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A comparative study between certain behavioral methods in treatment of stuttering

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Abstract

Stuttering is one of the controversy diseases. Thus, therapy for stuttering varies according to the therapists' belief. This study was conducted on four groups of stutterers; 30 stutterers each, with age range 15–35 years. Three groups received therapy sessions using the three different behavioral readjustment programs mainly: Coarticulation program of Stromsta, Smith Accent Method, and Van Riper's Non-Avoidance program. All patients attended individual therapy sessions, twice a week. The fourth group was a control one. All patients were assessed at the interview, after 8 weeks, and after 16 weeks.

A multidimensional assessment protocol was used for assessment of all patients. It included elementary diagnostic procedures, clinical diagnostic aids, and additional instrumental diagnostic assessment.

The results obtained from this study showed that there were significant improvements of the stuttering severity for most of the measurable parameters for all therapeutic groups. Although there was significant difference between all therapeutic groups and control group, there was no significant difference between the results of all therapeutic groups.

Keywords: Stuttering; Efficacy; Therapy

1. Introduction

There are wide varieties of method to take on the problem of fluency disorder (stuttering) [1]. The treatment modalities of the fluency disorders reflect a great controversy about its definition and etiology. The behavioral readjustment therapies are the main therapy used for treatment of fluency disorders. Three main lines of those

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interventions are shown in this study, namely: Van Riper's Non-Avoidance program [2], Coarticulation of Stromsta [3], and Smith Accent Method [4].

The stuttering problem has a different variety of implications (physiological, physical, social, and psychological), so the global level of measurement is the best way to assess the stuttering condition and analyse the efficacy of the therapy program [5]. A few controlled efficacy studies have been carried out on the fluency disorders, so the main line of treatment is to assess the efficacy of those lines as a therapy modality of fluency disorders.

2. Materials and methods

2.1. Subjects and method

This study was conducted on 120 stutterers, 99 males and 21 females, average age 21.1 years (15 to 35 years) with no history of medical or behavioral therapy. A sample group of stutterers was classified into four subgroups, 30 subjects each: three study groups and one control group. The study groups were trained by three different programs of therapy: Coarticulation method, Accent Method, and Non-avoidance method, respectively. They attended individual sessions, twice a week, 20 min each. The fourth group was a control group with no therapy program to compare it to each study group. All subjects were assessed three times: before therapy, after 8 weeks, and after 16 weeks.

2.2. Assessment procedures

The multidimensional assessment protocol used for assessment of all patients. It included:

I Elementary diagnostic procedures: it included personal interview and the rating scale—from 0 to 3—for evaluation of eye contact and involuntary movement (visual perceptual assessment).

II Clinical diagnostic aids: they included speech recording and formal tests for measuring stuttering severity using Stuttering Severity Instrument (SSI-3) [6], syllable per minute (SPM) and stuttering syllable percent (SS%). Symptom Check List-90 (SCL-90) [7] was used for assessing feeling and attitude.

III Additional instrumental measures: they included acoustic analysis of vowel /a/ at a comfortable level, spectrographic assessment of two vowels /a/ and /u/, and aerodynamic measures of Abduction/Adduction rate. They were achieved by using computerized speech lab (CSL) model 4300 software version 4305 and aerophone-2 model 6800 Kay Elemetrics.

2.3. Statistical assessments

ANOVA test of multivariate analysis was used to determine group main effect difference and interactions across time. Post-hoc multiple comparisons of the group main effect using Tukey test. Calculation of the percent of change between the first and the last evaluation was also measured by the Craig and his colleagues' formula [8].

3. Results

The result obtained from this study showed that there was significant difference between pre- and post-therapy for all therapeutic groups. There was improvement of stuttering severity for most of the measurable parameters. At the same time, the control group showed no significant improvement. Although the final evaluations indicated that there was a significant difference between all therapeutic groups and control one, there were no significant differences between the results of all therapeutic groups.

3.1. Visual perceptual assessment

There are highly significant differences between all groups, $F(3,356) = 24.46$, $p < 0.0001$. There is also a highly significant difference between the control group and all therapeutic groups ($p < 0.01$) and there is a significant difference between the non-avoidance method (group III) and other treatment methods. Post-hoc tests demonstrated a highly significant difference between the pre-treatment evaluation and post-treatment evaluation in all therapeutic groups with the highest percent of improvement for group III (71%).

3.2. Stuttering severity

3.2.1. Stuttering severity instrument-3

There is a significant difference between all therapeutic groups; $F(3,356) = 7.37$, $p < 0.0001$. Although there is a significant difference between each therapeutic group and control one, no significant difference is found between the treatable groups. Tukey test revealed a significant difference between pre- and post-therapy evaluation for all therapeutic groups. Table 1 shows the different degrees of stuttering severity among the patients of each group.

3.2.2. Syllable per minute (SPM) and stuttering syllable percent (SS%)

There are highly significant differences between all groups, $F(3,356) = 6.24$, $p < 0.0001$ for SPM and $F(3,356) = 4.16$, $p < 0.0001$ for SS%. There are also highly significant differences between the control group and all therapeutic groups ($p < 0.01$) and between pre- and post-evaluation for all treatable groups (Table 2). Accent Method has a significant effect on decreasing the SS% over other method. Coarticulation method has the highest percent of improvement in speech rate (38%) and Accent Method has the highest percent of improvement in SS% (34%).

3.3. Psychological assessment

3.3.1. Symptom check list-90 (SCL-90)

There is a highly significant difference between all groups for hostility [$F(3,356) = 9.01$, $p < 0.0001$], and for anxiety [$F(3,356) = 2.16$, $p < 0.0001$]. Although there were also highly significant differences found between the control groups and therapeutic groups ($p < 0.01$ for each of group I and II vs. control, $p < 0.05$ for group III vs. control)

Table 1
The different degrees of severity of stuttering among the patients of each group by using SSI-3

Groups	Degree	Number of cases		
		1st Evaluation	2nd Evaluation	3rd Evaluation
Group I (Coarticulations)	Very mild	0	1	1
	Mild	6	12	15
	Moderate	9	9	11
	Severe	7	5	2
	Very severe	8	3	1
Total		30		
Group II (Accent)	Very mild	0	4	7
	Mild	6	5	14
	Moderate	10	16	5
	Severe	10	3	4
	Very severe	4	2	0
Total		30		
Group III (Non-avoidance)	Very mild	2	3	5
	Mild	8	10	15
	Moderate	9	10	7
	Severe	7	4	3
	Very severe	4	3	0
Total		30		
Control	Very mild	0	0	0
	Mild	4	7	5
	Moderate	11	10	13
	Severe	8	7	5
	Very severe	7	6	7
Total		30		

for hostility and anxiety, there are no significant differences between all therapeutic groups in all variables. Subsequent analysis indicates that the post-treatment evaluation for anxiety demonstrates no significant change, but there is a significant change for hostility.

3.4. Acoustic analysis

Although there is no significant difference between all groups for fundamental frequency (Fo) [$F(3,356) = 0.42$ $p < 0.9489$], there is a highly significant difference between all groups for jitter, shimmer and harmonic to noise ratio (H/N ratio) $F(3,356) = 6.45$, $p < 0.0001$, $F(3,356) = 2.4$ $p < 0.0002$, $F(3,356) = 2.32$ $p < 0.0002$, respectively. Post-hoc Tukey test demonstrated that there is no significant difference between the control and each of therapeutic groups for Fo, but there is a significant difference for jitter, shimmer, and H/N ratio ($p < 0.01$). Tukey test also demonstrated no significant difference between the pre- and post-treatment evaluation in all groups for Fo. Instead of that, there are highly significant differences between pre- and post-for jitter, shimmer, and H/N ratio. The highest percent of improvement was shown for group II: 9% for Fundamental frequency, 27% for jitter, 20% for shimmer, and 37% for harmonic to noise ratio.

Table 2
Mean, standard deviation (S.D.), maximum (Mix), and minimum (Min) values of syllable per minute (SPM) and Syllable stutter percent (SS%)

	Group I (Coarticulation)				Group II (Accent)				Group III (Non-avoidance)				Control			
	Mean	S.D.	Max	Min	Mean	S.D.	Max	Min	Mean	S.D.	Max	Min	Mean	S.D.	Max	Min
SPM																
1st Evaluation	121	31	183	64	126	30.5	179	92	130	30.5	190	54	121	26.4	155	54
2nd Evaluation	123	28.7	176	57	133	45.8	188	68.4	149	26.7	186	65.9	120	22.6	154	60
3rd Evaluation	167**	20.7	184	90	170**	31.7	200	100	170**	21.8	200	95.6	122	23.3	140	11.9
SS%																
1st Evaluation	23.4	9	52.1	6.3	22.7	8	32	7.4	23.8	11.1	62.9	9.7	26.8	12	40.6	11.9
2nd Evaluation	21.3	8.5	40.1	5	19*	8.1	39.6	5.5	21.1	11.4	60.5	6.4	26.3	6.6	39.2	13.1
3rd Evaluation	17.1**	6.9	33.4	5.5	15**	6.3	30.6	7.9	17**	9	46.5	7.6	27.7	7.7	39.5	11.6

* $p < 0.05$ significant.
** $p < 0.01$ highly significant.

3.5. Spectrographic assessment

There are highly significant differences between all groups in voice onset time for both vowels /u/ and /a/, $F(3,356) = 4.05$, $p < 0.0001$, $F(3,356) = 3.26$, $p < 0.0003$, respectively. There is also significant difference between the control group and all therapeutic groups ($p < 0.05$) for both vowels with no significant difference between all therapeutic groups. There is significant difference between pre- and post-therapy for all groups.

3.6. Aerodynamic assessment

There is significant difference in Abduction/Adduction rate between all groups, $F(3,356) = 3.38$, $p < 0.0002$. There is only significant difference between the control and group III ($p < 0.05$) and between group III and other therapeutic groups ($p < 0.05$). There are also highly significant differences between the pre- and post-treatment evaluation for groups II and III (the percentage of change 43% and 45%, respectively).

4. Discussion

The emphasis of the study was to compare the short-term effectiveness of three stuttering therapy programs by using a broad-spectrum evaluation program within the clinic and to measure the efficacy of these therapy programs.

The treatment efficacy research is an investigatory tool for examining the effect of environmental variable (treatment) on the human variables (communication behaviors) [9]. In this study, both subjective and objective measures were used for the assessment of the efficacy. The subjective measures, like the perceptual assessment, were formulated in a rating scale in order to be quasi-objective one.

All parameters except intraphonemic disruption improved significantly in the second evaluation. Although the intraphonemic disruption increased in the second evaluation then decreased significantly in the last evaluation for all therapeutic groups. Stromsta [3] explained that other symptoms hide the intraphonemic disruptions. When these symptoms were improving, the intraphonemic symptoms appear obviously. Then it decreased by the effect of therapy.

Both involuntary movements and eye contact also improved significantly in all therapeutic groups. Non-Avoidance program had the highest percentage of improvement (71%). This can be explained by the fact that the steps of desensitization and variation at the beginning of the non-avoidance program deal with these issues deeply.

Coarticulation had the highest percent of improvement in most of perceptual evaluations as repetition and intraphonemic disruption. This can be attributed to the fact that it prepares the vocal tract to overcome the lack of sound blending.

Accent Method was the only method that had a significant difference between pre- and post-evaluations for jitter and shimmer. This indicates that it has the best role for coordination of phonation, articulation, and resonation that was claimed to be a cause of stuttering.

The psychological evaluation of the patients did not reach a significant level after all therapy programs. Therefore, the therapy programs seem to be in need of a long period for transferring the patients from fluent confident clinical situation to the outer environment with its conflicts.

The conclusion of this study can be summarized as follows: (a) Complete cure is not available for the adult stutterers. Therefore, reaching a stage of fluent stuttering is a reasonable target in the therapy program. A long-term transferring phase and follow-up is recommended to establish success of the therapy in all life's situations. (b) Searching for the causation of stuttering can be recommended in order to reach the clue and the basis of therapy program for each case accordingly. (c) A combined therapy program for adult stutterers is recommended and it should be focused on reducing the disabling element and changing the level of the handicap.

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