Relaxation and systematic desensitization in reducing dental anxiety

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Abstract

The anxiety experience in dentist’s office is one of the main barriers that prevent patients from using dental services, therefore a specific strategy is needed. The aim was to compare the efficacy of two methods: relaxation therapy and systematic desensitization. The general hypothesis is that the use of methods for reducing dental anxiety has a different efficacy. Participants were 60 patients of a dental clinic in Bucharest (scores MDAS\textgreater{}13). Anxious reactions were assessed with MDAS and DFS. After using the relaxation technique, the anxiety level decreased to the greatest extent, both for the global anxiety index and for its components.

Keywords: dental anxiety; relaxation therapy; desensitization.

1. Introduction

Dental anxiety is deemed as a multidimensional state which imposes a holistic approach (Berggren, Hakeberg & Carlsson, 2000) of emotional and psychological aspects of the anxious patient. Patients with dental anxiety are a heterogeneous group with origins, onset age and manifestations which vary to a great extent between individuals (Milgrom, Weinstein, Kleinknecht & Getz, 1985; Locker, Shapiro & Liddell, 1997). The anxiety patients experience in dentist’s office is one of the main barriers that prevent people from using medical services for routine clinical
examination and/or specialized treatment and also decreases patients’ compliance to the proposed treatment (Locker, Liddell & Shapiro, 1999). Anxious patients avoid going to the dentist even if they have scheduled an appointment; also, they need to spend more time on dentist’s chair for their treatment and, last but not least, override their own daily oral hygiene habits and their oral health state is generally poor (Pawlicki, 1987). Although dental anxiety prevention is recommended, once established, a specific strategy for approaching the anxious patient is needed. The first step is to identify anxious patients and then to ascertain the severity degree of dental anxiety. After that, methods for reducing the anxiety level must be used, such as: relaxation, systematic desensitization and cognitive approaching (diverting attention from the stressful situation, focusing on positive aspects of the treatment). These methods have been compared in many specialized studies and have proven to be effective in reducing dental anxiety (Berggren, Hakeberg & Carlsson, 2000). Relaxation is based upon the physiological impact (increased heart rate, muscle tension, sweat, etc.) of psychological feelings correlated with anxiety. As far as the patient learns and manages to use their imagination and to control their emotional manifestations, the anxiety level decreases to a great extent, according to the principle that one can’t be relaxed and anxious at the same time (Corah, Gale & Illig, 1979). Therefore, relaxation methods, although require several sessions in order to be successful, are useful in dentistry as well. Systematic desensitization consists of training the patient to face gradually stimuli or situations that create anxiety. At first, fear-triggering stimuli should be identified and afterwards their hierarchy is to be ascertained. Then the patient should be exposed repeatedly to anxiogenic stimuli, starting with the situation that induces the lowest degree of fear. The exposure takes place after the patient is taught how to relax, and the next stimulus is called in once the patient feels he/she is ready. At the end of each session, the patient is invited to face the reality of the situations for which the desensitization has been performed. Systematic desensitization method lasts 5-10 sessions, until the patient believes that the anxiogenic representations are tolerable. A review of a behavioral investigational research in dentistry related to dental anxiety and avoidance of dental treatment shows the efficacy of several behavioral therapy methods such as systematized desensitization, modeling and relaxation whose efficacy can be compared with cognitive techniques (Bray, Chhun, Donkersgoed, Hoover & Levitan, 2009).

2. Research Methodology

The purpose of the study was to compare the efficacy of two methods for treating dental anxiety: relaxation therapy and systematic desensitization.

2.1. The research hypotheses of the study were as follows: the general hypothesis, which we propose to demonstrate, is that the use of methods for reducing dental anxiety has a different efficacy on the general anxiety level and will determine a significant decrease of anxiety level; the specific hypotheses are as follows: it can be assumed that the effect of methods for reducing anxiety is a decrease of avoidance-anticipation anxiety, of physiological anxiety during the treatment and of the level of anxiety to stimuli and situations specific to dental treatment; it can be assumed that relaxation has the highest efficacy on physiological reactions during the dental treatment, desensitization techniques have the highest efficacy on anxiety related to stimuli and situations specific to dental treatment and cognitive techniques have the highest efficacy on dental treatment avoidance-anticipation anxiety.

2.2. Participants in this study were 67 patients of a private dental clinic in Bucharest, of whom 60 meet the criteria for inclusion into the research project (scores resulted from the assessment of anxiety level were above average values, MDAS ≥13). Patients are 22-59 years old (median age 38.23 years and a standard deviation of 8.05) and gender distribution is 43.8% men and 56.3% women. Ethical Considerations: by filling in the questionnaires, subjects agreed freely to participate in the study; participants’ confidentiality in relation with results of the questionnaires has been guaranteed.

2.3. Instruments and Research Methods The following research methods have been used: theoretical (assessment of dental anxiety level with questionnaires specific to dental medicine), investigational (intervention experiments – methods for reducing anxiety to treatment) and statistical methods (SPSS software version 13.0): descriptive analysis and t-student analysis (Independent One Samples T test).

2.3.1. Analysis instruments. Questionnaires recording social-demographic personal information related to age, gender and fear level, as well as dental anxious reactions have been used and assessed with 2 clearly established
scales: Modified Dental Anxiety Scale questionnaire (MDAS, Humphris & Hull, 2007) and Dental Fear Survey (Kleinknecht et al., 1973). MDAS assesses dental anxiety as varying from 5 (no fear) to 25 (extreme fear). DFS assesses patients’ level of dental anxiety with 20 questions related to avoidance anxiety (cancelling or missing an appointment at dentist’s office or avoiding to schedule an appointment because of fear), physiological manifestations during the treatment and categories of anxiogenic-perceived invasive or non-invasive stimuli in dentist’s office; DFS questionnaire has been validated in Romania with α Cronbach=0.95 (Mărginean & Filimon, 2011). The global index results from adding up values of the 20 items or of the 3 subscales. The score may vary between 20 and 100. Values of 48-75 show average scores, while values above 76 show high scores. Prof. Kleinknecht gave us the permission to use this instrument for didactic and research purposes.

2.3.2. Techniques Used in the Experiment for Reducing Anxiety: two types of psychological techniques have been used in order to reduce the anxiety level, each of them applied on a randomly selected group consisting of 20 patients, developed by the same researcher (the control group consisted of 20 patients as well) as follows:

- **Muscle relaxation technique**, together with suggestions for relaxation and increase of the ego strength (applied to group I). The patients have been explained that dental fear and anxiety will decrease when they have enough capability to remain relaxed during dental interventions. The patients have been trained in relation with Jacobson progressive muscle relaxation techniques and encouraged to practice relaxation daily for 10-15 minutes (Holdevici, 2011).

- **Systematic desensitization technique** (applied to group II). Initially, increasing hierarchies of anxiogenic situations and objects have been created (together with the psychotherapist) (such as when the dentist comes into the office, seeing the tools, the smell in the office, etc.). The patients have learnt how to become familiar with relaxation techniques before the actual desensitization began. The patients have been exposed gradually to the listed anxiogenic stimuli, so that they could keep their relaxation state. They started with the least anxiogenic object in the hierarchy and used the relaxation techniques they’ve learnt until the patients were confident that they can handle the least anxiogenic item. When patients managed to do this, they advanced to the next stimulus in the hierarchy. When this was not successful, they continued until the relaxation state was established and maintained. Then this process was repeated with each listed anxiogenic item until all the anxiogenic stimuli identified together with the patients were worked through, while keeping the relaxation state (Holdevici, 2011).

3. Results. Discussion

The research design was pretest-retest type and anxiety levels have been recorded both before and after interventions using DFS questionnaire with both global component and subcomponents: physiological, anticipation-avoidance and to anxiogenic stimuli. The difference between median values of DFS total score, between assessment timepoint and after interventions, compared to baseline, is 14.90 for the whole group (Table 1). Results of One Sample T test show a statistically significant difference (p=0.000, p<0.05, t=14.183 for a confidence interval of 95%) (Table 3). Therefore, the general research hypothesis is confirmed.

For group I (relaxation group), the global DFS score before relaxation is 75.50 (SD= 5.50) and after intervention is 52.55 (SD= 4.76) (Table 3). The differences between median anxiety values, as measured by DFS score, on all three components, between baseline and final assessment, show a statistically significant difference (results of t Test: t (1)=13.534, t (2)=17.448, t (3)=7.541, p= 0.000<0.05 for a confidence interval of 95%)(Table 1). The general research hypothesis, according to which the use of methods for reducing dental anxiety, i.e. relaxation, will determine a reduction in the anxiety level both globally and per subcomponents, is confirmed.
Table 1. T test indicators for DFS components for relaxation group (pretest and retest)

| Pair     | Component            | Mean  | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |
|----------|----------------------|-------|----------------|----------------|------------------------------------------|
|          |                      | Lower | Upper          |                |                                          |
| Pair 1   | Avoidance anxiety    | 2.650 | 1.96           | 2.240          | 3.060                                    | 13.543 | 19.000 |
| Pair 2   | Physiological anxiety| 11.100| 5.960          | 7.261          | 12.839                                   | 7.541  | 19.000 |
| Pair 3   | Stimuli anxiety      | 10.050| 5.960          | 12.110         | 24.890                                   | 25.465 | 19.000 |
| Pair 4   | Global scor DFS      | 23.000| 4.039          | 21.100         | 24.890                                   | 25.465 | 19.000 |

For group II (desensitization group), the global mean DFS score before relaxation is 11.05 (SD= 2.23) and after intervention is 79.90 (SD= 4.919) (Table 3). The differences between median anxiety values, for group II, as measured by DFS score, on all the components: avoidance-anticipation, physiological and to stimuli, between baseline and final assessment, show a statistically significant difference (results of T test: t (1)=16.907, t (2)=35.897, t (3)=36.732, p=0.000<0.05 for a confidence interval of 95%) (Table 2). The general research hypothesis, according to which the use of methods for reducing dental anxiety, i.e. systematic desensitization, will determine a reduction in the anxiety level both globally and per subcomponents, is confirmed. For the control group, the global mean DFS score before relaxation is 65.60 (SD= 8.3252) and after intervention is 65.40 (SD= 8.3252) (Table 3). The differences between median anxiety values, as measured by DFS score, on all the components: avoidance-anticipation, physiological and to stimuli, between baseline and final assessment, show a statistically insignificant difference (p>0.05). (Table 3). This shows that, in absence of any intervention, the anxiety level remains unchanged. The total anxiety level has been mostly reduced by using the relaxation technique, used on group I (total difference between DFS means = 23), followed by the desensitization technique (total difference between DFS means = 21.35). The dental treatment avoidance-anticipation anxiety level has been decreased to the greatest extent also by using the relaxation technique (difference between avoidance DFS score means = 2.65), followed by desensitization technique (difference between avoidance DFS score means = 1.85). The level of physiological anxiety before dental treatment has been decreased to the greatest extent also by using the relaxation technique (difference between physiological DFS score means = 11), followed by desensitization technique (difference between avoidance DFS score means = 5.75). The level of anxiety to anxiogenic stimuli in dentist’s office has been decreased to the greatest extent by using the desensitization technique (difference between physiological DFS score means = 13.45), followed by relaxation technique (difference between avoidance DFS score means = 10.05) (Table 3).

Table 2. T test indicators for DFS components for desensitization group (pretest and retest)

| Pair     | Component            | Mean  | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |
|----------|----------------------|-------|----------------|----------------|------------------------------------------|
|          |                      | Lower | Upper          |                |                                          |
| Pair 1   | Avoidance anxiety    | 1.850 | .840           | 1.621          | 2.079                                    | 16.907 | 19.000 |
| Pair 2   | Physiological anxiety| 5.750 | .716           | 5.415          | 6.085                                    | 35.897 | 19.000 |
| Pair 3   | Stimuli anxiety      | 13.450| 1.638          | 12.684         | 14.216                                   | 36.732 | 19.000 |
| Pair 4   | Global scor DFS      | 21.350| 1.814          | 20.501         | 22.199                                   | 52.623 | 19.000 |

4. Conclusions

This study is analyzing the result of the efficacy of two therapy methods used in reducing dental fear and anxiety: relaxation and systematic desensitization. The both psychological techniques for reducing anxiety have had a statistically significant effect in decreasing it, both for the general index (total DFS) and for the three components: avoidance, physiological and to stimuli. As a result of using the relaxation technique, the anxiety level decreased to the greatest extent, as compared with the other technique, both for the global anxiety index and for its components (avoidance, physiological and to stimuli). The decrease was statistically significant. Therefore, the hypothesis according to which relaxation is the most effective on physiological reactions during a dental treatment is confirmed, similar to previous studies (Berggren, Hakeberg & Carlsson, 2000).

Table 3. DFS scores for each group and technique and results of T test
Finally, the most effective therapy of dental anxiety will be decided on an individual basis and will be adjusted to each patient; it’s desirable that such a therapy addresses also the avoidance behaviour often seen in such patients. As a conclusion, this study emphasizes a scientifically proven fact: severe dental anxiety needs complex or ample therapy solutions.

| DFS score               | Relaxation | Desensitization | Control group | T Independent Test |
|-------------------------|------------|-----------------|---------------|--------------------|
|                         | N  Median  | DS              | N  Median  | DS              | Group I | t   | p    |
| Global score            |           |                 |              |                  |         |     |      |
| Before intervention     | 20  75.50 | 5.50            | 20  79.90 | 4.919            | 20  65.60 | 8.325 | Group I | 25.465 | 0.000 |
| After intervention      | 20  52.55 | 4.76            | 20  58.55 | 4.110            | 20  65.40 | 8.325 | Group II | 52.623 | 0.000 |
| Anticipation-avoidance  |           |                 |              |                  | Control | 1.710 | 0.104 |
| Before intervention     | 20 11.05  | 2.23            | 20 10.8   | 1.57             | 20  9.60 | 1.984 | Group I | 13.543 | 0.000 |
| After intervention      | 20  8.40  | 2.30            | 20  8.59  | 1.27             | 20  9.55 | 1.959 | Group II | 16.907 | 0.000 |
| Physiological anxiety   |           |                 |              |                  | Control | 1.000 | 0.330 |
| Before intervention     | 20  20.8  | 3.57            | 20 18.55  | 3.05             | 20 15.20 | 2.16  | Group I | 17.448 | 0.000 |
| After intervention      | 20  9.70  | 2.65            | 20 12.80  | 2.62             | 20 15.20 | 2.167 | Group II | 35.897 | 0.000 |
| Anxiety to stimuli      |           |                 |              |                  | Control | 0.000 |
| Before intervention     | 20 44.45  | 3.41            | 20 50.25  | 3.05             | 20 41.85 | 5.304 | Group I | 7.541  | 0.000 |
| After intervention      | 20 34.40  | 5.97            | 20 36.8   | 3.12             | 20 41.70 | 5.352 | Group II | 36.732 | 0.000 |

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