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Effect of Benson's Relaxation Technique on Night Pain and Sleep Quality among Adults and Elderly Patients Undergoing Joints Replacement Surgery

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Abstract: Sleep is a basic need as much as food and water, which are necessary for human survival. Sleep is a periodic, reversible state of cognitive and sensory disengagement from the external environment with a complex physiologic and behavioral process essential for rest, repair, wellbeing, and survival. **The aim of the current study was to** evaluate the effect of Benson's relaxation technique on night pain and sleep quality among adults and elderly patients undergoing joints replacement surgery. A Quasi experimental design was utilized. Setting: The current study was conducted at orthopedic department of Menoufia university hospital. **Subjects:** A purposive sample of 100 patients with knee or hip replacement who agree to participate in the study. Tools: 1. Structured interviewing questionnaire which consists of socio-demographic data and medical history. 2. The Short Form McGill Pain Questionnaire (SF-MPQ). 3. The Groningen Sleep Quality Scale (GSQS). The main result of this study showed that there was an improvement in the pain scores experienced by subjects in the study group than subjects in control group after intervention. Additionally, there was a statistically significant relation between pain score of studied sample and their age. Conclusion: Benson's relaxation technique had a positive effect in reducing postoperative pain and improving sleep quality among adults and elderly patients undergoing joints replacement surgeries. Recommendation: Patient's education about relaxation therapy should be implemented with all surgical patients to help in promoting patient's comfort and enhancing tissue healing.

Key words: Benson's Relaxation Technique, Pain, Quality of Sleep, Joints Replacement

INTRODUCTION

As the life span of the world's population continues to rise, a dramatic increase in the number of orthopedic surgeries required for knee or hip replacements and surgeries to stabilize, align, and repair bone fractures. Currently, it is estimated that there are 1.6 million hip fractures worldwide, and this number is projected to reach 6.3 million by 2050 [(1, 2)]. Elective joint replacement surgery is voluntary, but that does not diminish the seriousness of the procedure. One of the most common complaints after knee or hip replacement is sleeping difficulty by six weeks after surgery. This has many causes, including the stress response to surgery, cytokine release from soft tissue injury, the pain, medications, and the hospital environment. The focus has been on the experience of acute pain from surgery and disrupted sleep following surgery [(3)].

The average human being spends one-third of his/her life sleeping. This state, which is an active process, is composed of several stages. Each of these stages serves a specific purpose and is crucial for daytime functioning. Recent years have seen an increased focus on sleep disturbances, ranging from insomnia to sleep apnea. Sleep disorders are rather common, and improving sleep quality has become an important research and intervention focus [(3)].

One consistent fact is that acute pain affects the quality of sleep of these patients [(4, 5)]. In addition to sleep disorders, pain problems are one of the most common complaints in society. It is not surprising, therefore, that sleep and pain conditions co-occur quite frequently [(6)]. Pain is a subjective concept that can be defined only by the individual experiencing it. Pain has a negative effect on quality of life.

In the postoperative period, one of the most important patient complaints is acute pain that begins with the surgical trauma, decreases over time, and ends with healing of the tissues [(7, 8)]. Acute postoperative pain after orthopedic surgery is common [(9, 10, 11)].

The problem of acute postoperative pain after joint replacement is particularly pertinent for two reasons. Firstly, joint replacement is one of the most commonly performed elective surgical procedures and is predicted to increase dramatically over the coming decades, and therefore, the problem of acute postoperative pain will continue to rise unless appropriate pain management is implemented. Secondly, joint replacement is predominantly performed to alleviate chronic joint pain, and yet a number of patients continue to experience chronic pain after surgery, meaning that the surgery has failed for those people [(1, 12)].

Because acute postoperative pain is a risk factor for chronic pain after joint replacement, a reduction in acute postoperative pain severity could reduce the number of patients who fail to achieve long-term benefit from the surgery [(13)]. Perception of pain and anxiety is often elevated when patients feel a lack of control over their situation, and is very common around surgery. If a patient is unduly anxious physical recovery and well being may be affected, prolonging hospital stay and increasing the cost of care [(14)].

The delivery of effective pain management has become a pressing national issue in healthcare. Pain management is important because it lessens pain experienced by the patient and reduces the likelihood of physiological and psychological sequela. In addition, pain management may

improve patient outcomes and increase patient satisfaction [14].

Sleep deprivation is defined as the reduction in the total sleep time relative to one's usual baseline during a 24 hours period. It can have potentially dangerous multi-systemic effects in the critically ill, including surgical patients [15, 16, 17]. The need for adequate sleep must therefore be taken into account in both the preoperative and the postoperative care of surgical patients. The stress of poor sleep when coupled with surgical stress can lead to an increased catabolic activity and tissue breakdown as well as a reduced anabolic activity, which will affect postoperative recovery [16]. Previous studies have been shown that sleep deprivation leads to the depletion of glycogen stores and increases in oxidative stress and free radical production as well as the production of pro-inflammatory cytokines all implicated in poor postoperative recovery [18, 19].

Most of the studies on the effect of relaxation therapy on sleep disorders and pain have been focused on relaxation techniques, such as muscle relaxation, music relaxation, and a combination of muscle relaxation with aerobic exercise program [20, 21, 22, 23, 24, 25]. Benson relaxation technique is simple, easy to learn and implementation and does not require high cost [26]. This relaxation is a combination of relaxation response techniques with individual belief system/faith factor (focused on a particular form of expression of the name of God or a word that has a calming sense to the client) repeatedly spoken with a regular rhythm with resignation.

The Benson's relaxation technique led to complete relaxation of all the muscles and easy to use methods for treatment of sleep disorders. Relaxation technique as a kind of subjective stress management method decreased the anxiety level, mood disturbance, body discomfort, and autonomic nervous system's activity and at least it might affect the quality of sleep. The time needed to fall asleep, sleep-onset latency, and the frequency of waking up have been reduced by relaxation therapy, as well [27, 28, 29].
So **the aim of the current study was to** evaluate the effect of Benson's relaxation technique on night pain and sleep quality among adults and elderly patients undergoing joints replacement surgery

THE FOLLOWING RESEARCH HYPOTHESES WERE FORMULATED TO ACHIEVE THE AIM OF THE STUDY:

Patients who follow Benson's relaxation technique will have:-

1. Reduction in severity of postoperative pain than control group.
2. Better postoperative sleep quality than control group.

SUBJECTS AND METHOD

SUBJECTS

Design:

A quasi experimental research design was utilized to achieve the aim of this study.

Setting:

The current study was conducted at orthopedic department of Menoufia University Hospital.

Subjects:

A purposive sample of 100 patients with knee or hip replacement who agree to participate in the study in period from beginning of September 2016 to the end of February 2017 They were divided alternatively into two equal groups 50 patients in each group.

Study group (1) received the education about Benson relaxation technique and began implementation of the program two hours after the operation, after regaining patient's consciousness.
Control group (2) was exposed only to regular routine medical care.

Sampling technique:

The sample size was determined and calculated using EPI info program and it was estimated to be 84 patients at coefficient interval 95%. The researchers increased the sample size to 100 patients.

Tools:

To achieve the aim of the current study three tools were utilized by the researchers. These tools were as follow:

Tool I : Structured interviewing questionnaire:

It was constructed by the researchers to collect data about biosociodemographic data. It covered the following two parts:

- ***Part one :*** **Sociodemographic Data.** It was comprised of six items related to patients' age, sex, marital status, educational level, occupation, and income.
- ***Part two :*** **Medical data.** It was concerned with information related to medical data such as patients' present complaints, previous hospitalization, and previous surgeries.

Tool II : The Short Form McGill Pain Questionnaire (SF-MPQ):

It was developed by **Melzack (1987)** from **Melzack and Katz (2001)** [30]. It utilized by the researchers to assess patient's pain. It provides valuable information on the sensory, affective, and evaluative dimensions of pain experience. It consisted of 15 items, pain descriptors were brought together and categorized in three subscales of pain experience:

- Items from l to11 represent the sensory subscale of pain experience
- Items from 12 to15 represent the affective subscale of pain experience.

Scoring system

- Each item is ranked on an intensity scale of 0 = none, 1 = mild, 2 = moderate, 3 = severe.
- In addition to one item for present pain intensity on 10 cm visual analogue scale (VAS) for average pain.
- Then all items scores were summed to obtain a total score (45 scores). The total score was categorized as follow:

✓ Mild pain (1 < 15).
✓ Moderate pain (15 < 30).

✓ Severe pain (30 - 45).

Reliabilty: Grafton (2005) [31] tested the reliability of the SF- MPQ questionnaire in patients with rhumatic pain, it was demonstrated to be 0.85 with strong test re-test agreement, and Gillian (2011) when examine the questionnaire with patients with musculoskeletal pain the results were adequate (r=70) [32].

Tool III : The Groningen Sleep Quality Scale (GSQS):

It was developed by **Mulder et al., (1980)** [33] and used by the researchers to assess patient's previous night's sleep quality. It consists of 15 statements about the previous night's sleep, answered with true or false. The sum of this scale yields a generalized score of the previous night's sleep quality. A higher score in the GSQS means a more disturbed sleep.

Scoring system*:* Groningen Sleep Quality Scale total scores were summed that ranged from zero to 15, score ranges from 0 to 15, a higher score indicating lower subjective quality of sleep.

Reliability: Meesters et al., (1993) [34] tested the reliability of the questionnaire. They found that this questionnaire had high internal consistency with high test re-test reliability (Pearson's correlation coefficient = 0.88). **Simor, Köteles, Bódizs and Bárdos (2009)** reported that Groningen Sleep Quality Scale is sound from psychometric point of view therefore the scale is a valuable tool for the measurement of subjective sleep quality [35].

METHODS

Formal approvals:

An official approval was obtained from hospital director and the head nurses of the orthopedic department of Menoufia University hospital after an explanation of the aim of the study.

Ethical considerations and human rights:

A formal consent to participate in this study was obtained from all participants after explaining the aim of the study and they were assured that all collected data would be absolutely confidential and only will be used for the study' aim and the study maneuvers will not cause any harmful effects to the participants. The researchers emphasized that participation in the study is entirely voluntary and anonymity of the patients were assured through coding data. Subjects were also informed that refusal to participate in the study would not affect their care.

Pilot study: -

A pilot study was conducted prior to data collection on 10 patients (10%) to test all tools for clarity, objectivity, relevance, feasibility and the applicability of the tools. Also it was conducted to identify any problem associated with administering the tools and measure the time needed for data collection then the necessary modifications were carried out accordingly. Data included in pilot study was excluded from the current study.

Data collection Procedure*:-*

- Each participant interviewed individually three times.
- The first interview was carried out by the researchers for each participant of both groups for collecting baseline data about socio-demographic and medical data. The interview carried out often in the patient's room in hospital. It took about 25 to 30 minute using tool I, tool II and tool III.
- Then the researchers give instructions about Benson relaxation technique using videos and demonstration and re-demonstration to learn patients. And instruct the subjects of the study group that procedure will used after two hours postoperatively after regaining consciousness for 10 minutes every two or 4 hours throughout the day. Then the researchers carried revision and reinforcement according to participant's needs. Also the researchers corrected the wrong performance of technique and answered questions.
- The second and third interviews were carried out by the researchers for each participant of both groups at the one day postoperative and 3rd postoperative day using tool II and tool III.
- A comparison between both groups was carried out to evaluate the effect of Benson relaxation technique on pain and sleep quality at the one day postoperative and 3rd postoperative day.

Statistical Analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 16, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison between two groups and more was done using Chi-square test (χ^2). For comparison between means of two related groups (pre and post test data) of parametric data, paired t-test was used. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $p<0.05$ for interpretation of results of tests of significance.

RESULTS:

Table (1) showed socio-demographic characteristics and medical history of studied subjects. The mean age was 57.1 years and 55.4 years for study and control groups respectively. Regarding education, around half of study subjects were illiterate. Nearly three quarters of studied subjects were married and lived in rural areas. Concerning income, around two thirds of the participants hadn't enough income.

Table (2) showed the level of pain experienced by study and control group subjects at pre and post-intervention. There was an improvement in pain scores among the study group subjects at one day postoperative while there was a statistical significant difference existed between study and control groups regarding pain intensity at 3rd postoperative day.

Table (3) illustrated the sleep quality scores among study and control group subjects at pre and post-intervention. There were statistical significant differences existed between study and control groups regarding sleep quality at one day postoperative and 3rd postoperative day.

Table (4) revealed that there was a statistical significant difference in pain scores in relation to age of the study group subjects at one day postoperative.

Table (5) revealed that were insignificant relation between sleep quality scores and age of the studied subjects throughout the study period.

Table 1: Distribution of the study subjects according to socio-demographic characteristics (n= 100)

Socio-demographic characteristics	Study (n=50)		Control (n=50)		χ^2 p value
	No.	%	No.	%	
Age / years ($\overline{X}$ ±SD)	57.1±5.78		55.4±5.33		**t** = 1.565 0.121
Gender					
- Male	26	52	28	56	0.161
- Female	24	48	22	44	0.688
Marital state:					
- Married	40	80	33	66	4.02
- Widow	6	12	14	28	0.259
- Divorced	4	8	3	6	
Level of education:					
- Illiterate	23	46	21	42	1.139
- Primary education	13	26	13	26	0.768
- Secondary education	11	22	10	20	
- University	3	6	6	12	
Residence:					
- Urban	13	26	17	34	0.762
- Rural	37	74	33	66	0.383
Occupation:					
- Working	14	28	10	20	0.877
- Not working	36	72	40	80	0.349
Income:					
- Enough	22	44	17	34	1.051
- Not enough	28	56	33	66	0.305
Current surgery:					
- Knee joint replacement	8	16	7	14	0.078
- Hip joint replacement	42	84	43	86	0.779

Table 2: Distribution of pain score among both studied groups at different intervals (n=100)

Pain Items	Study (n=50)		Control (n=50)		χ^2 p value
	No.	%	No.	%	
One day preoperative: (pre-intervention)					
- Mild	45	90	43	86	1.379
- Moderate	3	6	6	12	0.502
- Severe	2	4	1	2	
Range	2-33		4-31		
1st postoperative day: (post-intervention)					
- Mild	47	94	41	82	3.682
- Moderate	3	6	8	16	0.159
- Severe	0	0	1	2	
Range	2-28		4-29		
3rd postoperative day: (post-intervention)					
- Mild	50	100	43	86	7.527
- Moderate	0	0	7	14	**0.006***
- Severe	0	0	0	0	
Range	2-12		4-19		

Table 3: Distribution of sleep quality scores among both studied groups at three different intervals (n=100)

Sleep Quality	The studied groups (n=100)		t-test	P
	Study group (n=50)	Control group (n=50)		
One day Preoperative: (pre-intervention) Range Mean ± SD	 2-14 10.88 ± 3.64	 2-14 10.90 ± 3.65	0.027	0.978
One day postoperative: (post-intervention) Range Mean ± SD	 3-10 6.88 ± 1.80	 3-12 7.88 ± 2.19	2.492	**0.014***
3rd postoperative day: (post-intervention) Range Mean ± SD	 2-9 4.98 ± 1.74	 2-12 7.50 ± 2.525	5.806	**0.0001***

*Significant (P<0.05)

Table 4: Mean of total pain scores in relation to age of studied subjects (n=100)

Socio- demographic data	Mean scores of pain					
	One day Preoperative		One day Postoperative		3rd Postoperative day	
	Study	Control	Study	Control	Study	Control
	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD
Age **- Adult** **- Elderly**	 1.08 ± 0.36 1.29 ± 0.61	 1.19 ± 0.46 1.08 ± 0.27	 8.11 ± 2.7 13.5 ± 5.66	 8.41 ± 4.45 7.62 ± 2.53	 6.83 ± 2.06 7.93 ± 1.59	 8.51 ± 4.35 8.00 ± 2.64
t-test **P value**	1.436 0.157	0.823 0.415	4.522 0.0001*	0.603 0.549	1.786 0.080	0.407 0.686

*Significant (P<0.05)

Table 5: Mean of total sleep quality scores in relation to age of studied subjects (n=100)

Socio- demographic data	Mean scores of sleep quality					
	One day Preoperative		One day Postoperative		3rd Postoperative day	
	Study	Control	Study	Control	Study	Control
	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD
Age **- Adult** **- Elderly**	 10.67 ± 4.06 11.43 ± 2.27	 10.65 ± 3.97 11.62 ± 2.53	 6.75 ± 1.74 7.21 ± 1.96	 7.84 ± 2.24 8.00 ± 2.12	 4.89 ± 1.70 5.21 ± 1.88	 7.54 ± 2.61 7.38 ± 2.36
t-test **P value**	0.660 0.513	0.818 0.418	0.815 0.419	0.227 0.821	0.589 0.559	0.190 0.850

DISCUSSION

Pain is most common in orthopedic patients and must be evaluated closely. Moreover, physiological, psychological, and environmental changes; disease; and hospitalization all of these factors affect patients, leading to negative consequences on sleep patterns and quality. Mostly patients after surgery experienced poor sleep effectiveness during a 3-night period because of postoperative pain [36, 37].

Regarding the socio-demographic characteristics the results of the current study revealed that the mean age of studied subjects was 57.1 years and 55.4 years for study and control groups respectively. Around half of study subjects were illiterate and having primary education these results were in consistent with Büyükyılmaz et al., (2011) who studied the effect of night pain on the sleep quality among postoperative orthopedic patients, who stated that around half of their study subjects were primary school graduates and the their mean age were 49.55 ± 21.10 years [38].

Concerning pain, the results of the current study showed that the level of pain experienced by all subjects. These results in line with Büyükyılmaz et al., (2011) who mentioned that the majority of the patients experienced pain at the surgical site and verbalized their pain as throbbing, cramping, aching and stabbing [38].

Also the current study results stated that there was an improvement in pain scores among the study group subjects at one day postoperative while there was a statistical significant difference was existed between study and control groups regarding pain intensity at 3rd postoperative day after implementation of Benson's relaxation Technique. These results in agreement with Solehati and Rustina (2015) who studied the effect of Benson technique in reducing pain after cesarean section, they reported a decrease in the average of pain intensity from 4.97 to 2.63 after using Benson's relaxation Technique and Rambod et al., (2014) who stated that Benson relaxation techniques had the greatest influence to decrease pain intensity [39, 40].

Moreover several studies found that the Benson relaxation technique is effective in reducing pain [41, 42]. In addition to Demiralp and Oflaz, (2007), Friesner et al., (2006) who have used relaxation exercises to reduce pain in preoperative and postoperative patients and show showed an improvement in the pain perception [43, 44].

In a contrary, Good et al., (2005) who examined the effect of relaxation exercises on pain of patients undergoing abdominal surgery. Postoperative pain levels were found to be markedly reduced with the use of relaxation exercises [45].

The results of present study support the findings of those other studies; they mentioned the pain was reduced with each passing postoperative day [45]. Pellino (2005) who studied pain with patients who had undergone total hip and knee arthroplasty found that pain levels were reduced with each postoperative day, both in the cases under study and in the control group. As a result, it is apparent that postoperative pain reduces with each postoperative day in parallel with tissue recovery [46].

Regarding sleep quality the current study results showed that an improvement in sleep quality scores among study group subjects than control group subjects after implementing Benson relaxation technique at one day postoperative and 3rd postoperative day. The results were similar to findings of Tsay et al., (2003) found that relaxation techniques improve sleep quality in patients with end stage renal disease and Field et al., (2002) observed that it decreased anxiety and depressed mood and increased the number of sleep hours in patients with fibromyalgia. Thus, previous studies support the finding that relaxations improve sleep and recovery in patients following surgery [47, 48].

The present study revealed that there was a statistical significant correlation between ages of the subjects at one day postoperative to their pain. These results were contradicted with Good et al. (2001a) and Roykulcharoen and Good (2004) who reported no correlation between individual characteristics (patients' age, gender, or educational status) and their pain levels before and after relaxation exercises [49, 50].

CONCLUSION

Based on the results of current study, it was concluded that:

- Benson relaxation technique was effective and had an influence to decrease pain intensity among study group than control group.
- Sleep quality was improved among study group than control group post implementing the Benson relaxation technique.

RECOMMENDATIONS

Based on the findings of the current study, the following recommendations can be suggested:

- Benson relaxation technique is a simple and inexpensive technique and nurses can use to manage pain and improving sleep quality.
- Patient's education about relaxation therapy should be implemented with all surgical patients to help in promoting patient's comfort and enhancing tissue healing.
- Replication of the study using a large probability sample from a broad geographical area to allow greater generalization of the results.

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