

# Optimal Temperature and Duration for Dabbing Customers with the Massage Compressed Packs Reported from Customers' Perception

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**Abstract**—The objective of this research was to study the appropriate thermal level and time for dabbing customers with the massage compressed pack reported from their perception. The investigation was conducted by comparing different angles of tilted heads done by the customers together with their perception before and after the dabbing. The variables included different temperature of the compressed packs and different dabbing duration. Samples in this study included volunteers who got massage therapy and dabbing with hot compressed packs by traditional Thai medical students. The experiment was conducted during January to June 2013. The research tool consisted of angle meters, stop watches, thermometers, and massage compressed packs. The customers were interviewed for their perceptions before and after the dabbing. The results showed that:

1. There was a difference of the average angles of tilted heads before and after the dabbing.
2. There was no difference of the average angles at different temperatures but constant duration.
3. There was no difference of the average angles at different durations.
4. The customers reported relaxation no matter what the various temperatures and various dabbing durations were. However, they reported too hot at the temperature 70°C and over.

**Keywords**—Massage, Therapy, Therapeutic Systems and Technologies.

## I. INTRODUCTION

WITH the fast pace of everyday life, the effect is on muscle strain resulting in muscle ache. This can be relaxed by getting massage or thermal therapy treatment. Thermal therapy treatment can cause muscles and blood vessels expand making better blood circulation and relaxation [1]. Moreover, it helps with the muscle flexibility and reduction of blood viscosity [2]. Traditional Thai medicine has realized the benefit of thermal therapy on muscles has invented a massage compressed pack consisting of Thai herbs for releasing muscle pain [3]. The massage compressed pack must be heated by steaming before dabbing on the painful body parts [4].

However, there has been no study on the optimal temperature and duration of the dabbing to relief the pain. So, the researcher investigated which temperature and which duration that made the best effect on muscle relaxation. The

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investigation was conducted by comparing different angles of tilted heads done by the customers together with their perception before and after the dabbing.

## II. OBJECTIVES OF THE STUDY

The objective of this research was to study the appropriate thermal level and time for dabbing customers with the massage compressed pack reported from their perception.

## III. RESEARCH METHODOLOGY

### A. Population and Sampling Group

Samples in this study included volunteers who got massage therapy and dabbing with hot compressed packs by traditional Thai medical students. The experiment was conducted during January to June 2013.

### B. Research Tools

The research tool consisted of angle meters, stop watches, thermometers, and massage compressed packs. The customers were interviewed for their perceptions before and after the dabbing. The researcher conducted the structure interview which was validated by 3 specialists to check the reliability of structure and contents.

### C. Research Procedure

- 1) Inform the volunteers and ask for their cooperation.
- 2) Train traditional Thai medical students for the dabbing skills, angle measuring skills, timing, and recording.
- 3) Set the sitting posture of the volunteers straight and upright position with their backs against the wall along with the defined lines.
- 4) Measure the angles of the volunteers' tilted heads against the defined line before dabbing.
- 5) Dab the volunteers with the massage compressed packs heated at various temperatures and at various durations.
- 6) Measure the angles of the volunteers' tilted heads against the defined line after dabbing.
- 7) Interview the volunteers for their perceptions on the relaxation feeling at various temperatures.

### D. Research Experiment

- 1) The comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 5 minutes.
- 2) The comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 10

- minutes.
- 3) The comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 15 minutes.
  - 4) The comparison of the average angles of tilted head before and after dabbing at the temperature of 60°C for 5 minutes.
  - 5) The comparison of the average angles of tilted head before and after dabbing at the temperature of 60°C for 10 minutes.
  - 6) The comparison of the average angles of tilted head before and after dabbing at the temperature of 60°C for 15 minutes.
  - 7) The comparison of the average angles of tilted head before and after dabbing at the temperature of 70°C for 5 minutes.
  - 8) The comparison of the average angles of tilted head before and after dabbing at the temperature of 70°C for 10 minutes.
  - 9) The comparison of the average angles of tilted head before and after dabbing at the temperature of 70°C for 15 minutes.
  - 10) The comparison of the average changing angles of tilted head with the change of the temperature at 50, 60, and 70°C for 5 minutes.
  - 11) The comparison of the average changing angles of tilted head with the change of the temperature at 50, 60, and 70°C for 10 minutes.
  - 12) The comparison of the average changing angles of tilted head with the change of the temperature at 50, 60, and 70°C for 15 minutes.
  - 13) The comparison of the average changing angles of tilted head with the change of the duration at 5, 10 and 15 minutes at the temperature of 50°C.
  - 14) The comparison of the average changing angles of tilted head with the change of the duration at 5, 10 and 15 minutes at the temperature of 60°C.
  - 15) The comparison of the average changing angles of tilted head with the change of the duration at 5, 10 and 15 minutes at the temperature of 70°C.
  - 16) Interview the volunteers for their perceptions on the relaxation feeling at various temperatures and various durations.

#### IV. DATA ANALYSIS

The data could be divided into 2 parts. The 1<sup>st</sup> part was analyzed by measuring the tilted head angles which were calculated by SPSS in the following comparison.

- 1) The comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 5 minutes. Find t value (t-test)
- 2) The comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 10 minutes. Find t value (t-test)
- 3) The comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 15 minutes. Find t value (t-test)

- 4) The comparison of the average angles of tilted head before and after dabbing at the temperature of 60°C for 5 minutes. Find t value (t-test)
- 5) The comparison of the average angles of tilted head before and after dabbing at the temperature of 60°C for 10 minutes. Find t value (t-test)
- 6) The comparison of the average angles of tilted head before and after dabbing at the temperature of 60°C for 15 minutes. Find t value (t-test)
- 7) The comparison of the average angles of tilted head before and after dabbing at the temperature of 70°C for 5 minutes. Find t value (t-test)
- 8) The comparison of the average angles of tilted head before and after dabbing at the temperature of 70 °C for 10 minutes. Find t value (t-test)
- 9) The comparison of the average angles of tilted head before and after dabbing at the temperature of 70°C for 15 minutes. Find t value (t-test)
- 10) The comparison of the average changing angles of tilted head with the change of the temperature at 50, 60, and 70°C for 5 minutes. Find F value (F-test)
- 11) The comparison of the average changing angles of tilted head with the change of the temperature at 50, 60, and 70°C for 10 minutes. Find F value (F-test)
- 12) The comparison of the average changing angles of tilted head with the change of the temperature at 50, 60, and 70°C for 15 minutes. Find F value (F-test)
- 13) The comparison of the average changing angles of tilted head with the change of the duration at 5, 10 and 15 minutes at the temperature of 50°C. Find F value (F-test)
- 14) The comparison of the average changing angles of tilted head with the change of the duration at 5, 10 and 15 minutes at the temperature of 60°C. Find F value (F-test)
- 15) The comparison of the average changing angles of tilted head with the change of the duration at 5, 10 and 15 minutes at the temperature of 70°C. Find F value (F-test)
- 16) In the part of interview, the data were analyzed by content analysis.

#### V. RESULTS OF THE STUDY

The analyzed data can be presented in the table below.

TABLE I  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 50°C FOR 5 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbing	13	32.0769	7.0292	6.364	.000
The angle after dabbing	13	39.1538	9.7026		

Alpha = 0.05

Table I presents the comparison of the average angles of tilted head before and after dabbing at the temperature of 50°C for 5 minutes with t value (t-test) that sig value = 0.00 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbing at the temperature of 50°C for 5 minutes showed the significant difference at 0.05.

TABLE II  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 50°C FOR 10 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	13	36.2308	8.5553	4.472	0.001
The angle after dabbling	13	41.7692	6.8939		

Alpha = 0.05

Table II presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 50°C for 10 minutes with t value (t-test) that sig value = 0.001 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 50°C for 10 minutes showed the significant difference at 0.05.

TABLE III  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 50°C FOR 15 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	13	38.5385	9.4394	3.249	.007
The angle after dabbling	13	43.6154	6.2388		

Alpha = 0.05

Table III presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 50°C for 15 minutes with t value (t-test) that sig value = 0.007 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 50°C for 15 minutes showed the significant difference at 0.05.

TABLE IV  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 60°C FOR 5 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	21	29.2857	8.9841	7.043	.000
The angle after dabbling	21	35.9048	8.4197		

Alpha = 0.05

Table IV presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 60°C for 5 minutes with t value (t-test) that sig value = 0.000 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 60°C for 5 minutes showed the significant difference at 0.05.

TABLE V  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 60°C FOR 10 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	21	32.5238	9.8773	7.047	.000
The angle after dabbling	21	40.1429	7.4181		

Alpha = 0.05

Table V presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 60°C

for 10 minutes with t value (t-test) that sig value = 0.000 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 60°C for 10 minutes showed the significant difference at 0.05.

TABLE VI  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 60°C FOR 15 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	21	35.6190	10.7447	5.897	.000
The angle after dabbling	21	43.8571	7.5649		

Alpha = 0.05

Table VI presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 60°C for 15 minutes with t value (t-test) that sig value = 0.000 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 60°C for 15 minutes showed the significant difference at 0.05.

TABLE VII  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 70°C FOR 5 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	18	31.0556	10.3040	5.190	.000
The angle after dabbling	18	38.4444	12.1472		

Alpha = 0.05

Table VII presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 70°C for 5 minutes with t value (t-test) that sig value = 0.000 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 70°C for 5 minutes showed the significant difference at 0.05.

TABLE VIII  
THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 70°C FOR 10 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig
The angle before dabbling	18	32.7778	9.3780	6.031	.000
The angle after dabbling	18	41.6111	10.4608		

Alpha = 0.05

Table VIII presents the comparison of the average angles of tilted head before and after dabbling at the temperature of 70°C for 10 minutes with t value (t-test) that sig value = 0.000 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbling at the temperature of 70°C for 10 minutes showed the significant difference at 0.05.

TABLE IX

THE COMPARISON OF THE AVERAGE ANGLES OF TILTED HEAD BEFORE AND AFTER DABBING AT THE TEMPERATURE OF 70°C FOR 15 MINUTES WITH T VALUE (T-TEST)

Group	N	$\bar{x}$	S.D.	t	sig.
The angle before dabbing	18	34.6111	9.1210	4.061	.001
The angle after dabbing	18	44.4444	10.5954		

Alpha = 0.05

Table IX presents the comparison of the average angles of tilted head before and after dabbing at the temperature of 70°C for 15 minutes with t value (t-test) that sig value = 0.001 which was less than alpha value = 0.05. This means that the average angles of tilted head before and after dabbing at the temperature of 70°C for 15 minutes showed the significant difference at 0.05.

TABLE X

THE COMPARISON OF THE AVERAGE CHANGING ANGLES OF TILTED HEAD WITH THE CHANGE OF THE TEMPERATURE AT 50, 60, AND 70°C FOR 5 MINUTES WITH F VALUE (F-TEST)

Average angles changing with various temp.	Variable sources	SS	df	MS	F-ratio	sig.
	Between groups	.893	2	.447	2.238	.117
	Within the group	9.780	49	.200		
	Total	10.673	51			

Table X presents the comparison of the average changing angles of tilted heads with the change of the temperature at 50, 60, and 70°C for 5 minutes by the analysis of One-way analysis of variance and One-way ANOVA. It was found that the sig. value was 0.117 which was higher than alpha at 0.05 meaning that the average changing angles of tilted heads with the change of the temperature at 50, 60, and 70°C for 5 minutes was not statistically significant difference at 0.05.

TABLE XI

THE COMPARISON OF THE AVERAGE CHANGING ANGLES OF TILTED HEAD WITH THE CHANGE OF THE TEMPERATURE AT 50, 60, AND 70°C FOR 10 MINUTES WITH F VALUE (F-TEST)

Average angles changing with various temp.	Variable sources	SS	df	MS	F-ratio	sig.
	Between groups	.541	2	.271	1.183	.315
	Within the group	11.209	49	.229		
	Total	11.750	51			

Table XI presents the comparison of the average changing angles of tilted heads with the change of the temperature at 50, 60, and 70°C for 10 minutes by the analysis of One-way analysis of variance and One-way ANOVA. It was found that the sig. value was 0.315 which was higher than alpha at 0.05 meaning that the average changing angles of tilted heads with the change of the temperature at 50, 60, and 70°C for 10 minutes was not statistically significant difference at 0.05.

TABLE XII

THE COMPARISON OF THE AVERAGE CHANGING ANGLES OF TILTED HEAD WITH THE CHANGE OF THE TEMPERATURE AT 50, 60, AND 70°C FOR 15 MINUTES WITH F VALUE (F-TEST)

Average angles changing with various temp.	Variable sources	SS	df	MS	F-ratio	sig.
	Between groups	1.597	2	.798	1.570	.218
	Within the group	24.922	49	.509		
	Total	26.519	51			

Table XII presents the comparison of the average changing angles of tilted heads with the change of the temperature at 50, 60, and 70°C for 15 minutes by the analysis of One-way analysis of variance and One-way ANOVA. It was found that the sig. value was 0.218 which was higher than alpha at 0.05 meaning that the average changing angles of tilted heads with the change of the temperature at 50, 60, and 70°C for 15 minutes was not statistically significant difference at 0.05.

TABLE XIII

THE COMPARISON OF THE AVERAGE CHANGING ANGLES OF TILTED HEADS WITH THE CHANGE OF THE DURATION AT 5, 10 AND 15 MINUTES AT THE TEMPERATURE OF 50°C WITH F VALUE (F-TEST)

Average angles changing with various temp.	Variable sources	SS	df	MS	F-ratio	sig.
	Between groups	.051	2	.026	.214	.808
	Within the group	4.308	36	.120		
	Total	4.359	38			

Table XII presents the comparison of the average changing angles of tilted heads at the change of time at 5, 10, and 15 minutes at the temperature of the massage compressed pack at 50°C by the analysis of One-way analysis of variance and One-way ANOVA. It was found that the sig. value was 0.808 which was higher than alpha at 0.05 meaning that the change of time at 5, 10, and 15 minutes at the temperature of the massage compressed packs at 50°C was not statistically significant difference at 0.05 based on the volunteers' perceptions.

TABLE XIV

THE COMPARISON OF THE AVERAGE CHANGING ANGLES OF TILTED HEAD WITH THE CHANGE OF THE DURATION AT 5, 10 AND 15 MINUTES AT THE TEMPERATURE OF 60°C WITH F VALUE (F-TEST)

Average angles changing with various temp.	Variable sources	SS	df	MS	F-ratio	sig.
	Between groups	.889	2	.444	2.414	.098
	Within the group	11.048	60	.184		
	Total	11.937	62			

Table XIV presents the comparison of the average changing angles of tilted heads at the change of time at 5, 10, and 15 minutes at the temperature of the massage compressed pack at 60°C by the analysis of One-way analysis of variance and One-way ANOVA. It was found that the sig. value was 0.098 which was higher than alpha at 0.05 meaning that the change of time at 5, 10, and 15 minutes at the temperature of the massage compressed packs at 60°C was not statistically significant difference at 0.05 based on the volunteers' perceptions.

TABLE XV

THE COMPARISON OF THE AVERAGE CHANGING ANGLES OF TILTED HEAD WITH THE CHANGE OF THE DURATION AT 5, 10 AND 15 MINUTES AT THE TEMPERATURE OF 70°C WITH F VALUE (F-TEST)

Average angles changing with various temp.	Variable sources	SS	df	MS	F-ratio	sig.
	Between groups	778	2	.389	.649	.527
	Within the group	30.556	51	.599		
	Total	31.333	53			

Table XV presents the comparison of the average changing angles of tilted heads at the change of time at 5, 10, and 15 minutes at the temperature of the massage compressed pack at 70°C by the analysis of One-way analysis of variance and One-way ANOVA. It was found that the sig. value was 0.527 which was higher than alpha at 0.05 meaning that the change of time at 5, 10, and 15 minutes at the temperature of the massage compressed packs at 70°C was not statistically significant difference at 0.05 based on the volunteers' perceptions.

TABLE XVI

THE VOLUNTEERS' PERCEPTIONS ON THE RELAXATION FEELING AT 50 OC AND AT VARIOUS DURATIONS (5, 10 AND 15 MINUTES)

5 min.	10 min.	15 min.
The massage compressed pack was hot at the right temperature giving the relaxation	The massage compressed pack was warm giving the relaxation	The massage compressed pack started cooling down but still rest and relaxation. The temp. should have been higher.

Table XVI showed the volunteers' perceptions on the dabbling of 50°C massage compressed pack at different durations. At the first 5 and 10min, the temperature was at the right level making them relax.

TABLE XVII

THE VOLUNTEERS' PERCEPTIONS ON THE RELAXATION FEELING AT 60 OC AND AT VARIOUS DURATIONS (5, 10 AND 15 MINUTES)

5 min.	10 min.	15 min.
Very hot, feel relaxation	Warm, relax muscles	Start cooling down but still rest and relaxation.

Table XVII showed the volunteers' perceptions on the dabbling of 60°C massage compressed pack at different durations. Most of the volunteers said that the packs were rather hot but made them relax.

TABLE XVIII

THE VOLUNTEERS' PERCEPTIONS ON THE RELAXATION FEELING AT 70 OC AND AT VARIOUS DURATIONS

5 min.	10 min.	15 min.
Muscles relax more, hot when being dabbed, more relax with wider angles of tilted head	Muscles relax more, the temperature was just right, comfortable	Muscles relax more, very comfortable, not enough hot, less strain on the shoulders, better movement, clear head, feel much better than at 10 min.

Table XVIII from the above table, it can be seen that most volunteers reported very hot at the beginning but it made them feel relax and comfortable.

## VI. CONCLUSION

The results showed that:

- 1) There was a difference of the average angles of tilted heads before and after the dabbling.
- 2) There was no difference of the average angles at different temperatures but constant duration.
- 3) There was no difference of the average angles at different durations.
- 4) The customers reported relaxation no matter what the various temperatures and various dabbling durations were. However, they reported too hot at the temperature 70°C and over.

## VII. DISCUSSION

The volunteers could tilt their heads at different angles when comparing between before and after dabbling. This showed that human muscles responded with the heat in relaxation way no matter what the various temperatures and various dabbling durations were. Thermal therapy treatment can cause muscles and blood vessels expand making better blood circulation and relaxation. Moreover, it helps with the muscle flexibility and reduction of blood viscosity. However, there was no significant difference at various temperatures. It might be due to the too small difference of the temperatures that could not make the difference on the muscles' expansion.

There was no statistical difference of the volunteers' perceptions on the difference of dabbling durations because the temperature was lower as the time passed. This had no effect on the muscle flexibility. To see the difference in muscle flexibility, the temperature of the massage compressed pack should have been at the constant point.

Most volunteers reported relaxation when being dabbed no matter at what temperatures. This supported the idea that thermal therapy treatment can cause muscles and blood vessels expand making better blood circulation and relaxation. However, some volunteers said that the temperature was too high while some said it was comfortable. As a result we cannot define the optimal temperature of the massage compressed pack.

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