Effect of lavender versus rosemary oil on physical function among patients with knee osteoarthritis

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Abstract

Knee osteoarthritis (KOA) is the most common joint disorder among middle to older age. It is painful and disabling diseases which are characterized by pain, stiffness, loss of joint function, difficulty moving, loss of muscle strength, and deterioration of the physical function. To evaluate the effect of lavender oil versus rosemary oil on physical function among patients with knee osteoarthritis. Quasi- experimental pre-posttest nonequivalent control group design. Study data were collected at the orthopedic outpatient's clinic at a surgical hospital, affiliated to Fayoum University Hospitals, Fayoum governorate. Ninety participants were included in this study, divided into three equal groups; (30 each) group I was received lavender oil, group II was received rosemary oil, and group III control group who received routine hospital treatment only. Two tools were used for data collection; (1) structured interview questionnaire including demographic and medical data, (2) Western Ontario McMaster Universities Osteoarthritis index (WOMAC). Revealed that the difference in total WOMAC scores regarding total physical function level were statistical significant differences in pre and post intervention within lavender group, as well as among rosemary group. While there were no statistical significant differences within control group. The results concluded that both lavender and rosemary application induced significant improvement in physical function among patients with mild and moderate knee osteoarthritis at the end of three week of intervention compared to control group. The study was realizing that increase awareness and teaching measures about practice of aromatherapy oil among patients with knee osteoarthritis and replicate the study on different types of pain.

1. Introduction

Knee pain is the main symptoms of knee osteoarthritis (KOA) with extreme limitations to perform physical functional activities and the patient experience decreased ability to perform even simple tasks [1]. Over time, the patient becomes less active and complain from disruption of physical function status as walking; bending; sitting and standing; performing motor activities; going up and down stairs and lifting. As KOA progresses the physical functional activity level decreased [2]. Self-patient application of aromatherapy oils could help to relieve the patient's recurrent pain, and produce highly effective outcomes especially for lifelong use and help in adherence to treatment [3]. Aromatherapy is a form of complementary therapy using essential oil extracted from plants, which can be absorbed into the body through the skin [4].

Aromatherapy is preferred in many areas because of its efficacy in relieving joint pain, stiffness, especially with everyday use of oil application for patients with KOA [5]. One of aromatic oil is the Lavandula Angustifolia, commonly known as lavender [6]. Furthermore, it used as an anti-rheumatic, analgesic, anti-inflammatory, decrease pain and muscle tension for patients [7]. Rosemary essential oil is best known for its stimulating, soothing and pain-relieving properties. Furthermore, it used as anti-viral, anti-microbial and anti-inflammatory especially in patients with osteoarthritis. Rosemary oil used also to help in reduce stress levels, pain, nervous tension, boost mental activity and relieve fatigue [8]. Previous studies concluded that with aromatherapy oil as lavender and rosemary application can be managed safely once per day for 3 weeks. This significantly reduces the severity of chronic pain, stiffness,

limitation of movement, while strengthening the immune system, alleviating inflammation and consequently improves physical functional status effectively [9]. Nurses have a significant role in relieving pain, and emphasize on the importance of self-care for patients as using one of non-pharmacological method as oil application on the knee joint by the patient [10]. Therefore, the current study aims to evaluate the effect of essential oils of lavender versus rosemary oil application on physical function among patients with knee osteoarthritis.

1.1. Research hypothesis

To achieve the aim of the study, the following hypotheses were postulated to be tested:

H1: There would be difference in total mean physical function scores between patient with KOA who receive lavender oil and patient with KOA who receive rosemary oil.

H2: There would be difference in total mean physical function scores between patient with KOA who receive lavender oil and patient with KOA who receive routine hospital treatment only.

H3: There would be difference in total mean physical function scores between patient with KOA who receive rosemary oil and patient with KOA who receive routine hospital treatment only.

2. Materials and Methods

2.1. Aim

Aim of the current study was to evaluate the effect of lavender oil versus rosemary oil on physical function among patients with knee osteoarthritis.

2.2. Design

A Quasi- experimental pre-posttest nonequivalent control group design was utilized to achieve the aim of the current study. This design demonstrates causality between an intervention (application of lavender versus rosemary oil on physical function among patients with knee osteoarthritis). In this design, the researcher had three groups, two experimental (group I was received lavender oil application, group II was received rosemary oil application and group III control was received routine hospital treatment only) [11].

2.3. Setting

The data was collected at the orthopedic outpatient's clinic at a surgery hospital, affiliated to Fayoum University Hospitals, Fayoum governorate.

2.4. Sample

2.4.1. Inclusion criteria of study sample

A purposive sample of adult ninety patients was recruited for the study, conscious male and female patients above the age of 18 with confirmed diagnoses of mild (stage II), or moderate (stage III) knee osteoarthritis and agree to participate in the study.

2.4.2. Exclusion criteria of study sample

Patients diagnosed with severe knee osteoarthritis (stage IV), those who have positive sensitivity test to lavender or rosemary oil, and patients on physical therapy or rehabilitation program were excluded from the study [12].

2.5. Tools of data collection

Two tools were used for data collection; (I) structured interview questionnaire including demographic and medical data…. etc. (II) Western Ontario McMaster Universities Osteoarthritis index (WOMAC).

2.5.1. Tool I: Structured interview questionnaire

It was developed by the researcher, it was included two parts: (a) Personal data which include age, gender, level of education, marital status, occupation, etc.... (b) Medical data to assess patient's medical condition which was include history of present problem, chief complaint, past medical/surgical history, current treatment, and body mass index.

2.5.2. Tool II. Western Ontario McMaster Universities Osteoarthritis Index (WOMAC):

Developed by Emeritus Professor Nicholas Bellamy (1982) to assess physical function status for patients with osteoarthritis. It consists of 24 items divided into 3 subscales: (a) Pain (5 items), (b) Stiffness (2 items), (c) Physical function (17 item).

2.5.3. Scoring system

Scoring system of WOMAC was interpreted to follow scale of difficulty for all items: from 0 to 4, where 0 indicates no difficulty, one indicates mild difficulty, two indicates moderate difficulty, three indicates severe difficulty and four indicates extremely difficulty level. The scores will be summed for items in each subscale, with possible ranges as follows: physical function =0-68. Scale of difficulty for each subscale as summed of total score as the following: 0=no physical function difficulty, 1-17= mild difficulty, 18-34=moderate difficulty, 35-51=severe difficulty, and 52-68=extremely difficulty.

2.6. Procedure

After an official permission was taken from administrative personnel and a written consent from patient. The researcher starts with control group, then the study group. Then collect personal and medical related data through using tool I, the researcher measures each patient's weight and height to obtain body mass index (BMI). Then physical function was assessed by using tool II as a baseline data. Before application of the oil for those who was used lavender or rosemary oil, the researcher was performed a sensitivity test by applying a drop of oil (lavender or rosemary) (about 0.1 ml) using standardized dropper on the patient's forearm skin and leaved for 5 minutes to detect its sensitivity. For those who had no sensitivity was included in the study after their approval, then the participated patient places his or her knee in a comfortable position. Then the researcher was applying one ml of oil by standardized dropper and spreads by fingertips over the patient's affected knee full diameter. The researcher was ensured that each participated patient was asked to demonstrate oil spread on his or her knee, and emphasized to apply oil at home once per-day at night for three consecutive weeks as the oil become more effective after three weeks of its application with every day use based on studies [13] [14] [12]. Follow up for patients was done by the researcher through telephone call through three weeks to ensure compliance of oil application. The researcher was evaluating physical function

for all groups; using tool II after three weeks of intervention at the orthopedic outpatient's clinic. By the end of the study, the control group was provided by bottle filled with 30 ml oil (lavender or rosemary) to make sure the equity, and justice.

2.7. Statistical analysis

By using version 20 of the Statistical Package for the Social Sciences, an analysis of the results was done. Descriptive statistics were expressed as percentage, mean, and standard deviation (SD). For the comparison of the groups with parametric and nonparametrically distributed data, the t-test (t), and X2-test were used, also, F-test was used in the comparison of means of three groups with parametric distribution.

3. Results and Discussion

Demographic characteristics in the current study showed that more than half of the study groups age ranged between nineteen to fifty years old, the possible explanation could be related to the higher incidence of mild to moderate knee osteoarthritis within the earlier age as it was apparent in this study, other than the incidence of severe knee osteoarthritis occurs in the older age or increasing with age (Figure1). The study results were similar to study [15] stated that, the higher incidence of mild and moderate knee osteoarthritis occur between patients less than sixty years, while severe knee OA occur at age sixty-five and more. The majority of the study group were females, married and from urban areas. Regarding to medical data, the study showed that the majority of study groups were have gradual disease onset and more than one year regarding to duration of knee osteoarthritis, this could refer to gradual degenerative effect of osteoarthritis that occur with age progression, and nature of disease chronicity. This finding is in accordance to study [16] stated that osteoarthritis mainly occurs in later life and tends to be slowly progressive in incidence and can cause significant knee pain and disability (Table 1). No specific study showed that osteoarthritis occurs in sudden onset,

usually occur gradually due to the nature of disease pathophysiology of wear and tear process that occur with average advance in age. Regarding to physical function, the current study results showed that the difference in physical function which measured by WOMAC scores regarding difficulty level pre and post intervention in ascending stairs, descending stairs, bending to the floor, walking on flat surface, and standing, sitting, rising from sitting, lying in bed and rising from bed, getting in/out of bath and toilet and putting on and taking off socks, shopping, getting on/out of car, light and heavy domestic duties. Both lavender, and rosemary groups show significant improvement in physical function difficulty degree compared to control group. In the same line, a study that investigate the effects of aromatherapy of lavender, and rosemary oil massage on pain, functional state and life quality of elderly individuals with knee osteoarthritis, find that the WOMAC physical function scores were lower and quality of life scores were higher in the aromatherapy than control groups, and these differences were statistically significant ($p < .001$) [17], this could be explain that aromatherapy massage with essential oil reduce the incidence of activities of daily living disability in patients with osteoarthritis of the knee (Table 2). Moreover, in accordance to study mentioned that the present study provides robust scientific evidence that oil supplement is safe and resulted in modest improvements in knee pain, stiffness, and physical function compared with a placebo [18]. In addition to a study aimed to evaluate the effects of aromatherapy massage with lavender essence on activities of daily living of patients with knee osteoarthritis, found that the Aromatherapy massage with lavender essential oil may reduce the incidence of activities of daily living disability in patients with osteoarthritis of the knee [19]. So that effect on the patient joint at the end of the day and during rest periods that indicate joint pain and stiffness of hip joint with each position even in resting position due to static in long time in the same position, that appear in patient physical function status of the patient (Table 3).
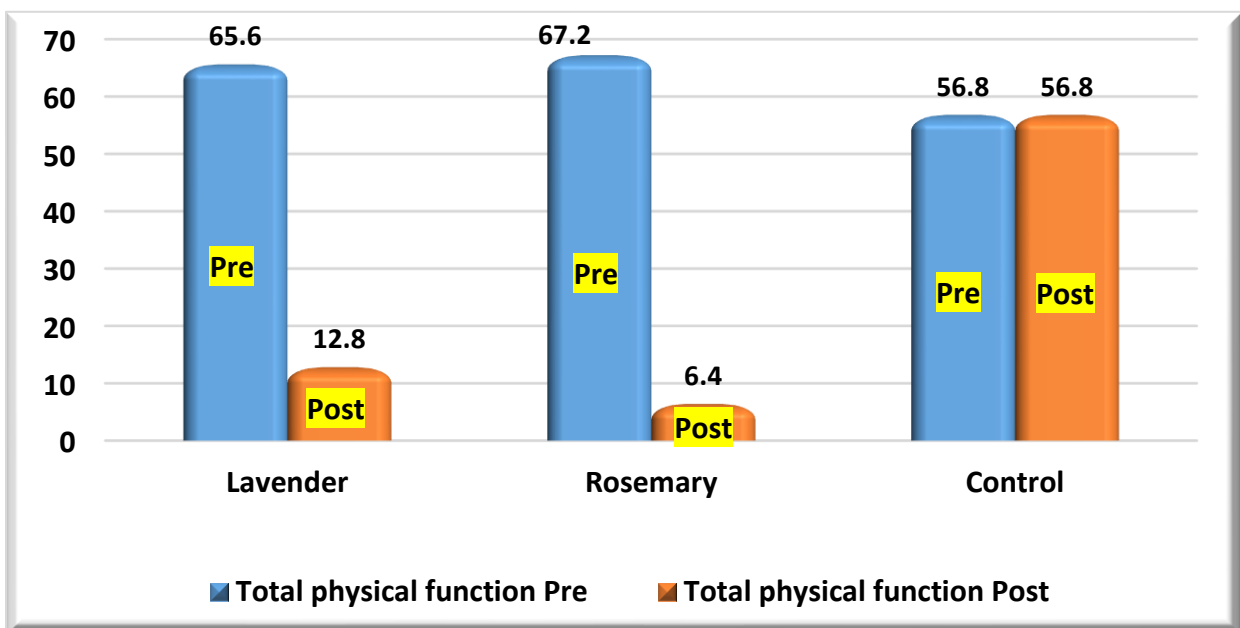

Figure 1: Comparison of total physical function score between three study group

Table 1: Frequency and percentage distribution of demographic characteristics among study groups (n=90).

Variable	Lavender group (n₁= 30)		Rosemary group (n₂= 30)		Control group (n₃= 30)		Test	p-value
	N	%	N	%	N	%		
Age							F	
19-50 year	16	53.3	16	53.3	20	66.7	2.5	0.3
51-80 year	14	46.7	14	46.7	10	33.3		
Mean±SD	53.3±12.4		51±13.4		49.3±12.8			
Gender							X^2	
Male	6	20.0	5	16.7	3	10.0	0.7	0.5
Female	24	80.0	25	83.3	27	90.0		
Marital status								
Married	29	96.7	30	100	29	96.7	1.02	0.6
Widow	1	3.3	0	0.0	1	3.3		
Educational level								
Can't read and write	8	26.7	8	26.7	12	40.0	20.9	0.02*
Read and write	0	0.0	0	0.0	1	3.3		
Primary	3	10.0	4	13.3	1	3.3		
Preparatory	4	13.3	0	0.0	4	13.3		
Secondary	2	6.7	8	26.7	7	23.3		
University	13	43.3	10	33.3	5	16.7		
Occupation								
Retired	4	13.3	4	13.3	0	0.0	15.9	0.04*
Clerk	17	56.7	18	60.0	11	36.7		
House wife	9	30.0	7	23.3	18	60.0		
University student	0	0.0	1	3.3	0	0.0		
Others	0	0.0	0	0.0	1	3.3		
Residence								
Rural	6	20.0	6	20.0	12	40.0	4.1	0.1
Urban	24	80.0	24	80.0	18	60.0		

*Significant difference with p-value <0.05

Table 2: Frequency and percentage distribution of medical data among the studied groups (n=90).

Variable		Lavender group (n₁= 30)		Rosemary group (n₂= 30)		Control group (n₃= 30)		X^2	p-value
		N	%	N	%	N	%		
Disease onset									
Gradual		26	86.7	23	76.7	27	90.0	2.2	0.3
Sudden		4	13.3	7	23.3	3	10.0		
Disease duration									
From 6 months to year		1	3.3	1	3.3	5	16.7	4.9	0.08
More than year		29	96.7	29	96.7	25	83.3		
Signs and symptoms									
Joint pain	Gradual	26	86.7	25	83.3	27	90.0	0.6	0.7
	sudden	4	13.3	5	16.7	3	10.0		
Numbness		10	33.3	11	36.7	8	26.7	0.7	0.7
Joint crepitating on movements		15	50.0	25	83.3	16	53.3	8.6	0.01*
Difficulty of movement on uneven surface		13	43.3	16	53.3	13	43.3	0.8	0.7
Inability of movement		5	16.7	7	23.3	3	10.0	1.9	0.4
Current treatment regimen									
Medications		12	40	15	50.0	10	33.3	3.4	0.5
None		18	60	15	50.0	20	66.7		
Body mass index									
Underweight		0	0.0	0	0.0	0	0.0	3.4	0.4
Normal		3	10.0	2	6.7	0	0.0		
Overweight		5	16.7	5	16.7	3	10.0		
Obese		22	73.3	23	76.7	27	90.0		
Severe obese		0	0.0	0	0.0	0	0.0		
Morbid obese		0	0.0	0	0.0	0	0.0	F	
Mean ±SD		32.6±5.3		34.6±4.8		34.6±4.7		1.3	0.3

*Significant difference with p-value <0.05

Table 3: Frequency and percentage of WOMAC physical function scores regarding physical function pre- and post-intervention within each study group (n=90).

Variable	Lavender group (n₁= 30)				Rosemary group (n₂= 30)				Control group (n₃= 30)			
	Pre		Post		Pre		Post		Pre		Post	
	N	%	N	%	N	%	N	%	N	%	N	%
Total physical function score												
None	1	3.3	24	80.0	0	0.0	28	93.3	0	0.0	0	0.0
= Mild	2	6.7	2	6.7	2	6.7	0	0.0	4	13.3	4	13.3
4 = Moderate	8	26.7	0	0.0	11	36.7	0	0.0	12	40.0	12	40.0
1 = Severe	12	40.0	2	6.7	8	26.7	0	0.0	13	43.3	13	43.3
8 = Extreme	7	23.3	2	6.7	9	30.0	2	6.7	1	3.3	1	3.3
Mean ±SD	65.60±24.35		12.80±29.38		67.20±23.07		6.40±24.35		56.80±18.35		56.80±18.35	
T-test (p-value)	7.131(0.001*)				12.208(0.001*)				1.000(1)			

*Significant difference with p-value <0.05

4. Conclusion

Based on the findings of the current study, it can be concluded that: both Lavender and rosemary application induced significant improvement in physical function status which measured by WOMAC tool among patients with mild and moderate knee osteoarthritis with application at the end of three weeks after their intervention in comparison to control group. The difference in total WOMAC scores regarding physical function difficulty level pre-post intervention for lavender, as well as rosemary show statistical significant improvement after intervention compared to control group. Therefore, hypothesis of the current study was accepted. The difference in total WOMAC scores regarding physical function level pre-post intervention for lavender, as well as rosemary show statistical significant improvement after intervention but in control group there was no statistical significant change.

List of abbreviation

KOA: Knee osteoarthritis, WOMAC: Western Ontario McMaster Universities Osteoarthritis Index, OA: Osteoarthritis, SD: standard deviation.

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