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Effectiveness of Nursing Intervention on Phantom Pain, Activities of Daily Living and Quality of Life among Patients with Amputation

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Abstract: Background: Lower limb amputation (LLA) is usually performed as a lifesaving procedure; it has a significant and dramatic change in a person's life which has an effect on quality of life of patients due to the physical activity limitations immediately after amputation and long-term implications in different aspects of life. **The purpose for the study** was to determine the effectiveness of nursing intervention on phantom pain, activities of daily living and quality of life among patients with amputation. **Design**: A quasi-experimental research design was utilized. **Setting:** the study was conducted at the general surgical department and rehabilitation unit in Menoufia University Hospital, Menoufia Governorate, Egypt. **Sample**: A consecutive sample of 60 adult patients were selected. Four instruments were used in data collection; 1) A Structured Interviewing Questionnaire, 2) Modified Barthel Index (MBI),3) World Health Organization of Quality-of-Life Brief (WHOQOL-Brief), and visual analogue pain scale. **Results**: 30% of both groups were male with mean grades of pain 4.73±2.77 and 5.90±3.35 of study and control groups respectively at post-intervention. **Conclusion**: patients with amputation have obvious improvement in pain score, activities of daily living and quality-of-life. **Recommendation**: The Continuous educational and training programs should be provided for patients with lower limb amputation on regular basis to improve their physical and psychological health and quality of life.

Keywords: *Nursing Intervention, Phantom Pain, Activities of daily living, Quality of life amputation*

Introduction

The limb amputation is considered a public health problem, since it is related to high rates of morbidity and mortality. Amputations represent a high financial cost to health, the care does not end there and requires a multi-disciplinary team approach and

follow-up would be required (Goodyear et al., 2024).

Phantom limb pain (PLP) prevalence can be estimated right up to 80% of all patients after limb amputation. Generally, pain diminishes in both frequency and duration during the first 6 months after amputation. About 10% of amputees will retain pain with severe intensity after 6 months and more after surgery. Nevertheless, PLP affects patients' quality of life with 25% to 50% reporting severe pain-related impairment (Gautam et al., 2023).

Nurses focus on patient care immediately after limb amputation includes monitoring drainage from the stump, managing pain, reducing edema, positioning the affected limb, assisting with exercises prescribed by a physical therapist, and wrapping and conditioning the stump. Postoperative care of the stump varies slightly, depending on the type of dressing applied to the stump (elastic bandage or plaster cast) (Swarnakar et al., 2023).

Significance of the study

Lower limb amputation induces several limitations in performing professional, leisure and social activities. It disturbs the integrity of the human body and lowers the quality of life (QoL) due to reduced mobility, pain and impaired physical integrity. (Sun, 2021).

Prevalence rate for amputation as informed by World Health Organization is approximately 2 million people in United States (USA). Approximately 2.2 million individuals lost limb in the United States, the number of US individuals lost limb is predictable to rise to 3.6 million by 2050(World Health Organization (2020). Unfortunately, no available recent census found in Egypt, but according to review of the medical and statistical records of Menoufia University prevalence of amputation was 6 cases of amputation monthly.

Empirical observation in Menoufia University Hospital indicated an increase of these complication among patients with lower limb amputation. Also limited researches have been found to determine the effect of nursing intervention on these complications in Egypt.

Purpose of the Study

The purpose of the current study is to determine the effectiveness of nursing intervention on phantom pain, activities of daily living and quality of life among patients with amputation.

Research Hypothesis

The following research hypotheses are formulated in an attempt to achieve the purpose of the study:

1) Patients with lower limb amputation who are exposed to nursing intervention (study group) will have a lower of phantom pain level than patients who do not receive nursing intervention (control group).

2) Patients daily living activities with lower limb amputation who are exposed to nursing intervention will be higher in level than patients who do not receive nursing intervention (control group).

3) Patients with lower limb amputation who are exposed to nursing

intervention (study group) will have higher score of quality of life than patients who do not receive nursing intervention (control group).

Methods

Research design:

A Quasi-experimental design (study: control) was utilized for this study.

Study settings:

The study was carried out at general surgical department and Rehabilitation Unit in Menoufia University Hospital at Shebein Elkom Menoufia Governorate, Egypt.

Sampling:

A consecutive sample of 60 adult patients of each gender was divided alternatively into two equal groups, 30 patients in each group.

Study group:

30 patients who received nursing intervention.

Control group:

30 patients who received only routine hospital care.

Sample was selected according to the following criteria:

- Conscious adult patients whose age ranges between 18 years and 60 years.
- Patients suffering from lower limb amputation.

Exclusion criteria:

- Major trauma patients who have cerebrovascular accidents, spinal cord injuries or head injuries because these patients have difficulty in speaking or understanding instructions, numbness or paralysis and inability to perform care.
- Psychiatric disorders such as schizophrenia, bipolar disorder and active substance use because they were disoriented, had difficulty in communication with them and were unable to understand.

Sampling technique:

The sample size was determined based on the following equation:

$$N= \frac{2(8.56)^2\ (1.96 + 0.84)^2}{(6.14)^2}$$

$$N = 2SD^2\ [\ Z\alpha/2 + Z\beta]\ ^2 / d^2$$

$$\frac{146.5 \times 7.84}{37.69} = 30 \text{ participants per group}$$

- N= number of samples
- SD= 8.56
- Z alpha= 1.96
- Z beta= 0.84

Instruments

Four instruments were utilized by the researcher for data collection, these instruments were:

Instrument one: - Structure interview questionnaire

It was developed by the researcher to assess baseline bio-demographic data. It is comprised of two parts as the follow:

- **Part 1**:- **Sociodemographic data**: It includes information about patient's age, sex, level of education, occupation and marital status.
- **Part 2**:-**Medical data**: It include information about past and present medical history such as etiology of amputation, type of amputation,

affected side, duration of illness, history of other chronic diseases, …. etc.

Instrument two: Modified Barthel Index (MBI)

The original Index developed by Mahoney& Barthel, (1965). later on, it was modified by collin et al ,1988 and then shah et al., 1989, the original Barthel Index Scale and the modified versions have been used in- patient rehabilitation assessment. It has greater sensitivity and internal consistency.

Scoring system:

The shah et al., 1989 interpretation as 0 - 20 indicate "total dependency", 21-60 indicate "severe dependence", 61-90 indicate "moderate dependence", 91–99 &100 Total Dependence.

Instrument three: World Health Organization of Quality-of-Life Brief: (WHOQOL);

It was developed by the WHOQOL Group (1995). WHOQOL-BREF was a quality-of-life instrument was developed by the WHOQOL Group with fifteen international field centers. The WHOQOL- Brief is a shorter version of the original instrumentWHOQOL-100. The WHOQOL-BREF questionnaire contains as total of 26 questions, two items from the Overall QOL and General Health and 24 items of satisfaction that are divided into four domains: Physical health with 7 items (DOM1: -6- Q3 + 6-Q4 + Q10 + Q15 + Q16 + Q17 + Q18), psychological health with 6 items (DOM2: - Q5 + Q6 + Q7 + Q11 + Q19 + (6-Q26), social relationships with 3 items (DOM3: - Q20 + Q21 + Q22) and environmental health with 8 items (DOM4: - Q8 + Q9+ Q12 + Q13 + Q14 + Q23 + Q24 + Q25).

Scoring system:

Each domain is comprised of multiple questions that are considered together in the derivation of each domain score. Each item of the WHOQOL-BREF is scored from 1 to 5-point on a Likert scale. Domain scores are scaled in a positive direction (i.e., higher scores denote higher QOL). Raw domain scores for the WHOQOL Brief were transformed to a 4-20 score according to guidelines. WHOQOL Brief using the mean score of items within each domain to calculate the domain scores, multiplying the mean scores by 4 in order to make domain scores, transforming the domain scores linearly to a 0-100 scale (WHO, 1995).

Instrument four: Visual Analogue Pain Scale (VAS numeric pain Scale)

Visual Analogue Pain Scale (VAS) was developed by Hayes & Patterso., (1921).

Scoring system:

Characteristics of pain	Scores
No pain	0
Mild pain	1-3
Moderate pain	4-6
Sever pain	7-9
Worst pain	10

Validity:

All instruments were tested for face validity by five academic staff (five experts in the field of Medical Surgical Nursing). Modifications were done accordingly to ascertain relevance and completeness.

Reliability:

For Reliability of Instruments one test retest was its value was.920, 0.860 and 0.923 respectively , Reliability of instrument two was tested using cronbach coefficiency alpha and its value 0.91,Meanwhile, The test-retest was used for Instrument three and its value was 95%
(Ferfeli et al., 2024, Almarabheh et al., 2023 & Han et al., 2022).

Pilot study:

A pilot study was carried out on 6 patients (10%) in order to test clarity, feasibility and applicability of the instruments. The pilot study was also used to estimate the time needed for each patient to fill in the questions. Modifications were done based on the results of the pilot study. Patients participated in the pilot study were excluded from the main study sample.

Ethical consideration:

Approval of the Ethical Research Committee, Faculty of Nursing was obtained. A written consent to participate in this study was obtained from the sample who met the inclusion criteria after explanation the purpose of study. Each patient was reassured that any information obtained would be confidential and would only be used for the study purpose. The researcher emphasized that participation in the study was entirely voluntary and anonymity of the patients was assured through coding data. Patients were also informed that they can withdraw from the study at any time without penalty and refusal to participate wouldn't affect their care. Moreover, they were assured that the nature of questionnaire didn't cause any physical or emotional harm to them.

Procedure:

- An official letter was submitted from the Dean of the faculty of nursing to the directors of including the purpose and methods of data collection. Data collection extended over a period of 9 months from September 2022 to May 2023.Patients who agreed to participate in the study and fulfilled the inclusion criteria were divided randomly into two equal groups study group (I) and control group (II) (30 patients for each group).Each patient of both groups was interviewed individually by the researcher in the General Surgical Department and Rehabilitation Unit

Assessment phase:

This phase took about 20-30 minutes for each patient of both groups. During this phase the researcher interviewed each patient of both groups at the general surgical department to collect base line data by using the following instrument.The researcher assessed bio-sociodemographic characteristics using part one and two of instrument one. All patients in the two groups was assessed for phantom pain, activities of daily living and quality of life by using instruments (two,three & four) at the beginning of the first session.

Planning phase:

- A colored illustrative booklet with pictures was prepared by researcher based on literature reviews (Preece et al., 2021& Silva et al., 2021). This booklet included lower limb amputation, phantom pain, Activities of daily living in a video form.

Implementation phase:

- The researcher conducted three teaching sessions of 30-45 minutes for each participant of group I (study group).The researcher interviewed each patient in the study group individually at General Surgical Department and Rehabilitation Unit. The researcher conducted at least three teaching sessions for each patient according to his/ her level of understanding.Each session was conducted using lecture and discussion. The researcher gave verbal instructions supplemented by written materials in form of booklet as an illustrative guide for more clarification to patients and video for illiterate patients.

Evaluation phase:

Post test was carried out two weeks post third teaching session.

Results

Table 1 shows the correlation between pain level and quality of life among studied patients (study and control groups) through the intervention. It clarifies that there was a negative correlation between pain level and World Health Organization of Quality-of-Life Brief: (WHOQOL) score for the study group, through pre, post 1 st & 2 nd follow-up - intervention.

Table 2 shows the correlation between pain level and activity of daily living among studied patients (study and control groups) through the intervention. It clarifies that there was a negative correlation between pain level and activity of daily living score for the study group, through pre, post 1 st & 2 nd follow-up - intervention.

Table 3 showed the correlation between quality of life and activity of daily living among studied patients (study and control groups) through the intervention. It clarifies that there was a positive correlation between quality of life and activity of daily living score for the study group, through pre, post 1 st & 2 nd follow-up - intervention.

Table (1): Correlation between Pain Level and Quality of Life Among Studied Patients (Study and Control Groups) through the Intervention (n=60)

Variable		Pain level		Follow –up1- intervention	Follow-up 2- intervention
		Pre- intervention	Post- intervention		
QOL of Study group	r	-.566	-.490	-.450	-.518
	p-value	.015*	.006*	.013*	.004*
QOL of Control group	r	-.273	-.357	-.047	-.178
	p-value	.014*	.053	.804	.347

Pearson coefficient

*: Statistically significant at $p \leq 0.05$

**. Correlation is significant at the 0.01

Table (2): Correlation between Pain Level and Activity of Daily Living Among Studied Patients (Study and Control Groups) through the Intervention (n=60)

Variable		Pain level		Follow –up1- intervention	Follow-up 2- intervention
		Pre- intervention	Post - intervention		
Activity of daily living of Study group	r	-.200	-.158	-.840	-.738
	p-value	.290	.041*	.030*	.006*
Activity of daily living of Control group	r	-.102	-.167	-.181	-.393
	p-value	.592	.377	.338	.032*

r: Pearson coefficient

*: Statistically significant at $p \leq 0.05$

**. Correlation is significant at the 0.01

Table (3): Correlation between Quality of Life and Activity of Daily Living Among Studied Patients (Study and Control Groups) through the Intervention (n=60)

Variable		Quality of life		Follow –up1- intervention	Follow-up 2- intervention
		Pre- intervention	Post- intervention		
Activity of daily living of Study group	r	.007	.499	.523	.653
	p-value	.969	.005*	.003*	.000**
Activity of daily living Control group	r	.151	.270	.080	.282
	p-value	.427	.150	.675	.130

r: Pearson coefficient

*: Statistically significant at $p \leq 0.05$

**. Correlation is significant at the 0.01

Discussion

Regarding to correlation between pain level and quality of life, the current study results showed that there was significant negative correlation between pain level and quality of life for both groups at second follow-up-intervention. These results are consistent with Migaou et al., (2024), who studied "Enhancing Quality of Life and Satisfaction through Prosthetic Intervention: A Prospective Study on Lower Limb Amputee patients". Revealed that there were negative association was found between pain level and quality of life.

Regarding to correlation between pain level and activities of daily living, the current study results showed that there was significant negative correlation between pain level and activities of daily living for both groups at second follow-up- intervention. These results are consistent with Padovani et al., (2015), who studied "Anxiety, depression and quality of life in individuals with phantom limb pain" revealed that there were negative association was found between pain and activities of daily living.

Regarding to correlation between quality of life and activity of daily living, the finding of the present study showed that there was significant positive correlation between quality of life and activities of daily living for both groups at second follow-up-intervention. These results are consistent with Attalla & El-Sayad., 2020, who studied "Effectiveness of Rehabilitation Nursing Protocol on Phantom Pain and Lifestyle Modification Among Patients with Lower Limb Amputation". Who revealed that there was significant positive relationship between activities of daily living and quality of life.

Conclusion

Based on the consequences of current study, designing and implementing a nursing intervention based on the needs of patients after lower limb amputation was effective in reducing phantom pain, physical and mental health, performance of activities of daily living (ADL) and quality of life (QOL).

The overall findings of this study provide evidence to support the value of nursing intervention for individuals with lower limb amputation.

Recommendations

Based on the findings of the current study, the following recommendations are derived and suggested:

A-Recommendations for patients:

- Improving awareness of patients and counseling on post- amputation goals will enhance patients' compliance with the nursing intervention.
- A simplified, comprehensive and illustrated Arabic guided images booklet should be distributed for each newly admitted patient diagnosed with amputation.

B- Recommendation for further research:

- A similar study can be replicated at different settings and on a larger probability sample to allow for greater generalization of the findings.

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