

Comparison of the effectiveness of Bobath and Vojta techniques in babies with Down syndrome: Randomized controlled study

Bobath & Vojta therapy for babies with DS

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Abstract

Aim: This study was performed to compare the effectiveness of two different early physiotherapy approaches in babies with Down syndrome (DS).

Material and Methods: A total of 23 babies with DS aged between 0-24 months were included in the study. The babies were randomly divided into two groups: the Bobath-therapy (BT) group included 12 babies (6 girls, 6 boys) and the Vojta-technique (VT) group included 11 babies (4 girls, 7 boys). A total of 12 sessions of physiotherapy were applied to the babies twice a week for 6 weeks. All evaluations were done before and after therapy. The Alberta Infant Motor Scale (AIMS) was used for assessing motor development level of babies, the Beck Depression Scale (BDS) was used for assessing emotional status of mothers, and the Nottingham Health Profile (NHP) was used for assessing the quality of life of mothers of babies.

Results: Mean age of babies, AIMS, BDS and NHP scores were similar in both groups before the therapy ($p > 0.05$). A significant improvement was detected in AIMS scores after therapy in both BT ($p = 0.001$) and VT groups ($p = 0.001$). The mean changes in the AIMS score between groups were 8.33 ± 6.34 for BT, 7.27 ± 3.46 for VT group ($p > 0.05$). No statistically significant difference was detected between groups with regard to changes in AIMS ($p = 0.629$), BDS ($p = 0.642$) and NHP ($p = 0.726$) scores.

Discussion: Early treatment methods, BT and VT approaches, both improved motor performance levels in infants with DS, as well as improved mothers' emotional state and quality of life.

Keywords

Alberta, Down Syndrome, Infant, Mothers, Physical Therapy Modalities

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Introduction

Down syndrome (DS) which was first described in 1846 is characterized by 21st chromosome's being three. Among all cases, 90-95% have regular type trisomy (47XX or XY+21), 4-6% have translocation (46XX) and 3-4% have mosaic type trisomy (47,+21). Likelihood of Down syndrome is reported in 1 in 600-700 live births, depending on maternal age. This risk gradually increases after 35 years of age and reaches 2/70 in 40 years and above [1]. Phenotype of DS is characterized by intellectual impairment, short stature, heart diseases, digestive disorders and orthopedic anomalies accompanying with abnormal physical and neurological findings. Motor development of the children with DS trails that of peers beginning from early ages due to neurological disorders including hypotonia, delayed correction and balance reactions, reduction in velocity of the movements [2]. Therefore early intervention is of importance in cases with DS. Studies are available in literature proving the benefits of early intervention in children with DS [3,4]. Although various approaches are available which would facilitate motor development, increase muscle tone and develop balance of children with DS, Bobath therapy (BT) and Vojta technique (VT) are the most commonly used ones [5].

Vojta-based neuro-physiologic physiotherapy applications have begun between 1954 and 1969, and continued thereafter [5]. Many disorders of central and peripheral nervous system are effectively treated with this method besides the structural disorders of muscles and joints. The treatment method developed by Vojta was first used in treatment of the adolescents with cerebral palsy and in treatment of the babies with coordination disorder. VT has effects not only in motor development but also in whole body including vegetative and sensory-neural system [6].

BT which is among the most common treatment methods for developmental dysfunction was first used in treatment of the children with cerebral palsy (CP) and in treatment of many developmental disabilities including DS thereafter [7,8]. Bobath therapy is focused on normalization of hyper or hypotonic muscles, development of balance reactions and facilitation of movements [7].

Despite the presence of the studies investigating the effectiveness of Bobath and Vojta-based early intervention therapy in babies with DS separately, number of the studies comparing the effectiveness of these methods is insufficient. Only one study is available in literature during the recent 10 years [5].

We had two purposes in carrying out this study. The primary purpose of the present study was to compare the effectiveness of BT and VT on motor development of babies with DS aged 0-24 months. As a reflection of the treatments, the secondary purpose was to investigate how the quality of life and emotional status of the mothers of the babies who received these treatments were affected.

Material and Methods

A total of 23 babies with DS aged between 0-2 years who met inclusion criteria were included in the study. Babies were randomized to two groups as BT (n=12) and VT (n=11). Inclusion criteria were being between 0 and 2 years, being diagnosed

with DS and not having an additional neuro-motor disease. No cases were excluded as all 23 patients met inclusion criteria and completed treatment processes (Figure 1). Approval was obtained from Pamukkale University Ethics Committee of Non-interventional Clinical Researches prior to the study (approval number:60116787-020/66911). The study was registered at Clinical Trials.gov (NCT04536506; URL: www.clinicaltrials.gov).

Measurements: Demographic data of the babies with DS (age, gender, history of surgery) and the mothers (age, education status etc.) were collected through a demographic data form. Alberta Infant Motor Scale (AIMS) was used for assessment of babies' motor development performance. Emotional status of the mothers was evaluated by using Beck Depression Scale (BDS) and quality of life of the mothers was evaluated by using Nottingham Health Profile (NHP). All assessments were done before treatment and at the end of 6th week.

AIMS: AIMS is a tool which evaluates the infants from baby to independently walking children and measures delay in motor performance, enables families and clinicians to obtain data about motor performance of the infant, compares motor performance before and after therapy. The child is observed when performing spontaneous behaviors with a certain postural control. The scale measures weight transfer, posture and anti-gravity movements at supine, prone, sitting and standing positions with 58 items. The child receives 1 point for the movements he/she can perform and 0 point for the ones that he/she cannot perform. It is a reliable test with norm reference and suitable for clinical use due to taking short time [9].

BDS: BDS is a scale used for evaluating emotional status of the mothers and it was arranged so as to include the symptoms of depression. Items of the scale were prepared based on clinical observations and data, not based on any hypothetical opinion. The Likert type scale is composed of 21 symptom categories. Each symptom category is scored between 0 and 3 with the



CONSORT 2010 Flow Diagram

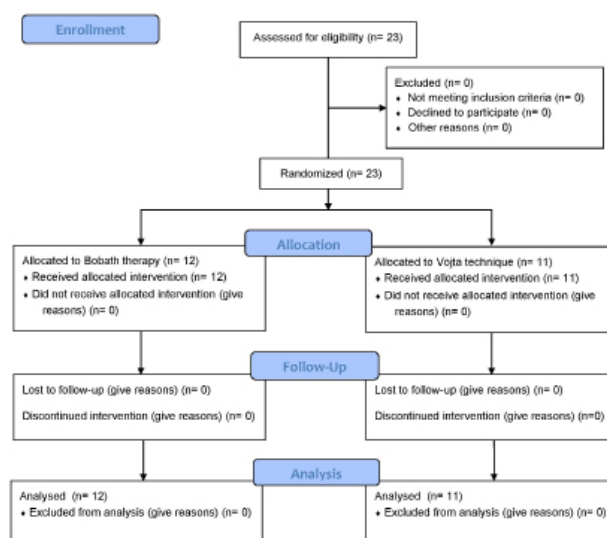


Figure 1. Flow chart of the study

highest possible score of 63. Higher score indicates more severe depression [10].

NHP: NHP was used for assessment of quality of life of the mothers. This is a scale which is commonly used in clinical practice and includes 38 items that evaluate quality of life in 6 sections (pain, energy level, social isolation, emotional reaction, physical activity). Ratio of the “yes” answers is evaluated and each section is scored between 0 and 100 where 0 is the best and 100 is the worst score [11].

Interventions; Bobath Therapy (BT) and Vojta Technique (VT): A total of 23 cases were randomly allocated to two groups: BT and VT. Both groups received 45min of sessions twice weekly for 6 weeks. BT was applied by the physiotherapists with minimum 5 years of experience. VT was applied by a Vojta therapist with 24 years of experience.

BT: An individual program was scheduled for each case following pre-assessment. It was targeted to enable normal posture, facilitation of corrective balance and protective responses and development of normal movement patterns [12]. Neuro-developmental techniques like approximation, taping and applying resistance to movements were used for increasing postural tone. Correction, balance and protective responses were facilitated at prone, supine, crawling, sitting and standing positions according to neuro-motor levels of the cases. Training for turning from prone to supine, from supine to prone position, reciprocal crawling and coming to sitting position by using trunk rotation were also given [13].

VT: Vojta proposes that postural reflex abnormalities that are present at newborn period may be corrected with VT and abnormal movement patterns may be exchanged with normal movement patterns. Same types of movements were detected to emerge by applying stimulus to certain points in newborns and spastic children. Vojta defined two main movements as “reflex crawling” and “reflex turning” [6]. VT is based on “reflex locomotion” and “forcing neural pathways”. The movements done in axial region of the body (trunk, head, thigh and shoulders) against resistance emerges as a special muscular energy that is spread to whole body. The kinesiological content of the pattern usually shows organized and repetitive character depending on the initial position. These patterns are global reciprocal as in locomotion types like crawling and walking. The patterns of reflex locomotion are crawling and turning reflexes. Specific stimulation techniques like pressure and strain applied for 30-60 sec to specific points are used for facilitating these reflexes [6,14].

1. Reflex crawling, 2. First stage of reflex turning, 3. Second stage of reflex turning were used as treatment methods in VT. Main and auxiliary points were stimulated (pressure and strain) symmetrically in both sides of the body (right and left) [14].

Statistical analysis

We determined that 90% statistical power could be achieved with a 95% confidence level when at least 20 cases (at least 10 cases per group) participated in the study with a Cohen-classified effect size was 0.6 [5]. Data were analyzed by using SPSS 22.0 package program. Continuous variables were given as mean±standard deviation, categorical variables were given as number and percent. Normality distribution of the data was tested with Kolmogorov- Smirnov test. Independent sample

t test when parametric test assumptions were provided and Mann-Whitney U test when parametric test assumptions were not provided were used for comparison of independent groups. The paired sample t test when parametric test assumptions were provided and Wilcoxon paired sample test while the was used when parametric test assumptions were not provided were used in dependent group comparisons. The differences between categorical variables were analyzed using Chi-square test [15].

Results

A total of 23 babies with DS were randomly allocated to two groups. Bobath therapy group consisted of 12 cases (5 girls, 7 boys) and Vojta technique group consisted of 11 cases (5 girls, 6 boys). Mean age was 13.50±7.22 months in BT group and 10.77±7.40 in VT group. Nine (75%) subjects in BT group and 8 (72.7%) subjects in VT group had co-morbid conditions. Parents reported that 2 (16.7%) subjects in BT group and 1 (9.1%) subjects in VT group underwent surgery. Demographic and clinical characteristics of the patients are presented in Table 1.

Eight (66.7%) mothers in BT group and 8 (72.7%) mothers in VT group were aged 35 years and above. While 6 (50%) mothers were graduates of high school and 5 (41.7%) mothers were graduates of elementary school in BT group, 4 (36.4%) mothers were graduates of high school and 6 (54.5%) mothers were graduates of elementary school in VT group. Demographic characteristics of the mothers are presented in Table 2.

Motor development (AIMS scores)

When pre-treatment AIMS scores were analyzed, mean score of BT group was 31.83±12.94 and mean score of VT group was 30.72±18.04. Groups were similar with regard to motor performance ($p>0.05$). When the change in motor performance was analyzed, statistically significant changes were detected after therapy both in BT ($p=0.001$) and VT groups ($p=0.0001$). When AIMS scores were compared at the end of the therapy, no difference was found between groups ($p>0.05$). In-group and inter-group comparisons of the groups with regard to motor performance levels are presented in Table 3.

Quality of life and emotional status of babies' mothers

No difference was found between groups with regard to pre-treatment emotional status and quality of life of the mothers ($p>0.05$). When the changes in BDS and NHP scores were analyzed, statistically significant differences were detected in post-treatment BDS scores were compared to pre-treatment score both in BT group ($p=0.002$) and VT group ($p=0.003$). There

Table 1. Demographic and clinical characteristics of the babies

Variables	BT group (n=12) Mean ± SD or n(%)	VT group (n=11) Mean ± SD or n(%)	p-value
Age (month)	13.50±7.22	10.77±7.40	0.382*
Gender			
Girl / Boy	6(50.0) / 6(50.0)	4(36.4) / 7(63.6)	0.680 ^a
Additional systemic disease			
Yes / No	9(75.0) / 3(25.0)	8(72.7) / 3(27.3)	0.901 ^a
Surgery history			
Yes / No	2(16.7) / 10(83.3)	1(9.1) / 10(90.9)	0.509 ^a

BT: Bobath therapy, VT: Vojta technique, SD: Standard deviation, * Independent sample t-test, ^a Chi-square test, Significance level: $p<0.05$

Table 2. Demographic characteristics of babies’ mothers

Variables	BT group (n=12) n(%)	VT group (n=11) n(%)	p-value
Age (year)			
20-24	1(8.3)	1(9.1)	0.910 ^a
25-29	1(8.3)	2(18.2)	
30-34	2(16.7)	0(0.0)	
35+	8(66.7)	8(72.7)	
Education level			
Primary school	5(41.7)	6(54.5)	0.365 ^a
Secondary school	0(0.0)	1(9.1)	
High school	6(50.0)	4(36.4)	
University	1(8.3)	0(0.0)	

BT: Bobath therapy, VT: Vojta technique, aChi- square test, Significance level: p<0.05

Table 3. Comparison of the motor performance levels of the babies within and between groups

AIMS score	Baseline Mean±SD	After treatment Mean±SD	p ²	Difference between baseline and after treatment Mean±SD
BT group	31.83±12.94	40.16±12.20	0.001 [†]	8.33±6.34
VT group	30.72±18.04	38.00±17.66	0.0001 [†]	7.27±3.46
p ¹	0.867*	0.734*		0.629*

BT: Bobath therapy, VT: Vojta technique, SD: Standard deviation
^{*}Independent sample t- test, ^{**}Mann-Whitney U test, [†] Paired sample t- test
 p¹: Intergroup significance level, p²: Intragroup significance level

was a difference between pre- and post-treatment results for NHP in both BT (p=0.018) and VT groups (p=0.018). When BDS and NHP scores were compared at the end of the therapy, no difference was found between groups(p>0.05).

Discussion

According to the results of our study which compares the effectiveness of BT and VT techniques that are applied as early intervention approaches in babies with DS, both BT and VT were found to improve motor performances of the children and thereby emotional status and quality of life of the mothers. Both approaches were detected to yield similar effects after therapy.

Many studies are available in literature investigating the effectiveness of early intervention approaches like various neuro-developmental treatment approaches, Vojta technique and sensory integration in children with DS [16-21]. Martinez and Garcia reported that physiotherapy methods that start in the early period and applied according to the requirements of the child with DS improve psychomotor development of the children [19]. The authors also emphasized the importance of family support for active participation of the child. In the study of Harris investigating the effect of BT on motor development of babies with DS, he divided the cases to two groups as BT group and control group [8]. While control group was provided only routine control, BT group was applied 3sessions of BT weekly during 9 weeks. The authors investigated development level by using Bayley Infant Development Scale and Peabody Motor Development Scale and reported that BT had a positive effect on motor development in cases with DS.

Malak et al. divided 79 patients with mean age of 6 years and

3 months into 3 groups as 0-3 years, 3-6 years and above 6years. All patients were applied one session of BT weekly during 2years and evaluated by using GMFM-88 and Motor Impairment Grading Scale, children in 0-3years were found to have a significant development in motor skills [20]. Similarly, Mahoney et al. applied BT 2sessions weekly during one year in a total of 50 patients (23 DS and 27 CP) with age of 14 months and detected that the cases with DS had improved motor development through Proportional Change Index [21]. Morais et al. reported that motivation and attention of the child also improved besides performance in children with DS [22]. In the study of Uyanik et al. comparing the effectiveness of various physiotherapy approaches in children with DS,they divided 45 children into 3 groups and applied sensory integration 3 days weekly for 3 months in Group 1, vestibular stimulation in addition to sensory integration in Group 2 and neuro-developmental treatment in Group 3. The authors concluded that these approaches were not superior to each other with regard to supporting motor development and the program should be arranged in accordance with the needs of the child [23].

In literature, only one study could be encountered comparing the effectiveness of BT and VT applied to babies with DS in the early period. However, not only babies with DS but also those with other nervous system pathology were included in this study.That study has revealed that both treatment approaches improved motor development in DS [5]. Consistently with literature, both BT and VT significantly improved motor skills of the cases following 6 weeks of treatment program as compared to pre-treatment skills. In addition to this study, we also questioned the quality of life and emotional status of mothers who care for babies.

Studies are available reporting that treatment approaches applied to children with DS had positive effects in emotional status of the family besides motor development of the children [18,24]. Shields et al. reported that participation of the family in physiotherapy applications improved the communication with the child and the family was affected positively during this period [24]. Our study has revealed that emotional status and quality of life of the mothers improved both after BT and VT. Our study is of importance for being a randomized controlled study comparing early intervention approaches in babies with DS. In conclusion, BT and VT were found to have similar effects with regard to development of motor skills in cases with DS below 2 years of age.

In conclusion, both BT and VT were found to be useful for developing motor skills and post-treatment effectiveness of the methods was found to be similar. They were also found to be effective for improving emotional status and quality of life of the mothers. The results of the study emphasize the importance of arranging treatment programs according to the needs of the children. And also, the present study is considered to contribute to literature which has limited reports concerning this issue. Our study will guide further studies. However, in order to fill the gap in the literature, further studies with larger sample sizes are needed to compare the effectiveness of different early intervention rehabilitation methods in DS babies.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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