




## Comparing the Effectiveness of Group Reality Therapy and Neurofeedback in Anxiety and Depression of Patients with Prostate Cancer

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### Quantitative Study

#### Abstract

**Background:** Prostate cancer (PC) is one of the most common cancers among men. The current study aimed to compare the effectiveness of group reality therapy and neurofeedback in the treatment of anxiety and depression in patients with PC.

**Methods:** The method of the present study was a quasi-experimental research with pretest, posttest, and follow-up design. Out of 184 patients with PC, 60 were selected using the simple random sampling method. Three groups of reality therapy, neurofeedback, and control were formed with 20 members. The participants answered the state anxiety, trait anxiety (Spielberger, 1970), and depression (Beck, 1960) questionnaires in three pretest, posttest, and follow-up stages. Data were analyzed using SPSS software and multivariate analysis of covariance (MANCOVA).

**Results:** There was a significant difference in the mean scores of trait anxiety, state anxiety, and depression ( $P \leq 0.05$ ). In the posttest phase, the control group had higher mean scores of depression than the two groups of reality therapy and neurofeedback ( $P \leq 0.05$ ), and the effects of reality therapy were better. The mean scores of anxiety and depression among patients with PC due to treatments were from 2.39 to 4.18, which showed an improvement.

**Conclusion:** The two therapies used in this study, reality therapy and neurofeedback, reduced depression and anxiety in men with PC. However, the reality therapy method had better results than the neurofeedback method. Therefore, it is recommended that the method of reality therapy be used more.

**Keywords:** Prostate cancer; Reality therapy; Neurofeedback; Depression

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## Introduction

Cancer is the name given to a set of diseases resulting from the uncontrolled proliferation of cells. Cancer cells are separated from the usual mechanisms of cell division and growth. The exact cause of this phenomenon remains unclear, but genetic factors or factors that disrupt cell function may play a role in cancer formation (Hopstaken et al., 2022). Prostate cancer (PC) is one of the men's most common cancers and is considered as one of the most important causes of mortality in adult men. In the United States (US), it is reported to be the second leading cause of death after lung cancer (among cancers). PC is the most common cancer in men, affecting about one in six men (Plym et al., 2022; Schmanke, Okut, & Ablah, 2021). The highest prevalence of PC is in Africa and the lowest in the Asian population. Several studies have shown familial accumulation of PC. The main reason for this accumulation is to inherit the genes involved (Dorff et al., 2022).

The prostate is one of the most important glands of the male reproductive system, located below the bladder and in front of the large intestine, and plays an essential role in reproduction. The gland is usually small in size, but over fifty, it gradually enlarges and sometimes causes problems for men. In general, the most common prostate diseases are inflammation of the prostate (prostatitis), enlarged prostate (benign prostatic hyperplasia) due to aging, and PC. The most worrying prostate disease is PC, which means forming cancer cells in the prostate tissue. Because this prostate cell deformity occurs slowly, it may not show symptoms for several years before severe malignancy. Late diagnosis can lead to malignancy as well as the spread of cancer cells to other tissues, including the bladder and colon (Alghamidi, Hussain, Alghamdi, & El-Sheemy, 2014; Orrason, Westerberg, Garmo, Lissbrant, Robinson, & Stattin, 2020). Studies show that cancer has several negative consequences in these patients, including decreased general health, reduced quality of life, and despair, among which anxiety, depression, and despair are more common. Cancer generally causes profound emotional problems in patients and their families, ranging from depression, anxiety, and maladaptation to emotional disorders and fear of relapse and death. The prevalence of psychological disorders in patients with cancer is high, and there is a high risk of depression and anxiety in these patients (Bastani et al., 2010; Choi, Rhee, & Flannery, 2022). Thus, if special measures are not considered to solve these problems, they will have destructive effects and adverse physical and psychological consequences.

The phenomenon of anxiety is one of the issues that human beings have always been involved with over time. This phenomenon is pervasive and universal, and it exists in all human beings, and even the most instrumental people have experienced it. Feeling anxiety occurs when a person perceives a danger beyond his ability to deal with it (Henriksson et al., 2022; Mayer, Craske, & Naliboff, 2001). Over the past decade, several psychological methods have been developed to improve the psychological status of people with cancer, like reality therapy and neurofeedback.

Reality therapy is a counseling and psychotherapy method founded by Glasser (2000). Reality therapy helps people explore wants, needs, behavioral values, and ways which help meet their needs. It is based on common sense and emotional conflicts, emphasizing reality, accepting responsibility, and recognizing right and wrong and their relationship to daily life. Glasser's approach is a unique blend of philosophy and existential and behavioral methods similar to the self-regulatory methods of therapists' behavior (Asadzadeh, Samad-Soltani, Salahzadeh, & Rezaei-

Hachesu, 2021; Glasser, 2000). Non-denial of reality, responsibility, and, accordingly, planning to achieve goals is one of the primary human needs in the process of life, which has been given importance in this therapeutic approach. This approach helps people control their behavior, take responsibility for their actions, and make better choices in their lives, emphasizing that access to a successful identity is achieved through successful work and the power to choose the agent. It is vital for his mental health (Chow, Hon, Chua, & Chuan, 2021). Researchers have examined and validated the effect of reality therapy on a wide range of psychological symptoms. Bhargava (2013) showed that reality therapy effectively reduced depression in deaf people. Lowe (2000) also found that reality therapy effectively reduced stress and anxiety in pregnant women.

The neurofeedback process involves training or learning to self-regulate brain activity. The brain controls blood flow through the dilation or contraction of blood vessels, and the blood flow in the brain is directed to specific areas. Neurofeedback works so that it has far fewer side effects than the drug. It is also a non-invasive method compared to other brain interventions, such as deep brain stimulation. It is a method of manipulating neuronal activity that allows researchers to evaluate changes in neuronal activity and gain important information about the relationship between brain activity and disease symptoms (Gruzelier, Egner, & Vernon, 2006; Munoz-Moldes & Cleeremans, 2020). Researchers have suggested that neurofeedback affects psychological disorders such as depression, anxiety, fatigue, stress, sleep problems, and pain in patients with cancer. In a study, Mennella et al. (2017) found that neurofeedback training reduced anxiety and negative emotion (depression) in women. Alino Costa et al. (2016) realized that neurofeedback training reduced anxiety.

The psychological consequences of cancer affect society, the individual, and the family. Therefore, the effective treatments for depression and anxiety in these patients must be identified to prevent the occurrence or exacerbation of their psychological problems. In this study, the researchers tried to answer the question of whether there is a difference in the effectiveness of reality therapy and neurofeedback training in reducing anxiety and depression in men with PC.

## **Methods**

The method of the present study was quasi-experimental with a pretest-posttest, follow-up design with a control group. The statistical population of the study consisted of men with PC who were referred to Baghdad Teaching Hospital in Baghdad, Iraq, for treatment for six months (January to June, 2020). Using the G\*Power software with effect size = 0.15 and  $\alpha = 0.05$  and also the sample size of previous studies, the sample size of the present study was considered to be 60 (20 people for each group) (Garrett, Tao, Taverner, Cordingley, & Sun, 2020; Huang, Lin, Han, Peng, & Huang, 2021). Finally, three population groups of 20 people in each group were randomly divided. It should be mentioned that 20 people were in the reality therapy group, 20 in the neurofeedback group, and 20 in the control group. Individuals in the three groups were barred from meeting during research and discussing the content of their treatment.

Inclusion criteria were symptoms of depression and anxiety based on the doctor's diagnosis, being 35 to 60 years old, at least one month passed since the diagnosis of PC and surgery, no history of mental illness and hospitalization, not having another cancer, having a high school education or higher, ability to participate in group therapy sessions, and willingness to cooperate. Exclusion criteria of the study were

not attending meetings for more than three sessions, unwillingness to continue attending meetings, and using psychotropic drugs to reduce anxiety and depression during the study. Due to ethical considerations, prior to the plan's implementation, participants were promised that the information received from each member remained strictly secret and that each member could withdraw from the training at any time when they did not want to continue.

Each patient's files in the mentioned hospital were studied to accomplish the research. The patients who met the inclusion criteria were found. Individuals who wanted to participate in the study were asked to come to the center to answer Beck Depression Inventory (BDI) and the State-Trait Anxiety Inventory (STAI) questionnaires. A total of 184 patients agreed to attend the center. After answering the questions by the invited patients and according to the scores obtained by each patient, 60 patients were selected using the simple random sampling method and divided into three groups: reality therapy, neurofeedback, and control.

In each group, the initial scores of the selected individuals were recorded as a pretest for their STAI and BDI questionnaires. The reality therapy group received reality therapy training for 12 sessions, and the neurofeedback group received neurofeedback training for 18 sessions. The control group had simple appointments (10 sessions) with the therapist.

After this stage, the posttest stage began. The control group also completed the questionnaires again after 12 sessions with the therapist. Five months later, the follow-up stage started, the patients' questionnaires were again completed, and the data were extracted as a result. In short, the classes of the reality therapy group were held as follows: group formation and acquaintance, self-acknowledging to strengthen self-confidence, promoting responsibility and giving responsibility to group members, examining the level of responsibility by controlling what should be done, discussing the wrong choice, successful and unsuccessful communication, and their perceptions of themselves, and finally reviewing previous sessions.

Neurofeedback was treated three times a week for 15 sessions. The neurofeedback device used in the current investigation was a Canadian device made by Thought Technology, FlexComp Infiniti model with ten channels. In this paper, neurofeedback therapy was performed on the experimental neurofeedback group for six weeks and three 40-minute sessions per week. In neurofeedback, first, according to the international 10-20 system, the electrodes were installed in F4-PZ locations according to the treatment protocol.

This study measures anxiety using a state-trait anxiety questionnaire, including separate self-assessment scales to measure overt and covert anxiety. The STAI explicit anxiety scale (Form Y-1) consists of twenty sentences that assess a person's feelings at "the moment and the time to respond." The STAI hidden anxiety scale (Form Y-2) also includes twenty sentences that measure a person's general and normal emotions. The minimum score for the trait and state anxiety subscale is 20, and the maximum score is 80. The reliability of the STAI test was calculated by Quek et al. (2004).

The BDI consists of 21 questions designed to assess the feedback and symptoms of patients with depression, and its items are based on the observation and summary of shared attitudes and symptoms among depressed mental patients. The minimum score in this test is zero, and the maximum is 63. The score for every person is obtained directly by adding the individual scores in each item: 0 to 13: no or minimal depression, 14 to 19: mild depression, 20 to 28: moderate depression, and 29 to 63: severe depression. Findings showed that this questionnaire had a

high validity (Stefan-Dabson, Mohammadkhani, & Massah-Choulabi, 2007; Yang & Stewart, 2020).

Data were analyzed using a multivariate analysis of covariance (MANCOVA). To do this, SPSS software (version 16, SPSS Inc., Chicago, IL, USA) was used.

## Results

After descriptive analysis of the data, for the final statistical analysis, the subjects included 60 men in three groups of reality therapy (20 people), neurofeedback group (20 people), and control group (20 people). Table 1 shows that all three groups were approximately the same in age. Besides, the percentage of literacy level (high school, diploma, and academic) for each group at different educational levels is shown in table 1.

In the following (in tables 2-4), the mean and standard deviation (SD) for the three criteria of state anxiety, trait anxiety, and depression of all three groups are given in three steps: pretest, posttest, and follow-up.

Based on the results shown in table 3, it can be said that by eliminating the effect of differences in pretest scores in the three groups, the difference between the mean scores in depression, trait anxiety, and state anxiety in the three groups of reality therapy, neurofeedback, and control in the posttest and follow-up was significance ( $P < 0.05$ ). In other words, the results showed that the difference between the adjusted posttest means in the score of depression, trait anxiety, and state anxiety by group ( $P < 0.05$ ) was significant. The test power for state anxiety, trait anxiety, and depression was obtained in the posttest stage at 0.952, 0.763, and 0.984, respectively, and in the follow-up stage at 0.994, 0.963, and 0.991, respectively, which indicated that the sample size was sufficient to prove the effectiveness of the interventions in two stages.

A pairwise comparison was performed to examine the groups' scores in the dependent variables in the posttest step. The results of pairwise comparisons (Table 4) for the posttest step showed that the difference between the mean scores of depression in the reality therapy group with the neurofeedback group, the reality therapy group with the control group, and the neurofeedback group with the control group was significance ( $P < 0.05$ ). Moreover, the difference between the mean scores of trait anxiety in the reality therapy group and the control group was significant ( $P < 0.05$ ). Nevertheless, the relationships of the reality therapy group with the neurofeedback group and the relationships of the neurofeedback group with the control group were not significant ( $P < 0.05$ ). Besides, the difference between the mean anxiety scores of the reality therapy group with the control group and the neurofeedback group with the control group was significant ( $P < 0.05$ ). However, the reality therapy group was not significant to the neurofeedback group ( $P < 0.05$ ).

**Table 1.** Mean and standard deviation (SD) of age and percentage of literacy level of three groups

	Neurofeedback	Reality therapy	Control
Age (year) (mean ± SD)	47.2 ± 6.7	48.8 ± 7.1	46.8 ± 6.3
Literacy level (%)			
High school	30	40	30
Diploma	25	35	40
Academic	45	25	30

SD: Standard deviation

**Table 2.** The mean and standard deviation (SD) for the state anxiety, trait anxiety, and depression criteria in all three groups in three sections: pretest, posttest, and follow-up

	Steps	Reality therapy (mean ± SD)	Neurofeedback (mean ± SD)	Control (mean ± SD)
State anxiety	Pretest	47.16 ± 3.15	48.14 ± 3.20	49.57 ± 3.52
	Posttest	39.52 ± 6.20	41.90 ± 6.60	46.83 ± 5.30
	Follow-up	38.14 ± 4.28	40.53 ± 4.72	46.38 ± 4.37
Trait anxiety	Pretest	49.83 ± 3.62	52.14 ± 2.91	50.27 ± 2.83
	Posttest	43.84 ± 4.83	46.81 ± 3.15	49.42 ± 4.18
	Follow-up	42.92 ± 5.32	46.75 ± 3.05	48.63 ± 3.86
Depression	Pretest	25.38 ± 3.68	27.41 ± 3.19	28.79 ± 3.41
	Posttest	18.65 ± 3.74	22.84 ± 3.03	26.74 ± 2.42
	Follow-up	18.20 ± 3.06	22.38 ± 2.89	26.53 ± 2.97

SD: Standard deviation

On the other hand, the results of pairwise comparisons for the follow-up stage (Table 4) showed that the difference between the mean scores of depression in the reality therapy group with the neurofeedback group, the reality therapy group with the control group, and the neurofeedback group with the control group was significant ( $P < 0.05$ ). Furthermore, the difference between the mean scores of trait anxiety in the reality therapy group and the neurofeedback group with the control group was significant ( $P < 0.05$ ). Nevertheless, the reality therapy group did not have a significant relationship with the neurofeedback group ( $P < 0.05$ ). Likewise, the difference between the mean anxiety scores of the reality therapy group with the control group, reality therapy with the neurofeedback group, and the neurofeedback group with the control group was significant ( $P < 0.05$ ).

Table 2 also briefly shows that the superiority of posttest treatment and follow-up in reducing depression favored reality therapy. In reducing state anxiety, reality therapy excelled in the follow-up step.

## Discussion

This study aimed to compare the effectiveness of group reality therapy and neurofeedback in treating anxiety and depression in patients with PC. The results showed that both reality therapy and neurofeedback had positive effects on reducing depression in men with PC. The results of the follow-up step showed that the effects of reality therapy and neurofeedback on depression in these patients were lasting. Neurofeedback and reality therapy immediately after treatment sessions for cancer anxiety, trait anxiety, and depression in men with cancer resulted in 0.34, 0.21, and 0.46 treatment changes, respectively. In the follow-up phase, the rate of change in these cases was 0.58, 0.34, and 0.59, respectively. It could be seen that the effectiveness of therapeutic interventions in patients' general anxiety was much higher than trait anxiety.

**Table 3.** Multivariate analysis of covariance (MANCOVA) comparison of groups in research variables

Steps	Criteria	SS	df	F	P-value	$\eta$	Power
Posttest	State anxiety	217.53	2	10.25	0.015	0.348	0.952
	Trait anxiety	94.67	2	5.64	0.001	0.209	0.763
	Depression	238.41	2	17.23	0.001	0.486	0.984
Follow-up	State anxiety	304.54	2	26.53	0.001	0.584	0.994
	Trait anxiety	124.31	2	9.94	0.001	0.342	0.963
	Depression	216.85	2	27.49	0.001	0.596	0.991

SS: Sum of Squares; df: Degree of freedom

**Table 4.** Bonferroni test to compare three groups

Steps	Criteria	Groups		Mean difference	P-value
Posttest	State anxiety	Reality therapy	Neurofeedback	-2.38	0.234
		Reality therapy	Control	-7.31	0.014
		Neurofeedback	Control	-4.93	0.036
	Trait anxiety	Reality therapy	Neurofeedback	-2.97	0.992
		Reality therapy	Control	-5.58	0.029
		Neurofeedback	Control	-2.61	0.062
	Depression	Reality therapy	Neurofeedback	-4.19	0.013
		Reality therapy	Control	-8.09	0.034
		Neurofeedback	Control	-3.90	0.020
Follow-up	State anxiety	Reality therapy	Neurofeedback	-2.39	0.002
		Reality therapy	Control	-8.24	0.002
		Neurofeedback	Control	-5.85	0.018
	Trait anxiety	Reality therapy	Neurofeedback	-3.83	0.994
		Reality therapy	Control	-5.71	0.001
		Neurofeedback	Control	-1.88	0.019
	Depression	Reality therapy	Neurofeedback	-4.18	0.003
		Reality therapy	Control	-8.33	0.018
		Neurofeedback	Control	-4.15	0.003

The results of this study comparing the two therapies showed that: first, in reducing the depressive symptoms of men with PC, group reality therapy excelled teaching neurofeedback to these patients immediately after treatment and in follow-up (Table 5). In anxiety, the two treatments were the same immediately after treatment, but reality therapy was somewhat superior in the long run. Both methods were equally effective in trait anxiety after treatment and in follow-up, and there was no difference between them. In addition, by comparing the treatment groups with the non-treatment group, it can be concluded that both treatment types significantly reduced anxiety and depression symptoms in patients with PC (Table 3).

Watson et al. (2014) showed that the basic concepts of reality therapy, such as responsibility for personal life and thinking differently about personal choices, have therapeutic effects. Reeder (2012) did research on students. His research showed that the reality therapy approach was associated with reducing depressive symptoms and increasing self-esteem and feelings of worth. Shafaei (2022) also showed that neurofeedback therapy effectively reduced anxiety and depression, which is consistent with the results of the present study.

Luctkar-Flude et al. (2017) indicated that neurofeedback affected psychological disorders such as depression, sleep problems, stress, fatigue, anxiety, and pain in patients with cancer. Mennella et al. (2017) in their research on neurofeedback training also found that non-asymmetry of alpha-wave of the forehead lip reduced anxiety and negative emotion (depression) in women. Ghosh et al. (2014) showed that the use of neurofeedback therapy effectively reduced patients' stress and anxiety and helped them make better decisions. However, in some cases, it has been reported that despite the success of neurofeedback therapy, some people have not benefited from this treatment (Alkoby, Abu-Rmileh, Shriki, & Todder, 2018).

In general, cancer is one of the most dangerous diseases that can affect any person's life and cause problems leading to feeling of hopelessness and depression. Therefore, the ways and methods that can help these patients recover mentally and psychologically should be examined to find the best and fastest ways of treatment. It is highly recommended that other methods such as cognitive-behavioral therapy (CBT) and the Roshi method be considered in other researches. Researchers can also consider treating depression and anxiety in children with cancer in future research.

## Conclusion

Findings showed that both reality therapy and neurofeedback were effective in reducing anxiety and depression in men with PC. Reality therapy has been superior to neurofeedback in reducing depression. Therefore, considering the superiority of reality therapy and regarding that it is cheaper and possibly more accessible than neurofeedback, it is suggested that in this group of patients, the method of reality therapy be considered more than before.

## Conflict of Interests

Authors have no conflict of interests.

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