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Effectiveness of Progressive Muscle Relaxation Sessions in Improving Body Image in an Adolescentwith Type 1 Diabetes: A Case Study

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Abstract:

This single-case study examined the effectiveness of a Progressive Muscle Relaxation (PMR) programme in improving body image in a 13-year-old male adolescent diagnosed with Type 1 diabetes mellitus (T1DM) since early childhood. A pre–post clinical case design was employed, combining a semi-structured clinical interview and the Goodenough–Harris Draw-a-Person (DAP) test to evaluate body image before and after eight consecutive PMR sessions delivered over four weeks. Blood glucose levels were recorded immediately before and after each session as a concurrent physiological indicator. Post-intervention drawings revealed marked qualitative improvements, including greater bodily proportionality, completeness of body parts, clearer and more positive facial expressions, appropriate representation of hands and fingers, and a notable reduction in shading intensity and pencil pressure. A general trend toward more stable post-session blood glucose values was also observed. These findings suggest that PMR may serve as a viable supportive psychological intervention for reducing somatic–psychological tension and enhancing body image among adolescents living with T1DM, and may be integrated within comprehensive diabetes care plans.

Keywords: progressive muscle relaxation; body image; Type 1 diabetes; adolescent; case study.

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1. INTRODUCTION

Body image constitutes one of the central constructs in developmental and clinical psychology. It encompasses the cognitive, affective, and perceptual representations that an individual forms about the shape, size, function, and personal worth of their body (Cash & Smolak, 2011; Grogan, 2017). A substantial body of literature indicates that body image is closely linked to self-esteem, life satis- faction, and health-related behaviours, with these associations being particularly pronounced during adolescence—a period characterised by heightened sensitivity to physical appearance and social ac- ceptance (Neumark-Sztainer et al., 2006).

During this developmental stage, rapid biological changes, peer pressure, and pervasive media messages about idealised body standards converge to increase the risk of body dissatisfaction and body image disturbance. Such disturbances frequently co-occur with anxiety, depressive symptoms, and maladaptive eating behaviours (Neumark-Sztainer et al., 2006; Morin & Dany, 2010).

The challenge intensifies considerably when adolescence coincides with a chronic illness such as Type 1 diabetes mellitus (T1DM). T1DM imposes an exacting self-management regimen that includes continuous blood glucose monitoring, multiple daily insulin injections, dietary regulation, and regular medical follow-up (American Diabetes Association, 2024; Delamater, 2007). This relentless focus on the body as a medicalised, vulnerable, or "defective" entity places the adolescent at elevated risk for body image disturbance, diminished self-esteem, and psychosocial adjustment difficulties (Helgeson et al., 2007; Hilliard et al., 2013).

Against this background, the need for simplified yet effective psychological interventions that target tension reduction and help the adolescent reconstruct a more adaptive relationship with the body becomes apparent. Among such interventions, relaxation techniques—particularly Progressive Muscle Relaxation (PMR), originally developed by Jacobson (1938) and subsequently refined by Bernstein & Borkovec (1973)

and Öst (1987)—have shown consistent efficacy in reducing anxiety and somatic arousal across diverse clinical populations.

2.Statement of the Problem

Both Arabic and international studies have documented significant associations between body image, self-esteem, and emotional disorders in adolescents. Body dissatisfaction has been linked to elevated anxiety, depressive symptoms, and lowered self-esteem, particularly among girls and under the influ- ence of prevailing aesthetic standards (Morin & Dany, 2010; Al-Qadi, 2009; Abd El-Sattar, 2007). Concurrently, the psychosocial literature on T1DM in young populations highlights that affected children and adolescents are susceptible to a range of psychological difficulties, including anxiety, de- pression, feelings of stigmatisation and perceived difference from peers, as well as treatment resistance and non-adherence (Delamater, 2007; Helgeson et al., 2007; Abd El-Aziz, 2016).

Despite the extensive research on body image during adolescence and on the psychological di- mensions of T1DM respectively, studies that specifically examine body image in adolescents with T1DM—while introducing PMR as the primary therapeutic modality—remain scarce in the Arabic- language literature. Moreover, the majority of existing intervention programmes focus predominantly on the biomedical aspects of diabetes management rather than on body representations and psycho- logical embodiment.

Drawing on fieldwork within an association devoted to diabetes care, the first author observed in numerous adolescents behaviours indicative of body image disturbance: reluctance to disclose the di- agnosis to peers, concealment of insulin injections, frequent absenteeism from medical appointments, a pronounced sense of deprivation regarding foods and activities enjoyed by healthy peers, negative self-appraisals of the body, and pessimistic future outlook. These clinical observations prompted the central research question of the present study:

To what extent can PMR sessions improve body image in an adolescent with T1DM, and to what degree might such improvement be associated with a trend toward better blood glucose regulation during the intervention period?

3. Study Objectives

3.1 General Objective

The overarching aim was to examine the effectiveness of a short-term PMR programme in improving body image in an adolescent diagnosed with T1DM, within the framework of a clinical case study.

3.2 Specific Objectives

1. Describe the adolescent's body image prior to the intervention, as manifested through clinical interviews and the Draw-a-Person test.
2. Identify post-intervention changes in drawing characteristics—specifically proportionality, completeness of body parts, facial features, limb positioning, hand and finger representation, shading, and pencil pressure.
3. Explore the impact of the sessions on the adolescent's daily experience of living with diabetes, including diagnostic acceptance, treatment adherence, attitude toward insulin, anxiety levels, and social withdrawal.
4. Document the general trend in blood glucose levels before and after each session, and explore the descriptive relationship between these values and the practice of PMR.
5. Highlight the feasibility of integrating PMR as a supportive therapeutic technique within comprehensive care programmes for adolescents with T1DM.

4. Method

4.1 Study Design

The study adopted a clinical case study methodology with a pre–post single-participant design, supplemented by repeated blood glucose measurements before and after each PMR session. This design falls within the category of single-case experimental designs (SCEDs), consistent with the Single-Case Reporting Guideline In BEhavioural Interventions—SCRIBE 2016 (Tate et al., 2016). The purpose was not statistical generalisation but rather a systematic, in-depth description of the changes observed in the participant in relation to the applied intervention, thereby enriching clinical understanding and informing future larger-scale investigations.

4.2 Case Description

The participant was a 13-year-old male, the eldest child in a low-income family, enrolled in the third year of middle school with satisfactory academic standing. He was diagnosed with T1DM at the age of five following a psychologically traumatic incident, after which he exhibited marked polydipsia, polyphagia, weight loss, and nocturnal enuresis. Since diagnosis, he has been maintained on a regimen of five daily insulin injections (American Diabetes Association, 2024).

Clinical interviews revealed pronounced anxiety and observable somatic tension—frequent pos- tural shifts, nail biting, and repeated sighing—alongside a strong sense of deprivation from sweets, outdoor play, and physical education. He avoided social outings and was found to occasionally falsify blood glucose readings in his monitoring log to avoid reprimand from his mother or physician. He expressed resentment toward sympathetic glances from others and his exclusion from sports classes. He described diabetes as "an enemy" and "a slow death," and characterised his body as "weak, sick, and tethered to insulin." He voiced fear about the future and about dying should a definitive cure not be discovered. These features collectively indicate a markedly disturbed body image and diminished self-esteem (Delamater, 2007; Helgeson et al., 2007).

4.3 Instruments

4.3.1 Semi-structured clinical interview

A semi-structured clinical interview was used to collect data on the participant's personal and medical history, family and social context, and representations of the body, illness, and future. These interviews provided the contextual understanding necessary for interpreting the projective test results.

4.3.2 Goodenough–Harris Draw-a-Person (DAP) test

The DAP test is a widely used projective tool in psychological assessment that involves analysing a human figure drawing to explore aspects of cognitive and emotional development, self-representation, and body image (Harris, 1963; Naglieri, 1988). In this study, the test focused specifically on body image indicators: figure size, proportionality of body parts, facial detail, limb positioning, hand and finger representation, shading, and pencil pressure. Narratives accompanying the drawings were also analysed. The test was

administered under identical procedural conditions before and after the intervention, with detailed behavioural observations recorded during each administration (e.g., hesitation, tension, drawing speed, pressure).

4.3.3 Blood glucose monitoring log

Blood glucose levels were measured immediately before and after each PMR session using a standard glucometer. Values were recorded in a structured log noting the session date, time, and pre- and post-session readings. These measurements served as a concurrent physiological indicator to explore the relationship between momentary stress states and the practice of relaxation (Delamater, 2007; American Diabetes Association, 2024).

4.4 Intervention Programme: Progressive Muscle Relaxation

PMR is grounded in the principle of sequentially tensing and then slowly releasing successive muscle groups, with the aim of reducing physiological arousal associated with stress and anxiety and fostering awareness of the contrast between muscular tension and relaxation (Jacobson, 1938; Bernstein & Borkovec, 1973; Conrad & Roth, 2007).

4.4.1 Programme structure

The programme comprised eight sessions delivered over approximately four weeks at a frequency of two sessions per week, with each session lasting between 20 and 45 minutes:

- **Session 1:** Psychoeducation on body image and the relationship between stress and diabetes; explanation of PMR principles and goals; introductory training in slow diaphragmatic breathing (nasal inhalation, breath holding, slow oral exhalation).
- **Sessions 2–4:** Review of breathing exercises; progressive tension–release training targeting facial muscles (forehead, eyes, mouth, chin), the neck, then shoulders, arms, and hands, with particular emphasis on the hands given their association with repeated insulin injections.
- **Sessions 5–6:** Extension of exercises to the back, abdomen, pelvis, thighs, legs, and feet in a head-to-toe sequence; introduction of guided imagery elements (visualisation of a safe, comfortable place; sensations of warmth and relaxation spreading through the body).
- **Sessions 7–8:** Integration of the full head-to-toe muscle relaxation sequence in a

single session; gradual reduction of therapist guidance with the adolescent encouraged to self-direct the exercise; discussion of perceived changes in sleep quality, mood, and attitude toward insulin.

4.4.2 Home practice

The adolescent was asked to practise breathing and relaxation exercises twice daily (e.g., morning and before bedtime) for 10–15 minutes per session, and was encouraged to observe and note his subjective feelings after each practice.

4.5 Data Collection and Analysis Procedures

1. Pre-intervention administration of the DAP test, with concurrent behavioural observations and narrative recording.
2. Delivery of the eight-session PMR programme, with blood glucose measured before and after each session.
3. Post-intervention re-administration of the DAP test under identical conditions.
4. Comparative qualitative analysis of pre- and post-intervention drawings along fixed dimensions: size, proportionality, completeness of body parts, facial features, limb positioning, hand and finger representation, shading, and pencil pressure (Harris, 1963; Naglieri, 1988).
5. Descriptive analysis of blood glucose trends to determine whether a general tendency toward reduction or stabilisation of values was evident following relaxation (Delamater, 2007).
6. Triangulation of drawing and physiological findings with interview data regarding the adoles- cent's feelings and behaviours before and after the intervention.

4.6 Ethical Considerations

Written informed consent was obtained from the adolescent's legal guardian following a detailed explanation of the study's aims and procedures. The adolescent himself provided age-appropriate assent. The family was informed that participation was entirely voluntary and that withdrawal at any stage would have no bearing on ongoing medical care. Confidentiality was maintained by removing all personally identifying information, and no real names appear in this report.

5. Results

5.1 Pre-Intervention Drawing Analysis

The pre-intervention drawings exhibited three salient features:

1. **Adult rather than adolescent figures.** All three figures depicted were adults, suggesting an implicit rejection of the adolescent developmental stage and a desire to identify with the adult world in search of strength and autonomy.
2. **Marked disproportionality and distortion.** The drawings showed conspicuous imbalances in body proportions, including an oversized head, heavily shaded arms and hands, and incomplete finger representation (three or four fingers depicted as claw-like forms). These features point to elevated tension and an intra-psychic conflict centred on the hands as the site of repeated insulin injections.
3. **Unclear or harsh facial expressions, heavy shading, and strong pencil pressure.** These indicators reflect intense anxiety, a pervasive sense of insecurity, and a negative stance toward the body.
4. In the accompanying narratives, the adolescent described the depicted characters as sick, ugly, deformed, wishing either to be cured or to die, and dissatisfied with their bodies. He drew explicit connections between illness, insulin injections, and a deficient body. These findings collectively support the presence of a disturbed body image and diminished self-esteem, consistent with established body image frameworks (Cash & Smolak, 2011; Grogan, 2017).

5.2 Post-Intervention Drawing Analysis

Following the eight PMR sessions, the post-intervention drawings demonstrated the following changes:

1. **Age-appropriate figures with improved proportionality.** All three figures were closer in ap- parent age to the participant himself, with markedly greater bodily symmetry and completeness of body parts. Facial expressions were either positive or neutrally relaxed.
2. **Accurate hand and finger representation.** Hands were drawn with five correctly proportioned fingers and without excessive shading, indicating a reduction in anxiety related to the hands and to receiving insulin injections, and suggesting improved integration of these body parts into the overall body image.

3. **Grounded, stable postures.** The figures were depicted standing firmly, conveying a sense of security and balance—in contrast to the unsteady, disorganised postures observed in the pre-intervention drawings—which may reflect an enhanced sense of safety and perceived familial–social support (Delamater, 2007).
4. Narratively, references to illness became less intense and were accompanied by expressions of aspiration, such as wanting to succeed academically, pursue realistic future goals, and adopt a more accepting attitude toward insulin and treatment. These shifts support an improvement in psychological adaptation to the illness.

5.3 Blood Glucose Trends

Blood glucose measurements across the eight sessions indicated that post-session values were lower than pre-session values in the majority of instances, with a general trend toward relatively better glycaemic regulation as the programme progressed. A direct causal interpretation is precluded by the multiple confounding factors that influence blood glucose (dietary intake, physical activity, injection timing). Nonetheless, these observations are congruent with evidence suggesting that stress reduction can exert favourable effects on certain physiological markers in individuals with diabetes (Delamater, 2007; American Diabetes Association, 2024).

6. Discussion

The results of this study indicate that a short-term PMR programme can produce appreciable im- provements in body image in an adolescent with T1DM. This is evidenced by the transition from pre-intervention drawings characterised by anxiety-laden, distorted adult figures to post-intervention drawings depicting more balanced, realistic adolescent figures, along with improved representation of hands and fingers and less negative facial expressions. These findings are consistent with the broader literature documenting the efficacy of PMR in reducing anxiety and enhancing psychological adjustment (Öst, 1987; Conrad & Roth, 2007; Hamida, 2015).

Two principal mechanisms may account for the observed changes:

1. **Reduction of physiological arousal.** The repeated practice of tension–release cycles and deep breathing is posited to lower the autonomic activation associated with illness-related fear and anticipatory anxiety (Jacobson, 1938; Bernstein & Borkovec,

1973).

2. **Enhancement of self-efficacy and bodily agency.** Through acquiring a practical skill that he could apply independently, the adolescent began to experience his body not merely as a locus of pain and stigma but as an entity that could be soothed and regulated. Such a perceptual shift is theorised to exert a positive influence on body image and self-representations (Cash & Smolak, 2011; Grogan, 2017).

Additionally, the relative improvement in blood glucose stability during the intervention period may have reinforced feelings of mastery and optimism, further nourishing the positive trajectory in body image and psychological adaptation (Hilliard et al., 2013).

These findings must, however, be interpreted with caution given the inherent limitations of a single-case design and the absence of a control condition or extended baseline. The present study is therefore best understood as an exploratory endeavour that warrants replication through studies employing larger samples, single-case or group experimental designs, and validated quantitative measures of body image, anxiety, depression, and quality of life (Tate et al., 2016).

7. Conclusion and Recommendations

The present findings provide preliminary evidence that PMR sessions can serve as an effective adjunc- tive intervention for improving body image and alleviating tension in an adolescent with T1DM, with concurrent indications of modest improvements in glycaemic regulation and treatment acceptance. On the basis of these results, the following recommendations are advanced:

1. Broaden the implementation of PMR programmes within psychological support units serving adolescents with T1DM.
2. Conduct experimental studies on larger samples incorporating standardised measures of body image, self-esteem, anxiety, depression, and quality of life alongside projective assessments.
3. Train clinical psychologists and diabetes care teams in relaxation techniques and integrate these within therapeutic education programmes for individuals with diabetes.

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