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The Relationships Between Stress Reduction Induced by Bedside Mindfulness Program and Mental Health Status

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1. Introduction

Patients receiving anti-cancer treatment experience physical problems such as pain, fatigue and nausea, and psychological problems such as anxiety, depression, distress (Specia, et al., 2006) and spiritual pain. A mindfulness approach is one of the most effective interventions to alleviate these problems. The Mindfulness-Based Stress Reduction (MBSR) program was modeled on the work of Kabat-Zinn (Kabat-Zinn, 1990; Kabat-Zinn, et al., 1998) and colleagues at the Center for Mindfulness-Massachusetts Medical Center. The program is based on the principle of mindfulness, defined as moment-to-moment, present-centered, purposive non-judgmental awareness. The goal of the MBSR program is to guide participants to achieve greater awareness of themselves, their thoughts, and their bodies through class discussion, meditation, and yoga exercises (Garland, et al., 2007).

For cancer patients, the MBSR has effects on mood disturbance stress symptoms (Specia, et al., 2000), or on QOL and the immune profile (Carlson, et al., 2004). The Mindfulness-Based Art-Therapy (MBAT), which includes mindfulness and art therapy, also produces a significant decrease in symptoms of distress and improvements in key aspects of health-related QOL (Monti, et al., 2006). Moreover, the MBSR affects stress symptoms, mood, post-trauma growth, and spirituality (Garland, et al., 2007; Matchim, et al., 2011).

However, since the duration of the program in these studies are from at least 4 weeks to 8 weeks, patients were sometimes hard to continue to participate. And they were easily to be tired because of chemotherapy or radiation therapy. Then we developed a mindfulness cyclic meditation program, in which participants could participate in the program even sitting on chair. After this program, anxiety and depression improved (Ando, et al., 2009).

However, some of patients with advanced cancer stage were hard to participate, because their physical strength was very low and they could not sit or walk. Thus we needed to develop a new program for cancer patient with advanced cancer stage, and we developed a novel mindfulness program, a Bedside Mindfulness program (Figure 1). A yoga instructor and a clinical psychologist discussed about program, and made the leaflet with drawing by an illustrator.

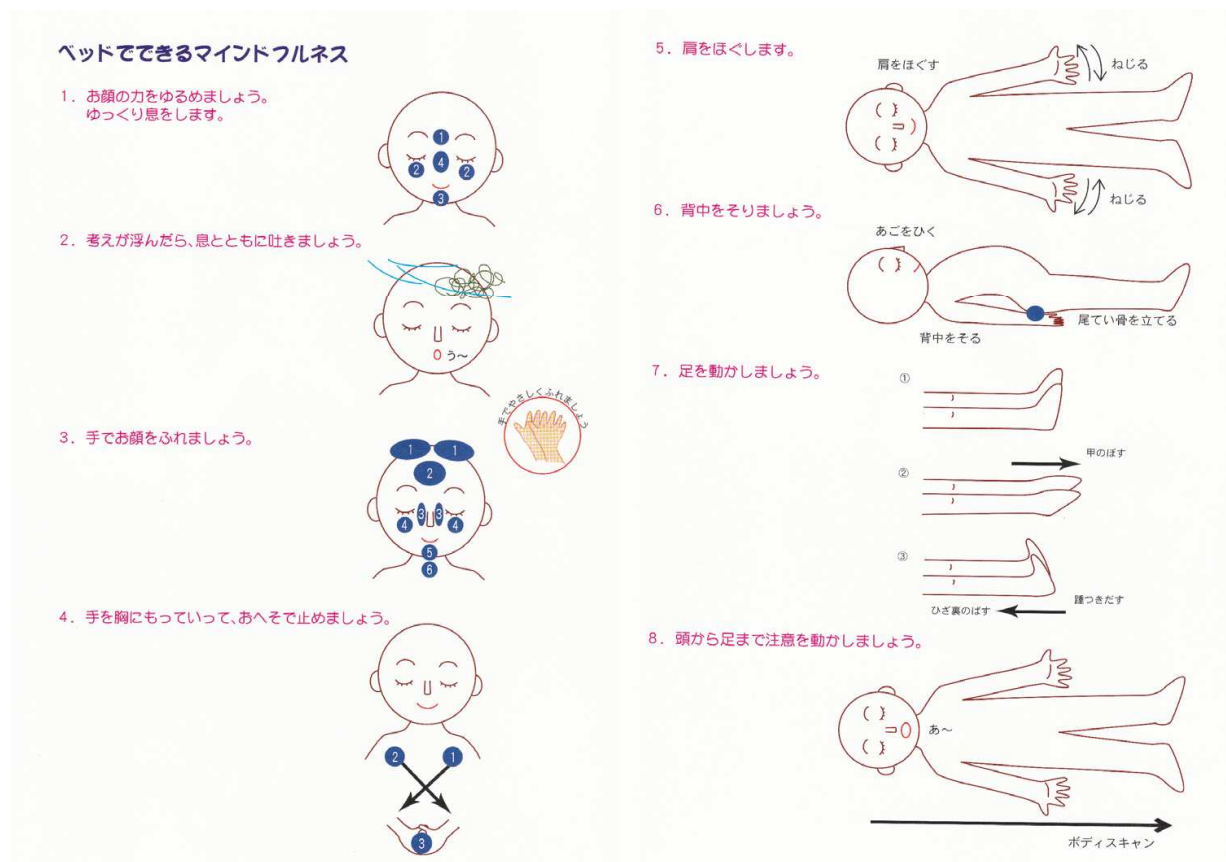


Fig. 1. The Bed-side Mindfulness Program

2. Study 1 – Efficacy of Bedside Mindfulness Program on mood related with mental health status

Firstly, we examined the efficacy of this program for college students, because we could obtain both subjective and objective data. Some previous studies examined efficacy of mindfulness including objective data.

Participants with alcohol use disorders received mindfulness program or cognitive behavior therapy. Psychological and physiological indices like **Galvanic Skin Response** of stress reduced in mindfulness program much more than cognitive behavior therapy (Brewer, et al., 2009). Or through mindfulness program, psychological distress like anxiety or depression reduced and also skin conductance level of women with chronic pain of fibromyalgia reduced (Lush, et al., 2009). These studies show that mindfulness reduced the skin conductance level which shows the stress level. Oppositely, healthy adults assigned a mindfulness group or a no mindfulness group. All participants viewed positive or negative films. Participants in the mindfulness group reported significantly greater positive affect in response to the positive film than those in the no mindfulness group. However, there was no significance between conditions on Galvanic Skin Response (GSR) or heart rate (Erisman & Roemer, 2010). That is, results of efficacy of mindfulness on skin conductance level are inconsistent.

About salivary cortisol as an indicator, for breast cancer outpatients MBSR program participants was associated with enhanced quality of life and decreased stress symptoms (Matchimy, et al., 2011), altered cortisol and immune patterns consisted with less stress

and mood disturbance (Carlson, et al., 2007). In the above studies, skin conductance or salivary level was used as indicators. Moreover, we thought that effects of a mindfulness program might be different by a level of mental health states, and we predicted that the Bedside Mindfulness Program might be more effective for people or patients with mental problems.

Thus, in this study, we examined mental health and mood as psychological indicator. Mood consists of the tense arousal and the energetic arousal (Matthews, et al., 1990). Tense arousals show a level of tension and it is uncomfortable. Energetic arousal shows a level of activity. As physiological indicator, we used Galvanic Skin Response and the salivary level of amylase which measure level of stress.

Participants and methods

The participants were Japanese college students in Western Japan consist of 4 males and 16 females; mean age 22.7 ± 4.8 . As questionnaires, we used the Japanese UWIST Mood Adjective Check List : JUMACLE (Shirasawa, et al. 1999). There are 20 items (10 each for Tense Arousal and Energetic Arousal). Items for Tense Arousal were [I am] "tense," "jittery," "nervous," and so on. Items about Energetic Arousal were [I am] "active," "vigorous," "energetic," and so on. Participants answered on a 4-point Likert scale ranging from 1= not at all to 4=exactly so. The range of scores for Tense Arousal and Energetic Arousal was from 10 to 40. To measure mental state, we used the Japanese version of the General Health Questionnaire-30 (Goldberg & Hillier, 1979) which was developed from the original one by Nakagawa and Daibo (1985). We separated participants into a non-risk group and a high-risk group by the cut-off point. The Bedside Mindful Program BMP included meditation, moving their hands or legs to focus their attention on bed (Figure 1). The BMP takes about 30 to 60 minutes per session and was conducted by nurses or a clinical psychologist who received training for at least 3 hours. The training included basic communication skills and Yoga skills learned directly from a Yoga specialist or using a CD. In the class, students received this program and complete questionnaires pre- and post-intervention. The study was approved by the appropriate institutional ethics committees and was performed in accordance with the ethical standards laid down in the Declaration of Helsinki. Statistical analysis, we separated participants into two groups, high risk group and non-risk group by cut off points of General Health Questionnaire. The t-test and the effects size test were performed on the scores of JUMACL, GSR, and salivary level of amylase.

Results

The Tense Arousal of the non-risk group significantly decreased from 18.4 ± 21.6 to 14.5 ± 22.3 ($t=3.1$, $p<0.01$) (Figure 2) . The effect size was large (Table 1). The Tense Arousal of the high risk group also significantly decreased from 20.0 ± 29.1 to 14 ± 26 ($t=4.68$, $p<0.001$)(Figure 3) and the effect size was large. The Energetic Arousal of the non-risk group significantly decreased from 29.7 ± 39.1 to 26.6 ± 43.6 ($t=3.31$, $p<0.01$) (Figure 4) and the effect size was large. However, that of the high risk group increased from 27.9 ± 37.4 to 28.5 ± 52.7 ($t=-0.27$, $p=0.79$) (Figure 5), though it was not significant and there was no effect. The salivary level of amylase of the non-risk group decreased from 99.8 to 73.9 ($t=1.01$, $p=0.34$) and the effects size was medium (Table 2). The salivary level of amylase of the high risk group significantly decreased from 71.7 to 45.2 ($t=2.27$, $p=0.05$) and the effect size was large.

	TA		EA	
	Effect size r	Level	Effect size r	Level
Non-risk group	0.72	Large	0.74	Large
High-risk group	0.84	Large	0.09	None

Table 1. Effect Sizes in Tense Arousal (TA) and Energetic Arousal (EA) after the Bedside Mindfulness Program

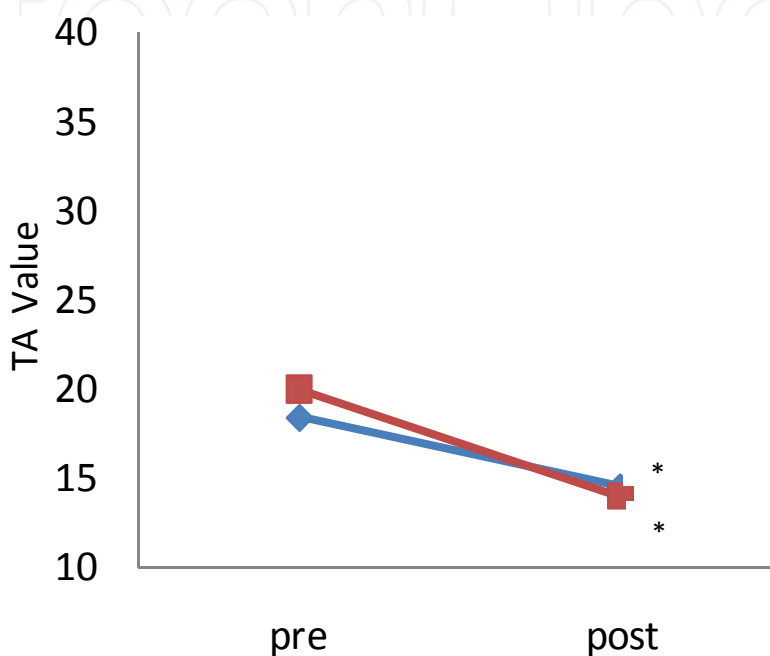


Fig. 2. Changes of Tense Arousal scores

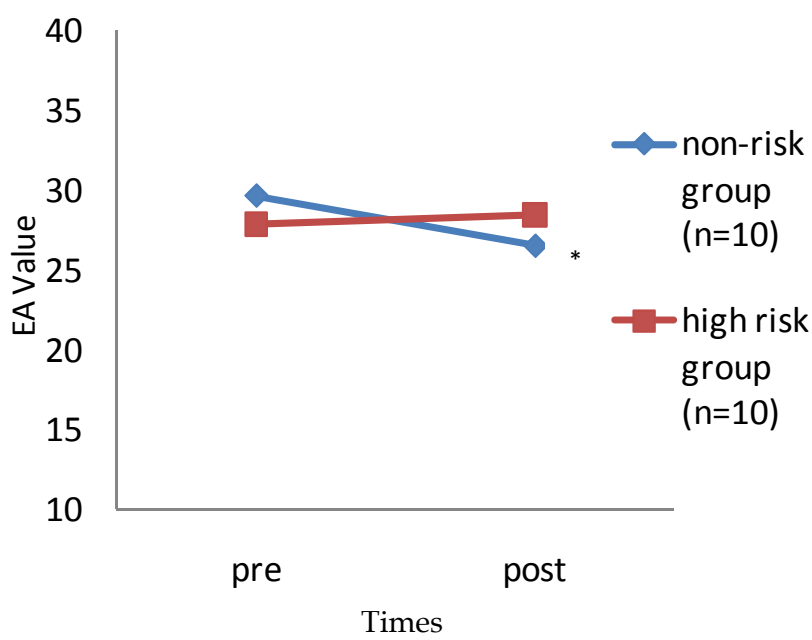


Fig. 3. Changes of Energetic Arousal scores

The GSR of the non risk group decreased a very little from 241.9 to 240 and there was no effect. Oppositely the GSR of the risk group increased from 301 to 386.2 ($t=-1.21, p=0.26$) and the effect size was medium.

	GSR		Amylase	
	Effect size r	Level	Effect size r	Level
Non-risk group	0.02	None	0.32	Medium
High-risk group	0.38	Medium	0.60	Large

Table 2. Effect Sizes in GSR and Amylase changes after the Bedside Mindfulness Program

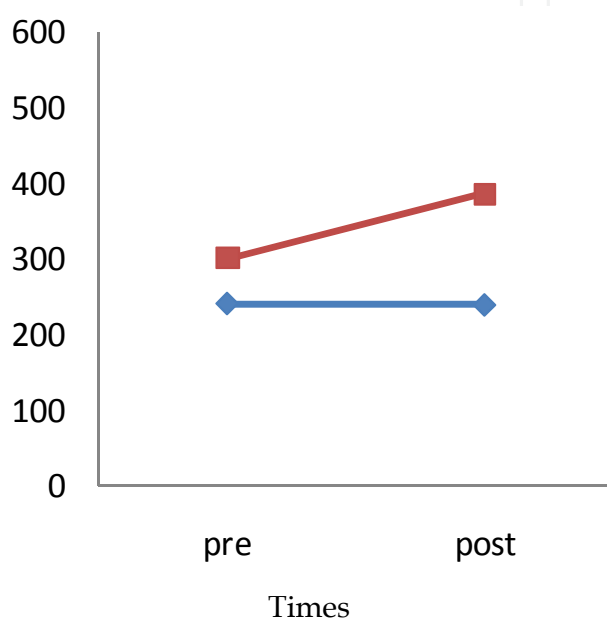


Fig. 4. Changes of GSR scores

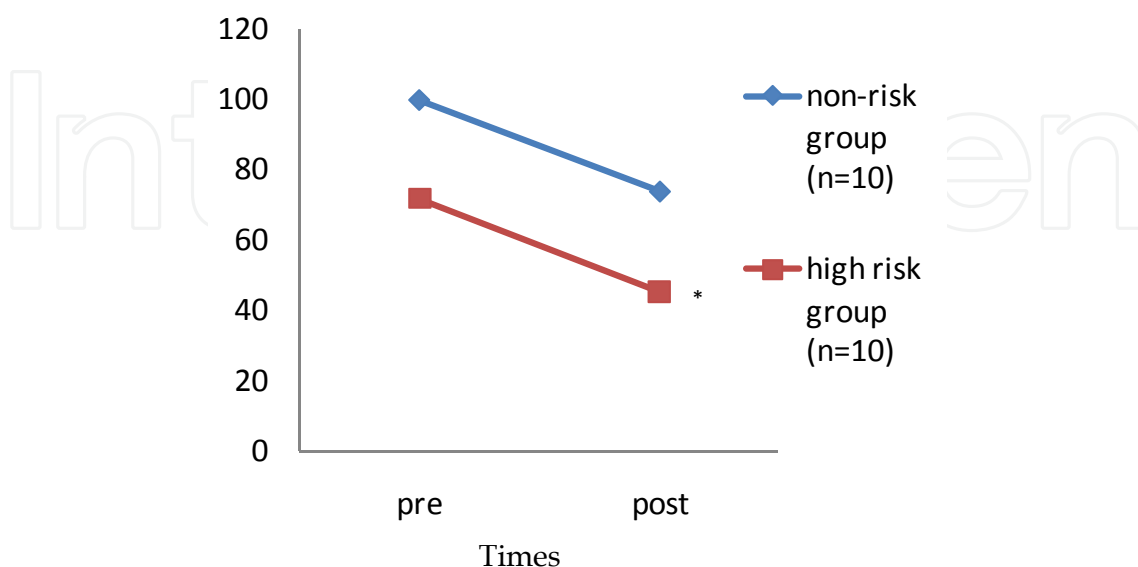


Fig. 5. Changes of Salivary level of Amylase

Discussion

The Tense Arousal significantly decreased both in the non-risk group and the high-risk group. The effects size was large in both groups. These results show that the BMP decrease tension or anxiety, regardless the mental health status. It is because that breathing and meditation leads people to focus attention on themselves, and attention moves from things with tension or anxiety to themselves. The effects of decrease of tension by mindfulness agree with the previous studies (Garland, et al., 2007; Matchim & Armer, 2007).

The Energetic Arousal of the non-risk group significantly decreased after the therapy and showed middle effect size. It shows that BMP decrease of activity and sedate their feelings for good mental health. This result is different from Ogasawara, et al. (2006) in which the Energetic Arousal of college healthy students did not significantly change by relaxation of aroma hand massage. Ditto, et al. (2006) shows that mindfulness meditation produced different cardiovascular and autonomic effects that relaxation, giving weight to the criticism against the conceptualization of mindfulness practice as a mere relaxation technique (Bishop, 2002).

In the high-risk group, the score did not change, showing no effect size. This result suggests that the BMP did not decrease activities for non-risk persons. The reasons of this phenomenon were that this therapy is useful to maintain energy for high-risk persons.

As for the salivary level of amylase, the high score demonstrates high level of negative stress. The scores of amylase significantly decreased in the high-risk group, but it did not change in non-risk group. It means that the BMP is more effective to reduce stress for high risk persons than non risk persons to reduce negative stress. In the previous study, the efficacy of mindfulness like decrease cortisol level which shows stress level as the physiological indicator (Carlson, et al., 2007) agreed with the present study for high risk persons. Carlson et al. (2007) demonstrated that breast cancer patients felt much psychological stress than healthy women, but the level of the salivary cortisol as the physiological indicator did not differ between patients and healthy women. Their studies suggest that physiological level was the same between patients and healthy women. However, from the present study, the effects of mindfulness program may be different by mental health level.

About GSR scores, a low score means high tension or stress. The GSR scores did not change in no-risk group, however, those of the high-risk group increased with middle effects size. It shows that the BMP has much more effects to reduce tension or stress for high risk persons than non-risk persons. Erisman & Roemer (2010) showed that the level of skin conductance was not differ between the mindfulness group and the non-mindfulness group. Though the present study design is different from Erisman & Roemer, contents of program or health level might affect people differently. The effects of mindfulness to physiological aspect will be needed to examine further more.

2.1 The efficacy of the Bedside Mindfulness Program on mood of cancer patients

We investigated the effects of the Bedside Mindfulness Program on mood by a level of mental status of cancer patients. We hypothesized that effects of the program on tension arousal may be the same regardless of mental status, however, effects of the program on energetic arousal may be differently.

Participants and methods

Four cancer patients participated in the study. Table 3 shows patients’ back ground. We used the same questionnaire to patients as college students. The primary physician selected participants. A pastoral care worker conducted the BMP, in which she conducted the program about from 30 to 60 minutes. Before the program, patients completed the General Health Questionnaire-30 and the Japanese UWIST Mood Adjective Check List (JUMACL), and after the program, they completed the JUMACL.

	Age	Gender	Disease	Stage
Patient A	64	Female	Breast	IV
Patient B	45	Female	Lung	IV
Patient C	50	Female	Breast	IV
Patient D	34	Female	Breast	IV

Table 3. Back ground of cancer patients.

Results

Table 4 shows the results. We reviewed each patient, patient A, Patient B, Patient C, and patient D. The score of GHQ was low and under the cut-off point. The scores of Patient A and Patient D was 1 and they had no mental problems. The scores of Patient B and Patient C show a little mental problem. The score 10 of TA was the lowest in the JUMACL, thus, patients had originally low tense arousal except patient C. As for EA, the score of Patient A and patient D who had no mental problems decreased (from 39 to 36, from 39 to 31), however, those of patient B and Patient C who had a little mental problem increased (from 30 to 40, from 34 to 39).

	GHQ	TA range (10-40)			EA range (10-40)		
		Pre	post	change	Pre	post	changes
Patient A	1	10	10	⇒	39	36	⇩
Patient B	3	10	10	⇒	37	40	⇩
Patient C	6	14	10	⇩	34	39	⇩
Patient D	1	10	10	⇒	39	31	⇩

Table 4. Score of GHQ (pre), Tense Arousal (TA) and Energetic Arousal (EA)

Discussion

Although patients in this study felt no mental problems originally, the decrease of TA of patient C suggests that BMP affects to decrease tense arousal. This facts support the results of college students. As for EA, the scores of Patient B and Patient C with a little mental problems increased, oppositely patient A and Patient C with no mental problem decreased. This facts also are the same of those of college students who received the same program, such that the EA score of the high-risk group increased, but that of the non-risk group decreased. Patients reflected the process of the program.

There were 2 patters. Some patients reflected that they were very calm before the program and they felt much more calm after the program. Other patients reflected that they had some problems before the program and they felt some energy to active something after the program. That is, this program affects on energy to elevate, particular for persons with some mental problems. In near future, we need to investigate further more.

2.2 The efficacy of the Bedside Mindfulness Program on anxiety or depression

We assess the efficacy of the Bedside Mindfulness Program (BMP) on anxiety or depression of cancer patients, because most of cancer patients feel anxiety or depression about treatments, future, works, economy, or recurrence. It seemed to be important for us to examine the efficacy of the Bedside Mindfulness Program on anxiety or depression.

Purpose

The aim of this study was to examine the efficacy of the BMP on anxiety of depression of cancer patients.

Participants and methods

Participants were cancer patients who received treatments like chemotherapy or radiation. The primary physicians selected patients. Table 5 shows the background of patients. The interviewer was a pastoral care worker. There were two sessions. In the first session, a patient received the BMP. The duration was about 60 minutes. Patients completed the questionnaires pre and post the intervention. Participants completed the Hospital Anxiety and Depression Scale.

	Basic Data
Mean age	56
Gender	Male:1 Female:13
Stage	II : 2 III : 1 IV: 12
Performance stage	0:7 1:3 2:1 3:1 4:1
Metastasis	Yes:10 No:1 Unclear:3

Table 5. Basic data of participants.

Results

The scores of HADS decreased from 9.57 ± 7.1 to 6.86 ± 6.9 after the program ($t=1.49$, $p=0.161$). The score of Anderson symptoms increased from 18.4 ± 18.3 to 21.3 ± 26.4 ($t=-0.43$, $p=0.67$). The Pearson's correlation coefficient was 0.84 ($p=0.00$).

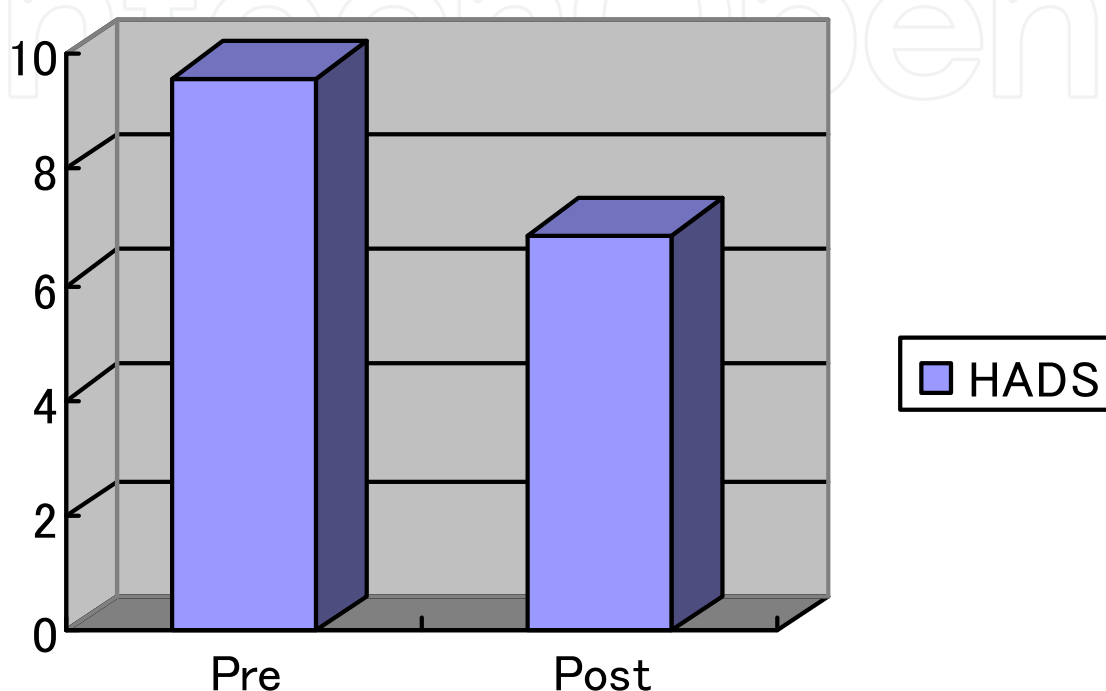


Fig. 6. Changes of HADS score

Discussion

The HADS score decreased in 10 % significance. It suggests that the BMP affects to decrease patients' anxiety or depression. Like the cyclic meditation therapy which alleviated patients' anxiety or depression (Ando, Morita, Akechi, et al., 2009), our mindfulness program for cancer patient affects on anxiety or depression. Since the cut-off points of the HADS score was 19/20, the patients in the present study did not have serious problems. It might be because the primary physician in the present study supported patients' mental aspect.

The Anderson symptom score increased a little, though it was not significant. It might be because patients under treatments were easily affected by the treatment process and the physical states were changeable. Since anxiety or depression of patients decreased regardless of the increase of symptom, this program may be useful to alleviate anxiety or depression, even though patients have symptoms.

As the co-relation coefficient between HADS score and Anderson scores was significantly high ($r=0.84$), patients who had much physical symptoms feel much more anxiety or depression. In the present study, since the duration was only one week, and session times

were only two times, we could not assess the efficacy of this program in details. In future, we need to investigate much more.

3. Conclusion

The Bedside Mindfulness Program decreases tension and maintains energy of mood, and it is supported by the results of Galvanic Skin Response level and amylase. For cancer patients, this program may be useful to reduce anxiety and depression. Since anxiety and depression related with physical symptoms, we assess the efficacy of this program from long term perspective.

4. Acknowledgments

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Topics in Cancer Survivorship

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Cancer is now the leading cause of death in the world. In the U.S., one in two men and one in three women will be diagnosed with a non-skin cancer in their lifetime. Cancer patients are living longer than ever before. For instance, when detected early, the five-year survival for breast cancer is 98%, and it is about 84% in patients with regional disease. However, the diagnosis and treatment of cancer is very distressing. Cancer patients frequently suffer from pain, disfigurement, depression, fatigue, physical dysfunctions, frequent visits to doctors and hospitals, multiple tests and procedures with the possibility of treatment complications, and the financial impact of the diagnosis on their life. This book presents a number of ways that can help cancer patients to look, feel and become healthier, take care of specific symptoms such as hair loss, arm swelling, and shortness of breath, and improve their intimacy, sexuality, and fertility.

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