



## Effects of Muscle Relaxation on Anxiety of Parents Who Have Children with Leukaemia Undergoing Chemotherapy

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### ABSTRACT

*This research intended to determine the effects of the muscle relaxation techniques on anxiety of parents having children with leukaemia who were undergoing chemotherapy at teaching hospitals of Zahedan in 2015. This was a randomized case-control intervention study. The study population consisted of 120 parents of children with leukaemia referred to teaching hospitals in Zahedan and undergoing chemotherapy. These parents were divided into the intervention and control groups, and the intervention group received muscle relaxation using Benson relaxation technique. Data collection tools included the demographic information questionnaire and the questionnaire for assessing apparent and hidden anxiety. Results showed a statistically significant difference between apparent and hidden anxiety in the intervention and control group after the intervention and a significant relationship between apparent anxiety and education level ( $p \leq 0.05$ ). The findings of this research can lay the groundwork for providing family-oriented nursing care to give greater support to parents of children with cancer in order to prepare the parents for confronting stresses resulting from their children's illness.*

**Keywords:** Muscle relaxation, anxiety, leukaemia, chemotherapy

### INTRODUCTION

Cancer disrupts children's life plans and those of their family members, especially life plans of their parents [1]. Moreover, chemotherapy is performed to increase life span and survival of children with cancer [2]. However, not only does this increased survival expose the children to other health risks such as developmental-cognitive problems and to changes in their quality of life, but it also causes stress and emotional tensions in their parents because their long confrontation with these conditions negatively affects their quality of life [3]. Anxiety is one of the major problems of human communities and in psychological states that encompasses slight distress in a daily activity to a disabling disease [4]. At present, stress, anxiety, and mental pressure in daily life, which is very complicated and full of problems and various stressors, negatively affect people's wellbeing and health [5]. Parents of children with leukaemia undergoing chemotherapy become exposed to many stresses that affect their quality of life, yet these parents are not considered clients or patients and there are no special support centres for them [6]. Control of fatigue, anxiety, and sleep quality includes pharmacological and non-pharmacological methods, desirability of complementary therapies in health systems has increased, and it is necessary to use non-pharmacological interventions for complementing advanced medicine [7]. Non-pharmacological methods, which are also called complementary medicine techniques, include music therapy, yoga, hypnotism, energy therapy, massage therapy, pressure therapy, and relaxation [8], and use of these non-pharmacological interventions is on the rise among nurses [7]. Muscle relaxation decreases muscle tension, regulates respiration, reduces heart rate and muscle spasms, and lowers undesirable physiological effects and anxiety by creating a balance between the anterior and posterior hypothalamus [9], through reducing the activity of the sympathetic nervous system, and by secreting catecholamine [10]. Therefore, this study was conducted at teaching hospitals in Zahedan to determine the effects of muscle relaxation technique on anxiety of parents having children with leukaemia who were undergoing chemotherapy.

### METHODS AND MATERIALS

In this semi-empirical randomized case-control intervention study, the samples were selected in blocks of four (so that

the A group was the intervention group and the B group the control group) and divided into the intervention and control groups (each with 60 participants). Intervention was in the form of muscle relaxation (a type of breathing relaxation that is easy to use for most parents and is accompanied by reduced activity of the sympathetic nervous system). The Spielberger State-Trait Anxiety Inventory (STAI), which was designed and published by Spielberger, is the standard tool for anxiety assessment [11]. This test includes 40 statements, 20 for each of the two scales of apparent and hidden anxiety. The four-point Likert scale questions determine the extent of apparent and hidden anxiety in the subjects, and anxiety is assessed in the two forms of state and trait. In answering the questions on apparent anxiety scale, the subjects must express their present feelings (at the time of completing the form), while in answering the questions on hidden anxiety scale they must point to their usual feelings (what they feel most of the time). The validity of this questionnaire was confirmed by Spielberger (and by Hoseini in Iran) and it has been used in various studies in Iran and in other countries. Moreover, the reliability of the Spielberg anxiety questionnaire was confirmed by Hoseini [12] using the test-retest method ( $r=89\%$ ). The interpretation criteria for apparent and hidden anxiety were as follows: Each statement in this test was assigned a score of 1 to 4 based on the given answer. In the 10 statements on the apparent anxiety scale and the 11 statements on the hidden anxiety scale, the options "very much" and "almost always," that represented high levels of anxiety received a score of four. In assigning scores for other statements, the options "very much," and "almost always," denoted lack of anxiety, were used for the 10 statements on apparent anxiety and the 9 statements on hidden anxiety, and received a score of one. In other words, the weights of the scores are 4-3-2-1 instead of 1-2-3-4. Therefore, the scores for each of the two scales will be in the range of 20 to 80. The collected data was entered in SPSS, and the central tendency, dispersion, frequency, and percentage indices were used to describe the data. The t-test and the chi-square tests were employed for homogeneity of quantitative demographic variables and for the anxiety dimension of the qualitative demographic variables. The paired-samples t-test was used to compare scores for hidden anxiety between the intervention and control groups due to the normality of the data. The Wilcoxon test was employed to compare the apparent anxiety dimension in the two groups prior to and following the intervention, and the Mann-Whitney test to determine the effects of the muscle relaxation technique on anxiety in the intervention and control groups. Furthermore, considering the difference between the average before-after scores for apparent and hidden anxiety and for the quantitative demographic variables followed normal distribution, non-parametric tests including t-test, Pearson's correlation and the one-way ANOVA were used to determine the relationships between the apparent and hidden dimensions of anxiety and the demographic variables.

## RESULTS

The results showed that the mean age was  $36.9 \pm 10.9$  and  $38.06 \pm 12.62$  in intervention and control groups, respectively. The majority of participants were housewives and had Blood Type A. In intervention group, 24% were illiterate and 36% were diploma and under-diploma. Twenty-six per cent were urban residents, while 34% were residing in villages. Fifty-six per cent had an income less than one million Iranian Toman.

According to the chi-square test, there were no statistically significant differences between the intervention and control groups in demographic variables. According to t-test results, no significant difference was found between intervention and control groups concerning demographic characteristics, fatigue, manifest anxiety and latent anxiety. The distribution of variables was similar in both groups (Table 1).

**Table 1 Quantitative demographic characteristics and manifest and latent anxiety in intervention and control groups of parents with children diagnosed with leukaemia undergoing chemotherapy in teaching hospitals in Zahedan in 2015**

Variable	Intervention		Control		t-test Statistics
	Mean $\pm$ Standard Deviation	Median (IQR)	Mean $\pm$ Standard Deviation	Median (IQR)	
Age	$36.9 \pm 10.9$	34 (16)	$38.06 \pm 12.62$	34 (17)	$t=-0.54$
Weight	$62.46 \pm 10.9$	62.5 (11)	$63.03 \pm 10.7$	64 (9)	$t=-0.28$ $p=0.776$
Number of Daughters	$1.9 \pm 1.4$	2 (2)	$2.1 \pm 1.3$	2 (2)	$t=-1.02$ $p=0.306$
Number of Sons	$2.46 \pm 10.9$	3 (2)	$2.7 \pm 1.5$	3 (2)	$t=-1.96$ $p=0.052$
Manifest Anxiety	$24.91 \pm 5.3$	27 (5)	$26.7 \pm 6.5$	27 (6)	$t=27.51$ $p=0.124$
Latent Anxiety	$22.11 \pm 4.08$	22 (5)	$23.7 \pm 4.5$	21 (5)	$t=29.38$ $p=0.081$

According to t-test results, no significant difference was found between intervention and control groups concerning

demographic characteristics, fatigue, manifest anxiety, latent anxiety, and quality of sleep. The distribution of variables was similar in both groups (Table 2).

**Table 2 Comparison of qualitative demographic variables between the intervention and control groups of parents having children with leukaemia who were undergoing chemotherapy at the teaching hospitals in Zahedan in 2015**

Variable	Subgroup	Intervention group	Control group	Test statistic results of statistical test
Gender	Male	30 (50)*	30 (50)	$X^2=0.001$ $p=0.572$
	Female	30 (50)	30 (50)	
Blood group	A	24 (50)	34 (56.7)	$X^2=6.27$ $p=0.98$
	B	12 (20)	12 (20)	
	AB	8 (13.3)	8 (13.3)	
	O	16 (26.7)	6 (10)	
Occupation	Government employee	8 (13.3)	2 (3.3)	$X^2=3.96$ $p=0.276$
	Freelancer	23 (38.3)	25 (41.7)	
	Housewife	26 (43.3)	30 (50)	
	Unemployed	3 (5)	3 (5)	
Education	Illiterate	24 (40)	30 (50)	$X^2=1.86$ $p=0.390$
	Without high school diploma	18 (30)	18 (30)	
	With high school diploma	18 (30)	12 (20)	
Residence	City	26 (43.3)	14 (23.3)	$X^2=5.4$ $p=0.033$
	Village	34 (56.7)	46 (76.7)	
Income	Less than one million Tomans	56 (93.3)	58 (96.7)	$X^2=0.7$ $p=0.679$
	1-3 million Tomans	4 (6.7)	2 (3.3)	

According to the Wilcoxon and Mann-Whitney tests, latent and manifest anxiety before and after intervention had a significant difference with intervention and control groups in parents of children diagnosed with leukaemia undergoing chemotherapy ( $p=0.0001$ ) (Table 3).

**Table 3 The effects of the muscle relaxation technique on apparent and hidden anxiety before and after the intervention in parents of children with leukaemia who were undergoing chemotherapy at teaching hospitals in Zahedan in 2015**

Variable	Group	Mean $\pm$ standard deviation		The p value statistic
		Before intervention	After intervention	
Apparent anxiety	Intervention group	60.86 $\pm$ 8.95	35.95 $\pm$ 4.61	$Z=-6.74$ $p=0.0001$
Hidden anxiety	Intervention group	56.56 $\pm$ 4.75	34.45 $\pm$ 4.95	$Z=-6.74$ $p=0.001$
Hidden anxiety	Control group	56.35 $\pm$ 4.46	53.13 $\pm$ 3.05	$Z=-5.91$ $p=0.112$
Apparent anxiety	Control group	57.56 $\pm$ 4.81	53.26 $\pm$ 3.60	$t=12.13$ $p=0.110$

## DISCUSSION

After the intervention, there were statistically significant differences in apparent and hidden anxiety in the intervention and control groups of parents having children with leukaemia who were undergoing chemical therapy, and this difference was greater in the intervention group. Cancer is a disease that severely affects patients, their parents, and their family members, leading to changes in the daily lives of the parents [13]. In his research conducted in 2005, Wills noticed that the first reaction of parents after their child was diagnosed with leukaemia was being overwhelmed with fear and anxiety [14]. In this relation, the findings of a study entitled, "The Burden of Care of Parents Having Children with Cancer," also found that this was more than an average burden for the parents [15]. In a research, experiences of parents having children with leukaemia were explained, the main identified theme of the research was that the parents reached an impasse in life and, due to the strength of family dependence, the stress experienced by them was stronger and had the strength of a heavy blow [16]. In the present research, the average anxiety level was

high before the intervention, which could be due to the nature of the child's disease and the contradictory effects of the disease conditions on parents having children with leukaemia, but their anxiety decreased after the intervention. Greening and Stoppelbein showed in their research that reactions of anxiety, depression, and stress after an accident had a direct relationship with emotion-focused strategies [17]. It has been found that use of emotion-focused strategies such as distraction, self-absorption, correct expression of emotions, and of complementary methods is effective in reducing levels of anxiety and stress in parents [18]. Therefore, muscle relaxation can restore calm to parents and reduce their anxiety under certain life threatening conditions, and is considered a useful and valuable intervention for caregivers in conditions under which patients experience anxiety in relation to their chronic and hard-to-cure disease. Vahedian-Azimi, et al. conducted research to determine the effects of muscle relaxation on perceived stress in patients with myocardial infarction and observed results that were more specific due to the relatively long duration of their study [19]. In agreement to their research, another study showed that relaxation, which was performed prior to surgery, reduced stress, and anxiety in patients [20], and decreased anxiety in the elderly was observed in research that was conducted by Hamidzadeh, et al. [21]. Results of another study also confirmed the effects of progressive muscle relaxation technique on decreasing levels of stress and pain in patients with osteoarthritis [7]. Mohammadi, et al. did not notice significant differences between the intervention and control groups in their research because they followed up the effects of the intervention for a short period [22]. In a study conducted by Flaherty, et al. it was found that communication between nurses and patients and their families created trust and confidence and eventually reduced intensity of undesirable mental and psychological states including stress and anxiety [23], which, in turn, played an important role in satisfaction of patients and in continuation of their treatment process [22]. These differences in research findings may be due to the duration and continuation of using the relaxation technique, which would certainly increase its effectiveness. Results of the present research indicated that average anxiety and stress levels in the intervention group declined compared to the time before the intervention began. Results of other studies also showed that levels of anxiety and stress in patients considerably decreased following the use of the relaxation technique [24]. Findings of another study revealed that patients who participated in classes of coping with stress and lived with their family members experienced less stress and anxiety compared to those who did not participate in these classes and lived alone without their family members [25]. Findings of the present research demonstrated that use of the relaxation method reduced the level of anxiety in parents of children with leukaemia who were in the intervention group. Utilization of relaxation methods can establish an effective relationship between children with cancer and their parents that will in turn probably increase their parents' satisfaction. Considering the findings of the present study, it can be recommended that greater priority be given in treatment of chronic diseases including cancer to treatment that is accompanied by relaxation for the children and for the parents. The reason for this recommendation is that it will not have any complications for the patients and will not impose any extra costs on the treatment system and on the patients either. Despite the effective results of using relaxation for controlling anxiety and stress, we did not find any research carried out in this regard, especially in parents having children with cancer, in our review of literature. Continuous stress and exhaustion resulting from these pressures can reduce the capabilities of caregivers of children with cancer and influence the effectiveness of treatment interventions. Education of parents having children with cancer, especially of their mothers who are considered the most important caregivers of these children, regarding muscle relaxation will help them in utilizing other more efficient coping strategies.

There was also a statistically significant relationship between occupation and apparent and hidden anxiety so that government employees experienced a higher average level of anxiety. It seems that the workload of parents who were government employees increased their levels of anxiety and stress. In research by Khanjari, et al. economic worries, followed by mental and physical suffering received the lowest scores. This could suggest economic worries of the parents and high levels of their suffering [6]. Mental and physical suffering refers to the emotional response of the caregivers to changes and to supportive care needs of the patients [26]. In a study entitled "The effects of caregiving to child with cancer on the quality of life of the parents' in relation to their health in Taiwan," Klassen, et al. also showed that there was a positive relationship between higher income levels of the families and better quality of life of parents having children with cancer [27]. In the present research, income levels of the families did not influence their anxiety levels. In the study conducted by Khanjari, et al. gender of the parents exhibited a significant relationship with their quality of life so that the mothers had a better quality of life compared to the fathers. The lower quality of life of the mothers could be due to anxiety and stress caused by the unpredictable nature of the disease, lack of

sufficient confidence in the treatments, and other responsibilities the mothers had at home and in the community [6]. Other studies also emphasized the role played by women caregivers of patients with cancer, and attributed their lower quality of life to the high level of stress they experienced [28]. Research by Tang, et al. entitled, "Quality of life of caregivers of family members dying with cancer in Taiwan," and the study by Kim, et al. on the quality of life of caregivers to patients with cancer in the United States, indicated that the average level of hidden anxiety in women was higher compared to men [29,30]. However, such a relationship was not observed in the present study. Results of research showed that mothers of sick children experienced more physical and mental problems compared to the fathers, and this lowered their quality of life [31]. It is very important that attention be paid to complications in caregivers resulting from their giving care to patients with serious and/or chronic illnesses because physical and mental health of caregivers can influence the health, wellbeing, and successful treatment of the patients [32].

Litzeman conducted research to determine the quality of life of parents having children with leukaemia and brain tumours and showed that higher education levels of parents were related to their reduced quality of life, because parents with higher education levels preferred to actively participate in making decisions on the treatment of their children. This increased their stress levels and negatively affected their quality of life [33]. However, in the study carried out by Tang entitled "Quality of life of caregivers to family members with cancer in Taiwan," it was found that higher education levels were associated with better quality of life [30]. Tang's research agreed with ours with regard to significant relationship between apparent anxiety and education level. However, in the study carried out by Khanjari, no significant relationship was observed between education level and quality of life [6]. In research conducted by Khanjari, et al. age of the parents did not have a significant relationship with their quality of life [6], while in the study carried out by Turkoglu and Kilic, it was observed that caregivers under the age of 35 and those older than 50 had a lower quality of life [34]. Moosavi, et al. and Ahangari, et al. showed in their studies that there was a significant relationship between quality of life and education level, and quality of life increased at higher education levels [35,36]. In research carried out by Patistea, it was found that, in parents with sick children, there was a positive relationship between the parents' education level and socio-economic status and their behavioural patterns [37]. In other words, the higher their education level and socio-economic status were the greater and more effective their attempts to maintain the position of the family under stressful conditions would be [37]. These studies conform to the present one with the difference that in our study greater stress, anxiety, and mental pressure were observed in parents without high school diplomas because they were neither illiterate nor to have knowledge of their children's illness nor did they have higher education levels to enhance their suitable function.

### CONCLUSIONS

In general, the findings of this research can lay the groundwork for providing family-centred nursing care to provide greater support for children with cancer so that they can cope with stresses caused by their illness. Family function can be improved through suitable educational interventions including family therapy and parental education in groups and the process of group dynamics, and steps can be taken for the empowerment of families. Improved family function will be accompanied by mental health of the families and of the community on the one hand and by improved quality of life of all family members and of the sick children on the other hand. It seems that it is necessary to plan and develop coherent programs for parents of children with cancer to take part in classes and be taught muscle relaxation techniques together with other parents, and for each such family to understand the conditions faced by the other families.

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### CONFLICT OF INTEREST

The author declares that he has no conflict of interest.

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