

# The Effects of Aromatic Oil on Shoulder Pain in the Middle-aged Woman Patients

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## 중년 여성 환자의 견관절 통증에 대한 아로마 오일의 효과

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### 국문 초록

대전에 소재하는 C 대학교 병원의 물리치료실에 2003년 5월 9일부터 2004년 10월 20일까지 내원한 환자들 중 견부 통증의 진단으로 치료를 받은 환자 가운데 중추신경계에 손상 병력이 없고, 치료사와 의사소통이 가능한 인지 능력을 가졌으며, 실험에 참가하기로 동의한 환자를 대상으로 내원한 순서에 따라 아로마 · 초음파군, 아로마군, 초음파군에 각각 30명씩을 배정하여 실험한 결과, 치료의 횟수가 증가함에 따라 통증의 정도를 알아보는 시각적 통증 점수가 감소하였으며( $p < 0.001$ ), 군 간에 통증 감소의 정도도 차이가 있었다. 사후 검정을 보면 아로마 · 초음파군과 아로마군의 통증 감소의 정도가 초음파군에 비해 높았다( $p < 0.001$ ). 또한 치료의 횟수가 증가함에 따라 McGill-Melzac 통증 점수 역시 감소하였으며( $p < 0.001$ ), 군 간에 차이는 없었지만, 교호작용을 고려하면 아로마를 사용한 군에서 감소 폭이 더 큰 것으로 해석할 수 있다. 압통계의 역치 역시 치료의 횟수가 증가함에 따라 모든 군에서 상승하였으며( $p < 0.001$ ), 군 간에 역치 증가의 정도에도 차이가 있었는데( $p < 0.05$ ), 사후 검정을 보면 아로마 · 초음파군이 아로마군에 비해 역치 증가의 폭이 더 컸다. 따라서 압통계의 역치 증가는 아로마 보다는 초음파에 더 영향을 받는 것으로 생각할 수 있다.

이상의 결과로 볼 때 아로마 오일은 주관적이고, 정서적인 통증을 검사하는 시각적 통증 점수와 McGill-Melzac 점수에 많은 영향을 미치는 반면 조직의 회복에 의해 상승하는 압력 역치를 검사하는 압통계의 수치에는 영향을 적게 미침을 확인할 수 있었으며, 반면 초음파는 주관적, 정서적인 통증의 감소보다는 실제 조직이 회복되면서 감소하는 통증에 더 많은 영향을 미치는 것을 알 수 있었다.

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**Key words:** 아로마 오일, 시각적 통증 점수, McGill-Melzac 점수, 압통계의 역치

## I. Introduction

People feel some pain, if any difference in degree, in any part of their bodies. They have a keen or a dull sense in pain, but their curative alternatives aren't simple, considering various causes such as mental pain from stress, physical pain from frailness - lumbago and shoulder pain.

Heat therapy for the pains are superficial-heat therapy like fomentation and stuping, and deep-heat therapy like ultra-sound and shortwave diathermy. Fomentation and stuping have heat effect mainly on the outer tissue layer; because deep heat therapy like ultra-sound can transmit even in the deep muscle layer, it can be used for sprain, arthritis, myofascial pain syndrome, tissue adhesion, etc.

The effect of ultra-sound on the body are pain decrease, subacute and chronic inflammation decrease, muscle rigidity, articular collagen tissue extension (Byl et al., 1993), tissue recovery, edema decrease, the therapy of pain-causing spots around the pain part(Dyson and Pond, 1970; Patrick, 1978), and the like.

In time of ultra-sound therapy, as great care of the parameters for tissue temperature increase was emphasized, Draper(1995) and Lehmann et al(1966) said that, according to medium type and temperature, subcutaneous-tissue temperature changes in its temperature increase distribution.

When ultra-sound is applied to the skin for transmission of deep heat, mineral oil, mentholatum, olive oil, liquid paraffin, etc., are used as radio medium substance for transmission of ultra-sound in muscle and have meaningful difference in temperature-increase effect(Min, Kyung Ok, 1987).

Therefore, researches on various medium substances are being made, and particularly, these days natural therapy has obtained good response from the public; much research has become required on aroma therapy using, as medium oil, jojoba oil with aroma blended by 3%.

Aroma therapy is a medical prescription using the features of concentrated plant-aroma stimulating brains and specific organs through absorption of volatile-perfumed substance existing in plants. That is, aroma essential oils affect each internal organ,

secreting glands, and hormones, which make physical functions balanced, recovers homeostasis, and strengthens resistance. Also, they reduce mental tension, slacken strained muscles to less pain, so they help prevent and heal common mental and physical diseases(Ha, Byoung Jo, 2000). Because aroma therapy can reduce mental, physical and emotional pains, much broad research is required on pain therapy using Aromatic oil as medium substance in time of ultra-sound therapy. When Jojoba oil with 3%-blended Aromatic oil is used in ultra-sound therapy, that can bring the deep-heat effect of ultra-sound and the medical effect of Aromatic oil such as pain-killing and sedative effect; the therapy can control pain much more effectively and have some effect on various pains from various stress.

Thus, the paper has tried to find out the effectiveness of Aromatic oil used in ultra-sound therapy by confirming whether Aromatic oil can reduce shoulder pains as medium substance in ultra-sound therapy for shoulder-pained patients under physical therapy.

## II. Methods

### 1. Subjects

The experimental subjects, woman patients under treatment for shoulder pains, who were selected from all the patients visiting the physical therapy room of C University Hospital in Daejeon City from May 9, 2003 to October 20, 2004, could communicate with therapists and had no central-nervous-system injury history, and agreed to join

the experiment. According to the order of visiting the hospital, they were divided into three groups of 30 members - an aroma & ultra-sound therapy group, an aroma therapy group, and an ultra-sound therapy group].

### 2. Instruments

#### 1) A Questionnaire

The questionnaire was based on the literature on the precedent questionnaires including the general characteristics such as sex, age, weight, height, etc., and a patient's present health condition elements such as subjective health condition, taking medicine or not, smoking or not, drinking or not, getting an injury from a fall or not, etc.

#### 2) Pain-examining Instruments

##### (1) VAS(Visual analog scale) Instrument

The most general method rating pain uses ratio standard — on a horizontally-drawn 10cm-long line, where the left means no pain and the right means a very acute pain, patients are instructed to mark what degree of pain they feel(Jensen et al., 1986). This method is used mainly to measure subjective symptoms as a method that a patient marks on a standard table the degree of pain felt conscious of by himself or herself].

##### (2) McGill Pain Questionnaire

McGill Pain Questionnaire was designed to rate the pains of multi-dimensional sides(Melzack, 1975). The questionnaire can rate sensible sides, analytic sides, and emotional sides, so it helps get reliable information about the pains of patients with other educational and socio-economic and cultural backgrounds. This is a method that patients find and mark terms expressing their own pain on the

questionnaire and is composed of 3 categories and 20 subcategories.

### (3) Algometer Pain Gauge

Algometer pain gauge was developed from a method measuring pressure threshold and against-pressure resistance through a pressure tester that a rubber disc is fixed (Fischer, 1986). It is a useful instrument providing objective and qualitative information about the degree of oversensitiveness to and recovery from pain. It uses as a mark the pressure value expressed by setting the rubber disc vertically on a painful part, then increasing pressure gradually, and finally stopping pressure just after pain starts. The electronic algometer used in the experiment was Algometer Commender & DigiTrack Commender.

## 3) Experimental Instruments

### (1) Ultra-sound Treatment Instrument

The frequency of ultra-sound was 1MHz, and its intensity was 1.5w/cm, and each experimental group had 5-minute treatment. The ultra-sound treatment instrument for the experiment was Sonotens 501 (DAEYANG MEDICAL CO. LCD).

### (2) Ultra-sound Mediums

The ultra-sound therapy group used 30% mentholatum as a ultra-sound medium; the aroma therapy group used jojoba oil (30ml) with a 3%-diluted mixture of Roman chamomil (one sixth) and marjoram (two sixths) and lavender (three sixths) that have pain-killing and stress-slackening effect.

## 3. Experimental Methods

### 1) Questionnaire surveys and Pain Examination

Questionnaire survey and pain examination were performed 8 times — before and after the 2nd

treatment, before and after the 4th treatment, and before and after the 6th treatment, but the paper used in statistics only the survey and the examination performed before treatment, after the 2nd treatment, after the 4th treatment, and after the 6th treatment.

VAS and McGill pain questionnaire were recorded by the patients themselves, and Algometer was used for measurement by the therapists. Each group was measured 20 minutes after each treatment, which was based on the result of a research by Maddocks (1994) that the main ingredient of lavender began to be detected from the blood of a patient within 5 minutes after massaging a local part with lavender oil and its detection reached the maximum 20 minutes later.

## 2) Treatment Methods

Based on the time when the patients began to appeal pain; as for the aroma therapy group, 3% three-blended Aromatic oil was applied lightly on the measured part 10 times, and as for the ultra-sound therapy group, 30% mentholatum is applied. The intensity of ultra-sound was 1.5w/cm, and the treatment time was 5 minutes.

## 4. Analysis Methods

$\chi^2$ -test was performed to confirm whether there was difference between the general and the clinical characteristics of the patients in each group, and One Way ANOVA was performed to confirm whether before treatment there was difference in the degree of pain between the groups. Also, Repeated ANOVA was performed to confirm whether the increasing frequency of treatment within each group decreased pain and whether there

was difference in pain increase and decrease between the groups; when there was some difference, Duncan's post-hoc test was performed. The statistical program for the experiment was SPSSWIN(ver. 10.0), and its significance level was  $\alpha=0.05$ .

### III. Results

#### 1. General Characteristics of Respondent

As for age of the general characteristics of respondents, 50.0% of the aroma & ultra-sound therapy group were 40- to 49-year-old patients, and 50.0% were 50- to 59-year-old patients; 53.3% of the aroma therapy group were 50- to 59-year-old patients, and 46.7% 40- to 49-year-old patients; 56.7% of the ultra-sound therapy group were 50- to 59-year-old patients, and 43.3% 50- to 59-year-old patients; accordingly, the three groups had no difference.

As for height, 46.7% of the aroma & ultra-sound therapy group patients were under 159cm, and 40.0% were 160cm-169cm; 46.7% of the aroma therapy group patients were 160cm-169cm, and 35.7% under 159cm; 43.3% of the ultra-sound therapy group patients were 160cm-169cm, and 30.0% under 159cm; accordingly, the three groups had no difference.

As for weight, 33.3% of the aroma & ultra-sound group patients weighed 60kg-69kg, and 26.7% weighed 50kg-59kg or over 70kg; 36.7% of the aroma therapy group patients weighed 50kg-59kg, and 33.3% 60kg-69kg; 43.3% of the ultra-sound

group patients weighed 60kg-69kg, and 26.7% weighed 50kg-59kg or over 70kg.

As for academic backgrounds, 40.0% of the aroma & ultra-sound therapy group patients just finished junior high school, and 30.0% just finished high school; 33.3% of the aroma therapy group patients just finished junior high or high school; 40.0% of the ultra-sound therapy group patients just finished junior school, and 30.0% high school. So there was no meaningful difference.

As for occupation, 60.0% of the aroma & ultra-sound therapy group were homemakers; 53.3% of the aroma therapy group were homemakers; 56.7% of the ultra-sound therapy group were homemakers.

As for hospitalization, 76.7% of the aroma & ultra-sound therapy group were outpatients, 63.3% of the aroma therapy group, and 63.3% of the ultra-sound therapy group; accordingly, there was no difference(Table 1).

#### 2. Clinical Characteristics of Respondent

As for the respondents' clinical characteristics, 56.7% of the aroma & ultra-sound therapy group patients had cervicoshoulder sprain, and 43.3% had frozen shoulder; 70.0% of the aroma therapy group had cervicoshoulder sprain, and 30.0% frozen shoulder; 63.3% of the ultra-sound therapy group had cervicoshoulder sprain, and 36.7% frozen shoulder; accordingly, there was no big difference.

As for the cause of an attack, 43.3% of the aroma & ultra-sound therapy group patients said it was working, 33.3% didn't know it well, and 23.3% said it had nothing to do with work; 46.7% of the aroma therapy group didn't know it well, 33.3% said it was working, and 20% said it had nothing to

Table 1. General Characteristics of the Respondent

( % )

Variable	Group	Aroma·U/S	Aroma	U/S	합계	$\chi^2$
Age(year)	40 - 49	15(50.0)	14(46.7)	13(43.3)	42(46.7)	0.268
	50 - 59	15(50.0)	16(53.3)	17(56.7)	48(53.3)	
Heigh(tcm)	- 159	14(46.7)	10(33.3)	9(30.0)	33(36.7)	2.760
	160 - 169	12(40.0)	14(46.7)	13(43.3)	39(43.3)	
	170 -	4(13.3)	6(20.0)	8(26.7)	18(20.0)	
Weight(kg)	- 49	3(13.3)	4(13.3)	1(3.3)	8(8.9)	3.387
	50 - 59	9(26.7)	11(36.7)	8(26.7)	28(31.1)	
	60 - 69	12(33.3)	10(33.3)	13(43.3)	35(38.9)	
	- 70	6(26.7)	5(16.7)	8(26.7)	19(21.1)	
Education	Elementary	6(20.0)	5(16.7)	7(23.3)	18(20.0)	3.818
	Middle	12(40.0)	10(33.3)	12(40.0)	34(37.8)	
	High	9(30.0)	10(33.3)	9(30.0)	28(31.1)	
	College	3(10.0)	5(16.7)	2(6.7)	10(11.1)	
Occupation	Housewife	18(60.0)	16(53.3)	17(56.7)	51(56.7)	0.271
	Employee	12(40.0)	14(46.7)	13(43.3)	39(43.3)	
Patient	Outpatient	23(76.7)	19(63.3)	19(63.3)	61(67.8)	1.628
	Inpatient	7(23.3)	11(36.7)	11(36.7)	29(32.2)	
Total		30(100.0)	30(100.0)	30(100.0)	90(100.0)	
		(33.3)	(33.3)	(33.3)	(100.0)	

do with work; 50.0% of the ultra-sound therapy group didn't know, 36.7% said it was working, and 14.3% said it had nothing to do with work. So there was no meaningful difference.

As for the cause of pain, 43.3% of the aroma & ultra-sound therapy group had no reason; 40.0% of the aroma therapy group said it was an accident; 40.0% of the ultra-sound therapy group had no reason. So there was no statistical difference.

As for the period of a case history, 56.7% of the aroma & ultra-sound therapy group had over 6 months, 50.0% of the aroma therapy group over 6

months, and 40.0% of the ultra-sound therapy group had 1 to 6 months; however, there was no meaningful difference between the groups.

As for the nature of pain, 53.3% of the aroma & ultra-sound group had something to do with stress; 46.7% of the aroma group with weather; 46.7% of the ultra-sound group had something to do with weather, and also, 46.7% with stress; however, the groups had no statistical difference.

As for the degree of pain, 40.0% of the aroma & ultra-sound group were serious, and 26.7% were medium; 50.0% of the aroma group were medium;

Table 2. Respondents' Clinical Characteristics

( % )

Variable	Group					$\chi^2$
		Aroma·U/S	Aroma	U/S	합계	
Diagnosis	frozen shoulder	13( 43.3)	9(30.0)	11(36.7)	33(36.7)	1.148
	cervicoshoulder sprain	17(56.7)	21(70.0)	19(63.3)	57(63.3)	
Causes	Work Related	13(43.3)	10(33.3)	11(36.7)	34(37.8)	2.312
	No Work Related	7(23.3)	6(20.0)	4(14.3)	17(18.9)	
	Unclear	10(33.3)	14(46.7)	15(50.0)	39(43.3)	
Pain Causes	No Reason	13(43.3)	8(26.7)	12(40.0)	34(37.8)	4.881
	Bad Posture	4(13.3)	5(16.7)	4(13.3)	13(14.4)	
	Accident	12(40.0)	12(40.0)	9(30.0)	33(36.7)	
	Overwork	1( 3.3)	5(16.7)	5(16.7)	10(11.1)	
Duration of Illness	Less than 1 Month	4(13.3)	5(16.7)	9(30.0)	18(20.0)	5.322
	1-6 months	9(30.0)	10(33.3)	12(40.0)	31(34.4)	
	More than 6 months	17(56.7)	15(50.0)	9(30.0)	41(45.6)	
Nature of Pain	Weather Related	10(33.3)	14(46.7)	14(46.7)	38(42.2)	3.042
	Stress Related	16(53.3)	11(36.7)	14(46.7)	41(45.6)	
	Unclear	4(13.3)	5(16.7)	2( 6.7)	11(12.2)	
Degree of Pain	Insignificant	4(13.3)	2( 6.7)	4(13.3)	10(11.1)	6.652
	Average	8(26.7)	15(50.0)	13(43.3)	36(40.0)	
	Severe	12(40.0)	7(23.3)	11(36.7)	30(33.3)	
	Excessive	6(20.0)	6(20.0)	2(6.7)	14(15.6)	
Total		30(100.0)	30(100.0)	30(100.0)	90(100.0)	
		(33.3)	(33.3)	(33.3)	(100.0)	

43.3% of the ultra-sound group were medium, and 36.7% serious; accordingly, there was no big difference between the groups(Table 2).

### 3. The Difference of Pre-experimental Pain between the Groups

In case of visual examination, the mark of the aroma & ultra-sound group was 6.65, that of the aroma group 6.25, and that of the ultra-sound group 7.28; however, the groups had no statistical

difference.

In case of MrGill marks, the aroma & ultra-sound group got 23.73, the aroma group got 21.59, and the ultra-sound group 22.87; however, there was no statistical difference.

In case of the value of algometer, that of the aroma & ultra-sound group was 19.07, that of the aroma group 21.59, and that of the ultra-sound group 20.89; however, there was no statistical difference(Table 3).

Table 3. The Differences of Pain between the Groups before Experiment

Variable	Group			t	p
	Aroma·U/S	Aroma	U/S		
VAS	6.65 ± 2.03	6.25 ± 1.39	7.28 ± 1.35	3.080	0.051
McG	23.73 ± 8.11	21.40 ± 8.26	22.87 ± 11.39	0.475	0.624
Algometer	19.07 ± 3.51	21.59 ± 3.11	20.89 ± 5.49	2.919	0.059

#### 4. The Effect of Treatment on Visual Analogue Scale Examination

In the effect of treatment on visual examination, the aroma & ultra-sound group decreased pain from 6.65(before treatment) to 5.34(after the 2nd treatment), then to 5.01(after the 4th treatment), finally to 4.13(after the 6th treatment); the aroma group decreased pain from 6.25(before treatment) to 4.23(after the 2nd treatment), then to 4.06(after the 4th treatment), finally to 3.66(after the 6th treatment); the ultra-sound group decreased pain from 7.28(before treatment), to 7.09(after the 2nd treatment), then to 6.93(after the 4th treatment), finally to 6.63(after the 6th treatment); accordingly,

the increasing frequency of treatment decreased the numerical value of pain( $p < 0.001$ ). Also, the degree of pain decrease was different between the groups; post-examination showed that the aroma & ultra-sound and the aroma group were higher than the ultra-sound group( $p < 0.001$ )(Table 4-1, 4-2). Therefore, the experiment has revealed that aroma had effect on the decrease of continuous visual analogue scale examination.

#### 5. The effect of Treatment on McGill Pain Scale

So far as the effect of treatment on McGill pain marks was concerned, the aroma & ultra-sound

Table 4-1. Tests of Within-Subjects Effects for VAS

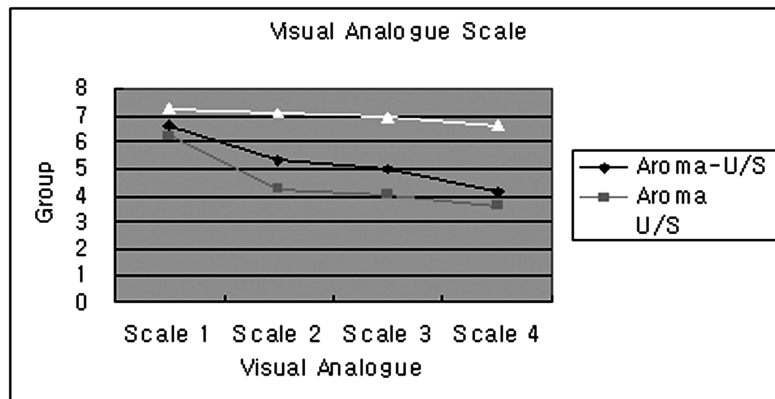
Unit: score

Factor	Variable		N	Mean	Std. Deviation	F	p
	Group						
VAS 1	Aroma·U/S		30	6.6467	2.0294	155.321	0.000
	Aroma		30	6.2467	1.3933		
	U/S		30	7.2767	1.3492		
VAS 2	Aroma·U/S		30	5.3400	2.2498		
	Aroma		30	4.2667	1.2452		
	U/S		30	7.0900	1.4070		
VAS 3	Aroma·U/S		30	5.0067	1.4357		
	Aroma		30	4.0567	0.8182		
	U/S		30	6.9333	1.6115		
VAS 4	Aroma·U/S		30	4.1267	1.5382		
	Aroma		30	3.6567	1.0595		
	U/S		30	6.6300	1.6855		



Table 4-2. Tests of Between-Subjects Effects for VAS

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Intercept	11315.375	1	11315.375	1373.843	0.000
Groups	372.255	2	186.128	22.598	0.000
Error	716.557	87	8.236		



group decreased from 23.73(before treatment) to 20.33(after the 2nd treatment), then to 11.80(after the 4th treatment), finally to 8.20(after the 6th treatment); the aroma group decreased from 21.40(before treatment) to 16.40(after the 2nd treatment), then to 11.57(after the 4th treatment), finally to 6.13(after the 6th treatment); the ultra-sound group from 22.87(before treatment) to 17.63(after the 2nd treatment), then to 14.83(after the 4th treatment), finally to 10.77(after the 6th treatment); accordingly, the increasing frequency of treatment decreased McGill pain scale in all the groups( $p < 0.001$ ). On the other hand, the degree of pain decrease showed no meaningful difference between the groups, but it hasn't been concluded that it resulted from reciprocal action. Before treatment, McGill pain scale were the highest in the aroma & ultra-sound group, and the lowest in the aroma group; after the 2nd treatment, that was the same; after the 4th treatment, however, the scale of

the ultra-sound group were higher than those of the aroma & ultra-sound group; after the 6th treatment, too, those of the ultra-sound group were the highest, and those of the aroma group were the lowest; therefore, it has been found that the degree of pain decrease was bigger in the two aroma-applied groups than in the ultra-sound group. Therefore, the experiment has concluded that aroma affected the decrease of McGill pain scale(Table 5-1, 5-2).

## 6. The Effect of Treatment on the Threshold of Algometer

As for the effect of treatment on the threshold of algometer was concerned, the aroma & ultra-sound group increased from 19.07(before treatment) to 20.70(after the 2nd treatment), then to 23.50(after the 4th treatment), finally to 26.02(after the 6th treatment); the aroma group from 21.59(before

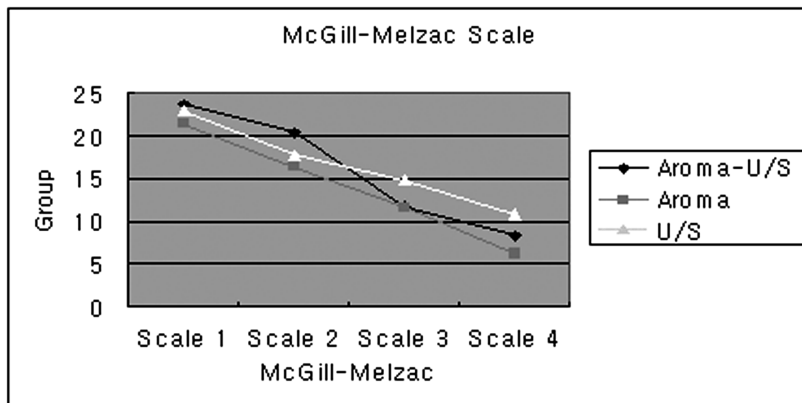
Table 5-1, Tests of Within-Subjects Effects for MCG

Unit: score

Factor	Variable		N	Mean	Std. Deviation	F	p
	Group	Group					
MCG 1	Aroma·U/S		30	23.7333	8.1110	237.408	0.000
	Aroma		30	21.4000	8.2571		
	U/S		30	22.8667	11.3949		
MCG 2	Aroma·U/S		30	20.3333	7.2223		
	Aroma		30	16.4000	3.7655		
	U/S		30	17.6333	10.2267		
MCG 3	Aroma·U/S		30	11.8000	5.8687		
	Aroma		30	11.5667	2.6741		
	U/S		30	14.8333	7.2211		
MCG 4	Aroma·U/S		30	8.2000	7.0633		
	Aroma		30	6.1333	1.8520		
	U/S		30	10.7667	5.5088		

Table 5-2, Tests of Between-Subjects Effects for MCG

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Intercept	86180.278	1	86180.278	541.270	0.000
Groups	474.706	2	237.353	1.491	0.231
Error	13852.017	87	159.219		



treatment) to 23.55(after the 2nd treatment), then to 25.58(after the 4th treatment), finally to 27.18(after the 6th treatment); the ultra-sound group from 20.89(before treatment) to 23.40(after the 2nd

treatment), then to 24.04(after the 4th treatment), finally to 26.09(after the 6th treatment); accordingly, the more the frequency of treatment, the more the threshold of algometer in all the

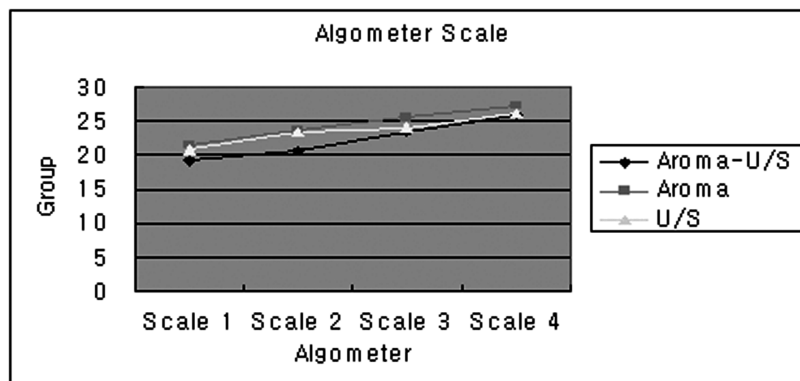
Table 6-1. Tests of Within-Subjects Effects for Algometer

Unit: score

Factor	Variable		N	Mean	Std. Deviation	F	p
	Group						
Algometer 1	Aroma·U/S		30	19.0700	3.5104	179.048	0.000
	Aroma		30	21.5867	3.1071		
	U/S		30	20.8933	5.4890		
Algometer 2	Aroma·U/S		30	20.7000	3.1891		
	Aroma		30	23.5467	2.1619		
	U/S		30	23.3967	5.7132		
Algometer 3	Aroma·U/S		30	23.4967	3.8458		
	Aroma		30	25.5767	2.7306		
	U/S		30	24.0433	2.6187		
Algometer 4	Aroma·U/S		30	26.0233	3.9770		
	Aroma		30	27.1867	2.4713		
	U/S		30	26.0900	3.2482		

Table 6-2. Tests of Between-Subjects Effects for Algometer

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Intercept	198260.480	1	198260.480	4496.907	0.000
Groups	281.225	2	140.612	3.189	0.046
Error	3835.673	87	44.088		



groups( $p < 0.001$ ). Also, the degree of threshold increase was different between the groups; according to post-examination, the aroma & ultra-sound and the ultra-sound group were in the same group, and the ultra-sound and the aroma group

were also in the same group; therefore, the element affecting the threshold increase of algometer has proved to be the effect of ultra-sound, not that of aroma( $p < 0.05$ )(Table 6-1, 6-2).

## IV. Discussion

As RESULTS already analyzed the experimental results of the experiment, this DISCUSSION has mentioned the literature on Aromatic oil used in the experiment, the precedent researches on the use of aroma for pain therapy, the future direction of research necessary for aroma pain therapy, etc. The Aromatic oils used for the experiment were lavender, Roman chamomil, and marjoram that have all pain-killing and sedative effect. The chemical ingredients of Aromatic oil with pain-killing effect are terpene, alcohol, and ester; terpene and alcohol soothe contractile tissue with the reciprocal-action effect of acetylcholine and reduce pain with slacking effect(buckle, 2003). Ester, the most balanced oil, has anti-spasticity effect; the more the number of ester, the bigger its effect; it is effective on pains from muscle spasticity. Particularly, the biggest number of ester in Roman chamomil reaches 310, and its pain-killing effect is quite excellent(Buckle, 2003; Franchomme and Peneol, 1990). Besides, ester has sedative and slcakening effect, and the three oils for this experiment have all ester; therefore, the above-mentioned has proved the meaningfulness of the experimental result that the Aromatic oils showed more effect on emotional and sensitive pains.

Inhaling clarysage aroma reduced pain in the neck or the shoulder from 1.57(before treatment) to 0.84(after treatment), together with decrease in the scale of physical stress of many other kinds(Seo, Hye Kyoung, 2002). As the result of visual examination measuring the effect of decrease in the pains of the degenerative-arthritis patients massaged with Aromatic oil such as lavender,

Roman chamomil, Juniper berry, and ginger, the experimental group decreased pain by 3.5cm before and after the experiment, but the controlled group increased by 0.3cm; therefore, Aromatic oil decreased pain by pain-killing, anti-inflammation, local circulation improve, etc.(kim Eun- Kyung, 2004). The research examining on physiological pain the effect of daily massaging the abdomen with lavender, clarysage, and rose from one week before a menstruation until its first day showed that physiological pain was 7.4cm(VAS) on its first day(before experimental treatment), but that the pain decreased to 4.3cm on its first day(after experimental treatment), then to 3.3cm on its second day(after experimental treatment)(Han, Sun Heuy, 2001). The results of visual pain-measuring examination from the above three researches have accorded with those of visual pain-measuring examination from the paper.

From these results, when jojoba oil with a 3%-diluted mixture of lavender and Roman chamomil and marjoram(having sedation, anti-myalgia, anti-spasticity, anti-melancholy effect) is applied lightly to a painful part after massaging or used as medium substance for ultra-sound therapy, they can be effective & complementary treatment methods for the pain therapy of various causes because of its smell effect on the parasympathetic nerve system, and its pain-killing effect.

## V. Conclusion

Woman patients under the therapy of shoulder pain, who were selected from all the patients visiting the physical therapy room of C University

Hospital in Deajeon City from May 9, 2003 to October 20, 2004, could communicate with their therapists, had no central-nervous-system injury history; then according to the order of the hospital visited by those having agreed to the experiment, they were divided into the three groups of 30 members — the Aromatic oil & ultra-sound therapy group, the aroma-oil therapy group, and the ultra-sound therapy group.

1. As the frequency of treatment increased, the pain scale from visual analogue scale examination decreased( $p<0.001$ ); and the degree of pain decrease showed difference between the groups — according to post-examination, the aroma & ultra-sound and the aroma group was bigger than the ultra-sound group( $p<0.001$ ).

2. As the frequency of treatment increased, McGill-Melzac pain scale decreased( $p<0.001$ ), and there was no difference between the groups; however, considering reciprocal action, it has been explained that the aroma-applied groups showed bigger decrease.

3. As the frequency of treatment increased, the threshold of algometer increased in all the groups( $p<0.001$ ), and the groups showed different threshold increases( $p<0.05$ ); according to post-examination, the aroma & ultra-sound and the ultra-sound group were in the same group, and the ultra-sound and the aroma group also in the same groups. Therefore, it has been thought that the threshold increase of algometer is affected by ultra-sound more than by aroma.

Considering the above results, it has been found out that Aromatic oil has bigger effect on McGill-Melzac and visual pain scale examining subjective and emotional pains, but that it has less effect on the algometer value examining the threshold of

algometer increasing from tissue recovery; on the other hand, it has been found out that ultra-sound has bigger effect on the decrease of pain resulting from tissue recovery rather than on the decrease of subjective and emotional pains.

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