

Effect of pre-instruction on anxiety levels of patients undergoing magnetic resonance imaging examination

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تأثير التعليمات المسبقة على مستويات القلق لدى المرضى الذين يخضعون للفحص بالرنين المغناطيسي

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خلاصة: لقد تقصت هذه الدراسة الاختلافات في مستوى القلق لدى المرضى الذين تلقوا التعليمات قبل إجراء الدراسة بالرنين المغناطيسي مع مجموعة شاهدة لم تتلق تلك التعليمات. وقد تم تقسيم ستين مريضاً بشكل عشوائي ضمن مجموعتين. وتلقى الأفراد في مجموعة الدراسة التعليمات التي وضعها الباحثون بالإضافة إلى التعليمات التي يقدمها المستشفى للمرضى بشكل روتيني، فيما لم يتلق أفراد المجموعة الشاهدة سوى التعليمات التي يقدمها المستشفى بشكل روتيني. وتم تزويد أفراد كلا المجموعتين (المجموعة الشاهدة ومجموعة الدراسة) بقائمة مجرد للصفات والحالات قبل وبعد الفحص بالرنين المغناطيسي. وقد أبلغ أفراد المجموعة التي تلقت التعليمات عن مستويات من القلق أخفض مما لدى أفراد المجموعة التي لم تتلق أي تعليمات. وتشير الموجودات أيضاً إلى أن 60% من مجمل العينة ياجأون إلى الصلاة لتخفيف حدة القلق. وتؤكد الدراسة على الحاجة إلى معلومات مفصلة عن إجراءات الفحص وإلى التدريب على أساليب الاسترخاء.

ABSTRACT This study investigated differences in anxiety level of patients who received instruction prior to magnetic resonance imaging (MRI) compared to a control group that did not. Thus, 60 patients were randomly assigned to two groups. Patients in the study group received instructions designed by the researcher plus the routine hospital instructions, while the control group received the routine hospital instructions only. The State-Trait Anxiety Inventory was administered to both groups before and after MRI examination. Patients who received the designed instructions reported significantly lower levels of anxiety than the controls. The findings also indicated that 60% of the total sample used prayer to reduce anxiety. The study emphasizes the need for detailed information about the procedure and training in relaxation techniques.

Effet de la préparation sur les niveaux d'anxiété des patients soumis à un examen d'imagerie par résonance magnétique

RESUME Cette étude a examiné les différences relatives au niveau d'anxiété des patients qui ont bénéficié d'une préparation avant l'imagerie par résonance magnétique (IRM) par rapport à un groupe témoin n'en ayant pas bénéficié. Soixante (60) patients ont donc été répartis de manière aléatoire en deux groupes. Les patients du groupe de l'étude ont bénéficié d'une préparation mise au point par le chercheur outre les instructions données systématiquement par l'hôpital, alors que seules les instructions de l'hôpital ont été fournies au groupe témoin. Les patients des deux groupes ont dû répondre à des questions visant à déterminer leur niveau d'anxiété avant et après l'examen IRM. Les patients qui ont été préparés ont notifié des niveaux d'anxiété considérablement moindres que les témoins. Les conclusions ont également indiqué que 60% de l'échantillon total utilisait la prière pour réduire l'anxiété. L'étude a souligné qu'il était nécessaire de fournir des informations détaillées concernant la procédure et une formation aux techniques de relaxation.

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Introduction

Magnetic resonance imaging (MRI) is a non-invasive imaging technique that uses a large, powerful magnet and radio frequency coil to obtain cross sectional images of the body tissues. It is based on biochemical differences between cells and uses the electric fields of atoms in cell nuclei [1]. Anecdotal evidence from different institutions shows that 1%–5% of all patients receiving MRI of the head or body experience a sensation of claustrophobia. This is caused by the introduction of the patient into a confined tube with a limited field of vision. In addition, although MRI carries no biological risk to patients with ferromagnetic implants, many patients experience psychological distress and/or panic reactions during the scan [2]. Flaherty and Hoskinson explained that a variety of anxiety reactions can occur among patients during this type of examination, including nervousness, fear, palpitations or a sensation of choking [3]. Patients say it is like being in a coffin or a tomb [4]. These anxiety reactions, characterized by fears specific to the constraints of the scanner, may mean that the scan cannot be completed [5]. Patients have attributed their anxiety to two sources. The first involves physical reactions to the MRI, such as not being able to see out of the tube, not being able to move, and hearing an unbearable noise “like metal being crunched”. The other source of anxiety is the fear of what the MRI might discover, e.g. “a brain tumour” [6]. According to a literature review it is clear that in spite of the many advantages of MRI over invasive diagnostic procedures, it can produce an extremely high level of anxiety in patients undergoing it [6,7]. Anxiety is defined as a palpable but transitory emotional state or condition characterized by feelings of tension, apprehension and

heightened autonomic nervous system activity [8]. It has been reported that patients experienced heightened anxiety both in anticipation of and during examination [9].

Nurses have an important role before, during and after any diagnostic procedure. They must be aware of the nature, purpose and the effect of the test on the patient. They must also know how to prepare the patient for each test, the appropriate requirements to complete and nursing measures to perform, how to interpret each test in order to notify the physician how the patient copes with the procedure, and how to document the test [10]. Anxiety is one of the most important diagnoses commonly facing nursing staff [11]. This study was undertaken to examine whether providing pre-MRI instruction to patients undergoing the procedure would have positive effects on the patients' anxiety levels compared to a control group.

Methods

An experimental research design was used in this study. Talbot stated that true experimental design has three properties: randomization, control and manipulation [12]. These properties allow other explanations of the phenomenon to be ruled out. In the current study, the patients were randomly assigned to either the study or the control group (30 patients each), and the instructions designed by the researcher were given to the study group as a manipulation of the independent variable; the dependent variable was the subjects' anxiety level.

Sample

In all, 60 patients were recruited from the MRI Unit appointment book at El Manial University Hospital, where patients undergoing MRI are dealt with directly by quali-

fied nurses trained to perform the procedure. These nurses are responsible for assessing the patient and helping the radiologist with the procedure of MRI. The patients were randomly assigned to two equal groups. The study group (30 patients) received the designed instructions before MRI examination, while the control group (30 patients) did not receive any instructions prior to MRI examination other than the routine hospital instructions. Patients examined in this unit are on a waiting list and are given an appointment for the examination. The sample included both male and female adult, conscious patients. The following selection criteria were established to increase the homogeneity of the sample: no previous history of MRI examination; no concomitant invasive procedure performed on the patients. Data were collected over a period of 2 months.

Two tools were used to collect data for the study: the State-Trait Anxiety Inventory (STAI), and instructions developed by the researcher. In addition, background data were collected.

STAI, a self-reporting psychometric test, was used to assess state anxiety levels. STAI has demonstrated reliability and validity in previous studies [8]. A valid and reliable Arabic version of STAI was used [13]. It consists of two separate 20-item self-reporting scales, one for measuring state anxiety and one for trait anxiety. Only the state anxiety inventory form was used in the present study. It requires patients to quantify their current anxiety levels by indicating their agreement or disagreement with a set of statements, such as "I am tense; I feel nervous or I feel frightened". Agreement and disagreement are plotted along a four-point scale. Total possible anxiety scores range from 20 to 80 (higher scores indicate higher anxiety levels). The

instructions were designed by the researcher after reviewing related literature [14,15] to provide patients with information about the nature and sequence of the examination and about the MR imager (its structure, features and principle of operation). In addition, the instructions included a description and discussion of relaxation techniques, e.g. blinding, imaginative visualization and breathing techniques that might be useful to the patient in managing anxiety during the examination. The routine hospital instructions covered questions such as whether the patient had any implanted mechanical or electrical devices (e.g. cardiac pacemaker or prosthetic valve) or orthopaedic prostheses, which may interfere with and affect the results of MRI. The total time required for the intervention ranged from 10 to 15 minutes for each patient.

Procedure

A background questionnaire sheet was developed to collect demographic data such as age, sex and level of education, as well as any past experience of MRI examination or computer tomography scanning. The state anxiety scale was provided by the researcher. Each patient individually completed the questionnaire before they began the intervention as well as before beginning the procedure of MRI examination. Patients who could not read or write were helped by the researcher to fill out the sheet.

The state anxiety scale plus the routine hospital instructions were given to the control group, while the state anxiety scale, the routine hospital instructions, plus the instructions designed by the researcher were all given to the study group. Instructions were explained individually to both groups by the researcher in lay terms. The anxiety level was assessed immediately after the

procedure of MRI examination by having the patients retrospectively report the anxiety levels experienced during the procedure.

Statistical analysis

The percentage distribution, mean and standard deviation, chi-squared test and *t*-test were used to ascertain any significant differences between the study and control groups. The level of significance was taken as $P < 0.05$.

Results

The age of the patients ranged from 20 years to 69 years with a mean age \pm standard deviation of 44.5 ± 6.46 years. No significant difference was found for sex or level of education between the control and study groups ($\chi^2 = 0.059$ and 0.776 respectively), when compared according to the severity of the anxiety level (mild, moderate or severe) before the MRI procedure. The highest percentage of patients reporting a mild level of anxiety was found among male patients of the study group (46.66%), while 50.00% and 13.33% of male and female patients respectively in the control group reported a severe level of anxiety. The highest percentage in both groups was among patients with a university level of education. In the study group, 23.33% had mild anxiety versus none of the control group; 20% in control group reported moderate anxiety versus none in the study group. In the control and study group respectively, 26.67% and 23.33% of patients reported severe anxiety. No statistically significant difference was evident between the two groups regarding the level of anxiety and the patients' level of education.

When comparing level of anxiety scores pre-MRI examination and before the designed instructions were given, no statisti-

cally significant difference was evident (Table 1). Furthermore, no statistically significant difference was found in the severity of anxiety (mild, moderate or severe) between the study and the control groups before MRI examination ($\chi^2 = 3.78$, $P = 0.1510$).

As can be seen in Table 2, a highly significant difference was found between the two groups when the total anxiety scores were compared after the procedure of MRI examination and after the designed instructions were given. A highly significant difference in terms of the severity of anxiety level was found immediately after the procedure was performed (Table 3). All the patients of the study group experienced mild to moderate state anxiety levels. In contrast, the majority of the control group subjects (60%) experienced a severe level of anxiety. When the state items in the

Table 1 Comparison of total anxiety scores before MRI examination among the study and control groups

Group	Mean	s	t	P-value
Study	39.97	07.16	00.50	NS
Control	41.93	07.55		

MRI = magnetic resonance imaging.

s = standard deviation.

NS = not significant.

Table 2 Comparison of total anxiety scores after MRI examination among the study and control groups

Group	Mean	s	t	P-value
Study	43.97	07.34	10.42	0.0001
Control	61.34	08.85		

MRI = magnetic resonance imaging.

s = standard deviation.

Table 3 Comparison of state anxiety levels among the study and control groups after MRI examination

Anxiety level	Study		Control		Total	
	No.	%	No.	%	No.	%
No (0-19)	0	00.00	0	00.00	00	00.00
Mild (20-39)	16	53.33	0	00.00	16	26.67
Moderate (40-59)	14	46.67	12	40.00	26	43.33
Severe (60-80)	00	00.00	18	60.00	18	30.00
Total	30	100.00	30	100.00	60	100.00

$\chi^2 = 36.15$, $P = 0.0001$.

MRI = magnetic resonance imaging.

Table 4 Comparison of mean anxiety scores before and after MRI examination among the study group

State Item	Before		After		Paired t-test	P-value
	Mean	s	Mean	s		
I am tense	5.93	1.66	3.30	1.39	7.64	0.001
I feel upset	8.37	2.70	4.45	1.74	6.66	0.001
I am presently worrying over possible misfortunes	2.60	1.13	0.63	0.85	4.66	0.001
I am nervous	19.20	3.20	17.63	2.76	2.54	0.01
I feel content	3.33	1.47	2.13	1.04	3.68	0.01

Only state items for which there was a significance difference before and after MRI are given.

MRI = magnetic resonance imaging.

s = standard deviation.

study group pre- and post-imaging were analysed, it was observed that 5 out of 24 test items were statistically significant (Table 4).

Discussion

Anxiety is a common reaction when people encounter new problems where they do not know what to expect. Knowing what will be experienced in any treatment and/or examination is very effective in decreasing the anxiety level [14]. The present study

hypothesized that the subjects in the study group would have a lower state anxiety score as a result of receiving specifically designed instructions before the MRI procedure. Statistical analysis of the mean post-test scores revealed a highly significant difference between the two groups. The hypothesis was supported, as the mean scores of subjects in the study group indicated a greater decrease in the level of anxiety than in the control group. The study also clarified that there were increases in mean scores among both groups (study and control) post-MRI examination.

The mean anxiety scores of the study group increased pre-MRI (39.97 ± 07.16) to post-MRI (43.97 ± 07.34), and there was also a marked increase in mean scores in the control group (pre-MRI, 41.93 ± 7.55 , post-MRI, 61.34 ± 8.85). These results suggest that patients' anxieties and restlessness could be addressed by reassuring a patient having MRI examination that it is a safe and painless procedure [14,15]. The findings also indicate that around two-thirds of the control group exhibited moderate to severe anxiety after examination, while the study group experienced mild to moderate anxiety levels. A significant difference was evident, which people used prayer as a method of reducing anxiety. This is understandable as within Egyptian culture many people believe that they can become sick if God decides to test their faith. This is also illustrated from what was said during data collection, when most patients gave thanks to God and continued thanking God because acceptance of illness may be rewarded by its relief. Thus, a person's faith, religion and spiritual beliefs can help calm emotions and reactions to stressors, and can be a vital support in times of medical crises [16,17].

Once the patient knows what to expect, he or she will attain a higher degree of relaxation that will affect behaviour. So, if people are provided with a description of the sensations they can expect to feel (e.g.

burning, pressure) and if they are given instructions in coping behaviours such as deep breathing, they will experience less distress and have better outcomes [14]. There was a highly significant difference between the study and control group before and after the procedure of MRI examination for some items on the state anxiety scale (Table 4). More than 52% of the total sample made some remark about their experience when they were in the imager, e.g. "At first I was a little nervous and my heart was pounding in my throat." Some patients emphasized that it is very important to have information on the procedure, the structure of the imager and the approximate length of time that the patient will spend inside it.

Conclusion and recommendations

The data suggest that MRI unit personnel and the referring physician should consider the patient's perception of the procedure. Detailed information on the procedure and training in relaxation techniques should be given. Positive re-appraisal and information on sensations to be anticipated, rather than procedural details, will be more successful in alleviating stress and anxiety. The study should be replicated using a larger sample, using sex and educational level as variables of interest.

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