at number No.LB.02.02/1.3/9578.1/2020.

Statistical analysis used to test the difference between pre and post physiotherapy treatment using repeated measures ANOVA test if the data is normally distributed and Friedman's test if the data is not normally distributed. Statistical analysis was used to find out which intervention was more influential, using the one-way ANOVA test analysis technique.

Results and Discussion

Table 1.
Description of research data.

	Term	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
						Pre-Test	Bobath Concept		
	Bobath Concept dan Taping	5	45.80	15.802	7.067	26.18	65.42	23	63
	Bobath Concept dan Stretching	6	21.67	21.621	8.827	-1.02	44.36	1	48
	Bobath Concept dan Massage	4	13.25	21.391	10.696	-20.79	47.29	0	45
	Bobath Concept dan Infrared	4	7.50	5.447	2.723	-1.17	16.17	1	14
	Total	26	30.58	27.518	5.397	19.46	41.69	0	91
Post-Test I	Bobath Concept	7	51.14	32.876	12.426	20.74	81.55	8	92
	Bobath Concept dan Taping	5	48.20	13.989	6.256	30.83	65.57	30	63
	Bobath Concept dan Stretching	6	22.00	21.872	8.929	-.95	44.95	1	49
	Bobath Concept dan Massage	4	13.75	20.998	10.499	-19.66	47.16	1	45
	Bobath Concept dan Infrared	4	8.50	6.608	3.304	-2.01	19.01	1	17
	Total	26	31.54	27.660	5.425	20.37	42.71	1	92
Post-Test II	Bobath Concept	7	53.14	32.231	12.182	23.33	82.95	13	94
	Bobath Concept dan Taping	5	51.80	17.312	7.742	30.30	73.30	31	74
	Bobath Concept dan Stretching	6	25.33	24.402	9.962	-.28	50.94	2	59
	Bobath Concept dan Massage	4	17.25	21.793	10.896	-17.43	51.93	3	49
	Bobath Concept dan Infrared	4	10.00	7.483	3.742	-1.91	21.91	2	20
	Total	26	34.31	28.302	5.551	22.88	45.74	2	94

Table 2.
Normality Test with Shapiro-Wilk Test.

Modalities	Pre-Test		Post-Test I		Post-Test II	
	Statistic	Significant	Statistic	Significant	Statistic	Significant
Bobath Concept	.929	.540	.925	.508	.920	.468
Bobath Concept dan Taping	.958	.793	.931	.606	.972	.886
Bobath Concept dan Stretching	.817	.083	.825	.098	.863	.200
Bobath Concept dan Massage	.742	.033	.730	.025	.785	.078
Bobath Concept dan Infrared	1.000	1.000	.980	.900	.961	.783

Table 3.
Homogeneity Test.

Data	Levene Statistic	df1	df2	Significant
Pre-Test	2.437	4	21	.079
Post-Test I	2.507	4	21	.073
Post-Test II	1.939	4	21	.141

Table 4.
Repeated measured anova: mauchly's test of sphericity.

Groups	Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
						Greenhouse-Geisser	Huynh-Feldt	Lower-bound
1	Time	.436	4.151	2	.126	.639	.736	.500
2	Time	.831	.557	2	.757	.855	1.000	.500
3	Time	.052	11.790	2	.003	.513	.524	.500
5	Time	.036	6.676	2	.036	.509	.523	.500

Table 5.
Repeated measured anova: tests of within-subjects effects.

Groups	Term	Type III Sum of Squares	df	Mean Square	F	Sig.
1	Time Sphericity Assumed	27.714	2	13.857	12.838	.001
	Greenhouse-Geisser	27.714	1.279	21.673	12.838	.006
2	Time Sphericity Assumed	91.200	2	45.600	6.739	.019
	Greenhouse-Geisser	91.200	1.710	53.323	6.739	.027
3	Time Sphericity Assumed	49.333	2	24.667	5.139	.029
	Greenhouse-Geisser	49.333	1.027	48.039	5.139	.071
5	Time Sphericity Assumed	12.667	2	6.333	4.385	.067
	Greenhouse-Geisser	12.667	1.018	12.442	4.385	.126

Table 6.
Repeated measured anova: pairwise comparisons.

Groups	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
						Lower Bound	Upper Bound
1	1	2	-.714	.286	.140	-1.654	.225
		3	-2.714*	.680	.022	-4.950	-.478
2	1	2	-2.400	1.288	.408	-7.503	2.703
		3	-6.000	1.703	.073	-12.745	.745
3	1	2	-.333	.211	.524	-1.078	.412
		3	-3.667	1.520	.182	-9.039	1.706
5	1	2	-1.000	.707	.757	-4.434	2.434
		3	-2.500	1.190	.380	-8.281	3.281

Table 7.
Friedman test.

	Mean Rank		N	Chi-Square	df	Asymp. Sig.
Pre-Test	Post-Test I	Post-Test II				
1.38	1.63	3.00	4	7.538	2	0.023

Table 8.
One way anova test.

	Term	Sum of Squares	df	Mean Square	F	Sig.
Post Test I	Between Groups	8013.054	4	2003.264	3.785	.018
	Within Groups	11113.407	21	529.210		
	Total	19126.462	25			
Post Test II	Between Groups	8023.798	4	2005.949	3.510	.024
	Within Groups	12001.740	21	571.511		
	Total	20025.538	25			

Table 9.
Post hoc test: multiple comparisons

(I) Modalities	(J) Modalities	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
<i>Bobath Concept</i>	<i>Bobath Concept dan Taping</i>	2.943	13.470	.999	-37.19	43.07
	<i>Bobath Concept dan Stretching</i>	29.143	12.799	.192	-8.98	67.27
	<i>Bobath Concept dan Massage</i>	37.393	14.419	.108	-5.56	80.35
	<i>Bobath Concept dan Infrared</i>	42.643	14.419	.052	-.31	85.60
<i>Bobath Concept dan Taping</i>	<i>Bobath Concept</i>	-2.943	13.470	.999	-43.07	37.19
	<i>Bobath Concept dan Stretching</i>	26.200	13.930	.357	-15.30	67.70
	<i>Bobath Concept dan Massage</i>	34.450	15.432	.207	-11.52	80.42
	<i>Bobath Concept dan Infrared</i>	39.700	15.432	.112	-6.27	85.67
<i>Bobath Concept dan Stretching</i>	<i>Bobath Concept</i>	-29.143	12.799	.192	-67.27	8.98
	<i>Bobath Concept dan Taping</i>	-26.200	13.930	.357	-67.70	15.30
	<i>Bobath Concept dan Massage</i>	8.250	14.849	.980	-35.99	52.49
	<i>Bobath Concept dan Infrared</i>	13.500	14.849	.890	-30.74	57.74
<i>Bobath Concept dan Massage</i>	<i>Bobath Concept</i>	-37.393	14.419	.108	-80.35	5.56
	<i>Bobath Concept+Taping</i>	-34.450	15.432	.207	-80.42	11.52
	<i>Bobath Concept+Stretching</i>	-8.250	14.849	.980	-52.49	35.99
	<i>Bobath Concept+Infrared</i>	5.250	16.267	.997	-43.21	53.71
<i>Bobath Concept dan Infrared</i>	<i>Bobath Concept</i>	-42.643	14.419	.052	-85.60	.31
	<i>Bobath Concept dan Taping</i>	-39.700	15.432	.112	-85.67	6.27
	<i>Bobath Concept dan Stretching</i>	-13.500	14.849	.890	-57.74	30.74
	<i>Bobath Concept dan Massage</i>	-5.250	16.267	.997	-53.71	43.21
<i>Bobath Concept</i>	<i>Bobath Concept dan Taping</i>	1.343	13.998	1.000	-40.36	43.04
	<i>Bobath Concept dan Stretching</i>	27.810	13.300	.261	-11.81	67.43
	<i>Bobath Concept dan Massage</i>	35.893	14.984	.156	-8.75	80.53
	<i>Bobath Concept dan Infrared</i>	43.143	14.984	.061	-1.50	87.78
<i>Bobath Concept dan Taping</i>	<i>Bobath Concept</i>	-1.343	13.998	1.000	-43.04	40.36
	<i>Bobath Concept dan Stretching</i>	26.467	14.476	.385	-16.66	69.59
	<i>Bobath Concept dan Massage</i>	34.550	16.037	.235	-13.22	82.32
	<i>Bobath Concept dan Infrared</i>	41.800	16.037	.105	-5.97	89.57
<i>Bobath Concept dan Stretching</i>	<i>Bobath Concept</i>	-27.810	13.300	.261	-67.43	11.81
	<i>Bobath Concept dan Taping</i>	-26.467	14.476	.385	-69.59	16.66
	<i>Bobath Concept dan Massage</i>	8.083	15.431	.984	-37.89	54.05
	<i>Bobath Concept dan Infrared</i>	15.333	15.431	.855	-30.64	61.30
<i>Bobath Concept dan Massage</i>	<i>Bobath Concept</i>	-35.893	14.984	.156	-80.53	8.75
	<i>Bobath Concept+Taping</i>	-34.550	16.037	.235	-82.32	13.22
	<i>Bobath Concept+Stretching</i>	-8.083	15.431	.984	-54.05	37.89
	<i>Bobath Concept+Infrared</i>	7.250	16.904	.992	-43.11	57.61
<i>Bobath Concept dan Infrared</i>	<i>Bobath Concept</i>	-43.143	14.984	.061	-87.78	1.50
	<i>Bobath Concept dan Taping</i>	-41.800	16.037	.105	-89.57	5.97
	<i>Bobath Concept dan Stretching</i>	-15.333	15.431	.855	-61.30	30.64
	<i>Bobath Concept dan Massage</i>	-7.250	16.904	.992	-57.61	43.11

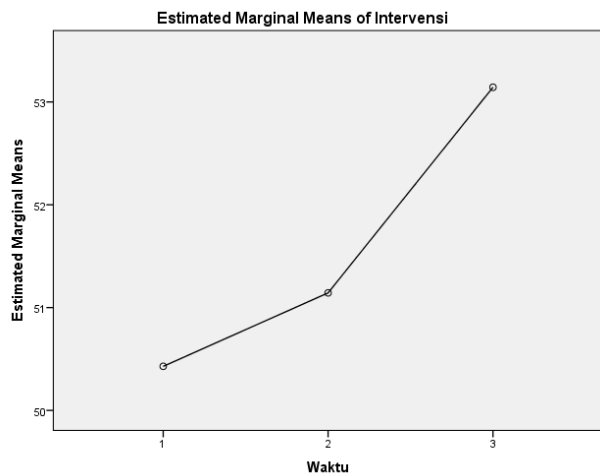


Figure 1. Profile plot of the control group with the bobath concept treatment.

This research was conducted from June to September 2022 at the Bumiayu Great Parents Community. The research sample was determined through purposive sampling method.

Distribution of subjects based on gender (table 1), the majority were male, namely 16 children (62%), and a small portion were female, namely 10 children (38%). Distribution of Subjects Based on Age, the majority of children aged 0-5 years were 15 children (58%), children aged 6-11 years were 10 children (38%), and a small proportion were early adolescents 12-16 years namely 1 child (4%).

The total sample who became research respondents was 26 people so that the statistical analysis to test the normality of the data used the Shapiro-Wilk Test. Based on the results of the analysis in the table above, it can be concluded that in groups 1, 2, 3, and 5 for the pre-test data, the first post-test and the second post-test were normally distributed. As for group 4, only the data in the second post-test were normally distributed, whereas in the pre-test data and the first post-test the data were not normally distributed (table 2).

The data homogeneity test was carried out to see whether the variants or research data sets had the same characteristics or not. The results of the research data homogeneity test show that each data that has been recapitulated shows a homogeneous variant (table 3).

The pre and post test differences were carried out using parametric statistical analysis, namely repeated measured anova tests for groups 1, 2, 3, and 5, where the data were normally distributed. Whereas in group 4 the data were not normally distributed so that the pre and post test differences used non-parametric statistical analysis,

namely the Freadman test. Based on the results of the repeated measured ANOVA test in group 1 or the control group, it is known that the greenhouse-geisser value has a significance of 0.060 (table 5) or less than 0.05 so that it can be concluded that the alternative hypothesis is accepted, namely that there is a significant difference in functional ability after the intervention in the form of a bobath concept. As for the pre-test data compared to the first post-test data, there was a difference in the increase in average functional ability of -0.714, while the pre-test data compared to the second post-test data there was a difference in the increase in average functional ability of -2.714 (table 6).

The control group in this study illustrates the data that there are differences or improvements in functional abilities in children with CP after receiving treatment in the form of the bobath concept. These results are in line with research conducted by Nida Sha dan Rehana Mushtaq [13], where children with spastic CP who received the bobath concept intervention along with conventional physical therapy treatment showed significant improvements in gross motor function and postural control.

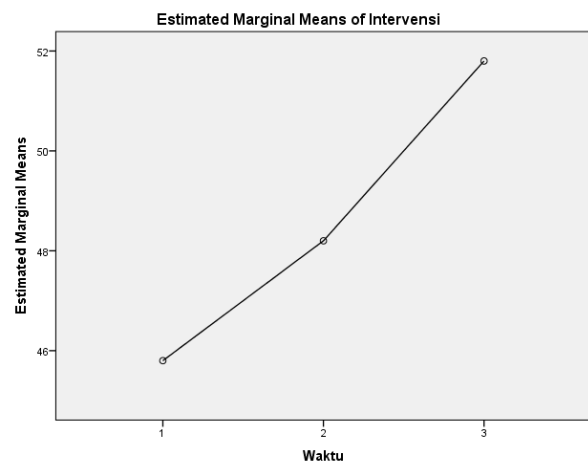


Figure 2. Profile plot of the experimental group with bobath concept and taping treatment.

Based on the results of the repeated measured ANOVA test in group 2 or the experimental group, it is known that the greenhouse-geisser value has a significance of 0.027 (table 5) or less than 0.05 so that it can be concluded that the alternative hypothesis is accepted, namely that there is a significant difference in functional ability after the intervention in the form of the bobath concept and tape. As for the pre-test data compared to the first post-test data, there was a difference in the average increase in functional ability of -2,400, while the pre-test data compared to the second post-test data had a

difference in the increase in average functional ability of -6,000 (table 6).

The first experimental group in this study illustrated the data that there were differences or improvements in functional abilities in children with CP after receiving treatment in the form of the bobath concept and taping. The results of a study conducted by Shamsoddini *et al.* [14], stated that the kinesiotaping technique is part of an effective multimodal therapy program for the rehabilitation of children with CP which has an impact on improving motor function and dynamic activity [13].

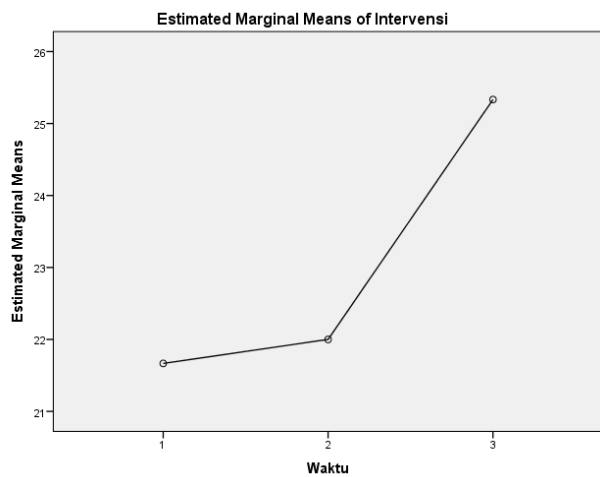


Figure 3. Profile plot of the experimental group with bobath concept and stretching treatment.

Based on the results of the repeated measured ANOVA test in group 3 or the experimental group, it is known that the greenhouse-geisser value has a significance of 0.071 (table 5) or more than 0.05 so that it can be concluded that the alternative hypothesis is rejected, namely there is no significant difference in functional ability after the intervention in the form of the bobath concept and stretching. As for the pre-test data compared to the first post-test data, there is a difference in the average increase in functional ability of -0.333, while the pre-test data compared to the second post-test data there is a difference in the increase in average functional ability of -3.667 (table 6).

The second experimental group in this study illustrated the data that there was no difference or increase in functional ability in children with CP after receiving treatment in the form of a bobath concept and stretching. Stretching may have the benefit of preventing worsening of muscle contractures, but may not increase muscle length growth or improve function in children with CP [21].

Based on the results of the Freadman test, it is known that the significance value of 0.023 (table 7) is less than 0.05 so that it can be concluded that the alternative hypothesis is accepted, namely that there is a significant difference in functional ability after giving interventions in the form of bobath concept and massage.

The third experimental group in this study illustrated the data that there were differences or improvements in functional abilities in children with CP after receiving treatment in the form of a bobath concept and massage. Massage as an additional intervention needs to be applied to reduce muscle tone in spastic CP [22].

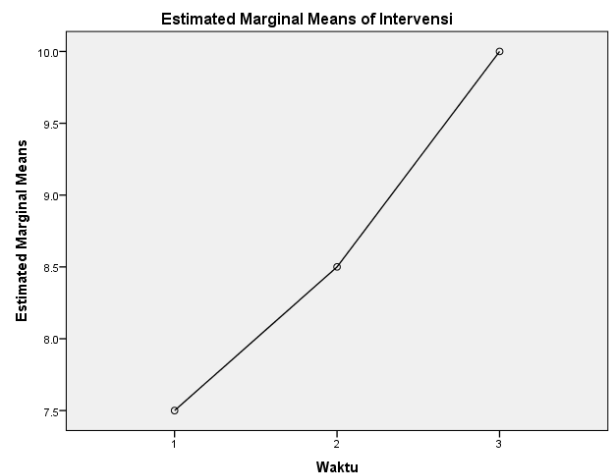


Figure 4. Profile plot of the experimental group with bobath concept and infrared treatment.

Based on the results of the repeated measured ANOVA test in group 5 or the experimental group, it is known that the greenhouse-geisser value has a significance of 0.126 (table 5) or more than 0.05 so that it can be concluded that the alternative hypothesis is rejected, namely there is no significant difference in functional ability after the intervention in the form of the bobath concept and infrared. As for the pre-test data compared to the first post-test data, there is a difference in the average increase in functional ability of -1,000, while the pre-test data compared to the second post-test data there is a difference in the increase in average functional ability of -2,500 (table 6).

The fourth experimental group in this study illustrated the data that there was no difference or increase in functional abilities in children with CP after receiving treatment in the form of bobath concept and infrared. Infrared as an electro-physiotherapy therapy modality that utilizes infrared electromagnetic waves with a wavelength of 770-106nm does not have an effective effect when applied to children with CP.

Comparative hypothesis testing to see differences between groups using statistical analysis one way ANOVA test. Based on the data above, it is known that the significance value in the first post-test data is 0.18, and in the second post-test data is 0.024, where both are stated to be less than 0.05. Therefore, it was concluded that the average increase in functional ability between groups differed significantly in both the first and second post-test data.

Based on the different tests between the five study groups, it was stated that each had a significant difference in impact. Every intervention given by physiotherapy with various modalities has an impact on the functional abilities of people with CP. The thing to note is about how to choose the right action or modality according to the needs or conditions of the client so that therapeutic goals can be achieved effectively.

The incidence of CP from studies conducted in Europe obtained a prevalence of 5 out of 1000 children showing motor deficits consistent with CP; 50% of cases are severe while 10% are mild. The definition of mild motor deficit is a patient who can take care of himself, while those classified as severe motor deficit are sufferers who cannot take care of themselves requiring special care [23].

The results of a multi-centre study conducted by Beckung et al, children with CP with severe motor deficits will experience difficulties in their functional development including carrying out self-help activities, whereas children with CP with mild motor deficits will have the opportunity to develop better functional abilities. including doing self-help activities [23].

Based on a longitudinal cohort study conducted by McMaster University Ontario with serial observations for 4 years in 657 CP children aged 1 to 12 years, it was found that children with low motor levels (levels I-III) get low motor development results with a score GMFM is less than 60%, whereas children with a high motor level (level IV-V) get motor development results with a GMFM score that is above a score of 60% [9].

The study provides evidence to support the use of a specific reflex integration approach to integrate primitive reflexes in children with CP and also demonstrates the association of unintegrated primitive reflexes and delayed motor skills [24].

According to research by Arshad, Imran, Munir, Akram, & Hameed [18], bobath techniques or neurodevelopmental techniques (NDT) can reduce spasticity. The bobath technique in gross motor learning is very effective and indeed plays an

important role in CP. It improves muscle tone, reflexes and reaction and movement patterns.

According to Kerem [19], functional exercise combines aerobic and anaerobic capacities and strength training, to improve physical fitness, activity intensity, and quality of life. Training programs such as a stationary bike or treadmill are beneficial for gait and gross motor skills.

Conclusion

This research was conducted at the Bumiayu Great Parents Community, 26 respondents were given treatment in the form of several physiotherapy modalities 2 times a week for 16 weeks or as many as 32 treatments. Evaluation of functional ability using GMFM was carried out 3 times, namely before treatment, after 16 treatments and after 32 treatments.

The conclusion of this study is that there is a significant difference in functional ability improvement after giving interventions in the form of bobath concept, bobath concept plus taping, and/or bobath concept plus massage; there was no significant difference in the increase in functional ability after giving interventions in the form of bobath concept plus stretching and/or bobath concept plus infrared. The average increase in functional ability between groups differed significantly in both the first and second post-test data.

Physiotherapy modalities to optimize functional abilities will work more effectively if the choice of modality is adjusted to the client's needs and applied every day by involving the family, especially the role of both parents in order to achieve independence for people with CP.

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