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**Measuring the effects of Zen training on quality of life and mental health among
Japanese monk trainees: a cross-sectional study**

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Running title: Effects of Zen on QOL and mental health

Abstract

Objective: Previous studies have reported that the practice of meditation can have beneficial physiological and mental effects. Therefore, Zen trainees who regularly practice meditation might have high quality of life scores and high levels of general mental health; however, no previous study has tested these relationships. This article reports on a study that examined how rigorous professional training affected the International Quality of Life (QOL) Assessment Short Form-36 (SF-36) and General Health Questionnaire-28 (GHQ-28) scores of Zen trainees in Japanese monasteries.

Design: Single center questionnaire based study.

Settings/Location: Rinzai Zen monasteries.

Subject Interventions: Anonymous and confidential survey containing the SF-36 and GHQ-28 were distributed by mail, and 256 questionnaires were collected from Rinzai Zen monasteries.

Outcome measures: 198 complete questionnaires were collected and the participants were divided according to their training length: group I (<1 year), group II (1-3 years), and group III (≥ 3 years). One-way ANOVA and Tukey test for multiple comparison was conducted on normally distributed data and Kruskal Wallis test was performed on non-normally distributed data.

Results: The SF-36 seven subscale scores (physical functioning, role-physical, body pain, general health, vitality, role-emotional and mental health) of longer length training group were significantly higher compared to other groups. The SF-36 MCS (mental component summary) score among the groups were significantly different and the scores of group III were significantly higher compared to the scores of group I. Further, the GHQ-28 total and subscales (somatization, anxiety, social dysfunction, and depression) scores of longer length training were significantly lower (better).

Conclusions: These findings suggest that Zen professional training, including inward attention practices, improves the QOL and general mental health of trainees, even in a tough and distressing environment. However, detailed qualitative and longitudinal studies are required to fully assess these effects.

Keywords

Quality of Life; General Mental Health; SF-36; GHQ; Zen; Meditation

Introduction

Mindfulness is widely known and used to improve psychological condition. Mindfulness-based stress reduction (MBSR) was founded in 1979 by Dr. Jon Kabat-Zinn (Kabat-Zinn, Lipworth et al. 1985) as a way to enhance a patient's functional abilities and improve overall well-being by reducing painful physical symptoms and psychological distress (Reibel, Greeson et al. 2001). This practice was designed to teach patients with chronic medical conditions how to live fuller and healthier lives (Kabat-Zinn, Lipworth et al. 1985). Numerous studies have shown that meditation affects certain physiological and mental functions (Kabat-Zinn, Lipworth et al. 1985, Sudsuang, Chentanez et al. 1991, Wenneberg, Schneider et al. 1997, Shapiro, Schwartz et al. 1998, Davidson, Kabat-Zinn et al. 2003, Lazar, Kerr et al. 2005, Tang, Ma et al. 2007, Liu, Wei et al. 2009). For example, stress reduction programs that employ mindfulness meditation training can reduce psychological symptomatology, increase patients' ability to exert control over specific domains of their lives, and, consequently, lead to higher scores on measures of patients' spiritual experiences (Astin 1997).

Scientific and scholarly interest in MBSR has grown over the last two decades. Studies have examined the effectiveness of MBSR in diverse populations, including health care providers and individuals diagnosed with cancer, depression, and heart disease. For example, researchers found significant reductions in depression and anxiety scores (as measured by the Beck Depression Inventory, Spielberger State-Trait Anxiety Inventory, and Dysfunctional Attitude Scale) among members of an intervention group like chronically ill members of an intervention group and their healthcare providers, whose interactions with the patients were enhanced, after completing an MBSR program (Praisman 2008).

The history of MBSR begins with the traditional mindfulness meditation techniques practiced in Indian Theravada and Mahayana Buddhism approximately 2,500 years ago. Zen

meditation is one of the core practices in Buddhism. This Buddhist meditative exercise has its roots in the metaphysical tenet of “emptiness,” which stems from the writings and beliefs of the Japanese Zen schools.(Nishitani 1982) The practice of Zen meditation has been described in detail in several previous studies and works(Kit 2001, Chiesa 2009). Harmony of and balance between body, breath, and mind are essential ingredients in the practice of Zen(Ospina, Bond et al. 2007).Cardiorespiratory interactions have been investigated among the physical functions in the practice of Zen. For example, Zen meditation synchronizes cardiorespiratory interaction with respect to breathing oscillations and the HRV (heart rate variability) induced by respiration (Cysarz and Bussing 2005), and Inward-attention meditation practice appears to push the sympathovagal balance to parasympathetic predominance and induce regular oscillations in hear rate (Wu and Lo 2008). Additional studies were based on heart rate variabilities of different levels of Zen meditation (Peressutti, Martin-Gonzalez et al. 2010).

The current study investigated the potential health benefits associated with Zen meditation training. The religious training in meditation that Zen monks experience is extremely challenging. This rigorousness leads some monks to abandon their training and others to develop physical and mental illnesses. Trainees who remain in the monastery typically spend hours in meditation each day in order to enhance their concentration abilities (Knight 2004). Despite recent scientific interest in MBSR, no studies have yet been published on health-related quality of life (HRQOL) and psychological distress among Zen monk trainees. This study addresses this empirical gap by focusing on the HRQOL and mental health among trainees at Japanese Rinzai Zen training centers.

There are two major Zen sects in Japan, Rinzai and Soto. The basic stance of the Rinzai is the self-realization which is regarded as the essence of Shakyamuni’s (the historical Buddha) teaching. Using Zen questionnaire (koan) for meditation is one of the important

features of Rinzai sect. Koan is understanding stories that surpass intellectual understanding. To obtain major psychological (“sense of oneness”) as well as physiological effects, Zen practitioners cultivate particular skills like slow breathing. Breathing control is given more emphasis among the Rinzai Zen practitioners. Their discipline often involves training in very slow and quiet breathing and chanting and attention to the sensations accompanying respiration(Lehrer, Sasaki et al. 1999).

We hypothesized that experiences with Zen Buddhism training would improve HRQOL and mental health as measured by the International Quality of Life Assessment Short Form-36, version 2 (SF-36), and the General Health Questionnaire (GHQ-28).

Materials and Methods

Procedure

This study was approved by the Human Subjects Institutional Review Board of Iwate National Hospital, National Hospital Organization. We invited the head office directors of the largest branch of the Rinzai Zen religion to participate in our survey. Zen monasteries are generally very conservative and would not normally allow the mental status of their trainees to be examined. However, in this particular case, the directors were cooperative because the first author of this article had participated in Rinzai Zen training at the headquarter monastery. Twenty Zen monasteries were selected, out of them thirteen directors agreed to participate. Questionnaires containing age, gender, monastery addition day, past and present ill history, Japanese versions of the SF-36 and GHQ-28 were disseminated to the individual trainees by the leaders at the various monasteries. All the participants who disagreed to participate in this study were excluded. All 462 registered monk trainees at thirteen monasteries were included to this study. The purpose and contents of the questionnaires were explained to the trainees by the leaders before their voluntary participation. The trainees were asked to complete the questionnaires and return them, along with their written informed consent, in a sealed

envelope to their leader. We received a total of 294 questionnaires from 13 monasteries. A total of 256 questionnaires were obtained with the informed consent, and 198 questionnaires completed all answers. Trainees ranged in age from 22–63 years (mean = 27.7, SD = 6.5). The mean training length was 2.6 (SD = 3.2). All of the trainees were men.

Instruments and measures

1) SF-36

The SF-36 is a 36-item survey that assesses health-related quality of life. The SF-36 questionnaire was translated into Japanese and validated by Fukuhara et al (Fukuhara, Bito et al. 1998, Fukuhara, Ware et al. 1998, Fukuhara 2004). The instrument is widely used in the evaluation of allopathic treatment modalities and has been used in many Japanese studies. We obtained permission for using the questionnaire version 2 in this study from the Medical Outcomes Trust, Health Assessment Lab, and Quality Metric Incorporated, as well as from Shunichi Fukuhara. Scores for eight health concepts are calculated: Physical Functioning (PF), Role Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role Emotional (RE), and Mental Health (MH). The first four concepts assess the physical aspects of HRQOL and result in a Physical Component Summary (PCS). The next four assess the mental or psychosocial aspects of HRQOL and result in a Mental Component Summary (MCS). The scoring was based on Japanese standards, and the subscale scores ranged from 0–100; higher scores indicated better quality of life (Fukuhara 2004). We used this scoring system for this study and calculated Japanese norm-based subscale, PCS, and MCS scores by using SF-36 version 2 scoring program provided from Institute for Health Outcome & Process Evaluation research, the system is written in SF-36 manual (Fukuhara 2004).

2) GHQ-28

The GHQ is a self-administered tool originally developed for the screening of non-psychotic psychiatric illness. It is used in both clinical settings and epidemiologic studies to investigate the mental health of general populations. The GHQ was designed to provide a general measure of mental health and psychological distress levels by measuring the presence and levels of distressing symptoms and the individual's inability to carry out normal functions. Each item includes four answer options scored either from 0–3, for a total score ranged from 0–84, or by an alternative binary method in which a threshold of 4 was set for “caseness” (or the presence of psychiatric distress). The GHQ includes “positive” items that represent an ability to carry out normal functions (e.g., “Have you recently been able to enjoy your normal day-to-day activities?”), and “negative” items that address distressing symptoms (e.g., “Have you recently felt constantly under strain?”). A person with a high GHQ score was considered to have a high level of psychological distress, including symptoms of somatization, anxiety, social dysfunction, and depression (Goldverg 1988). In addition, the total score was standardized including normal and neurosis. The 28-item GHQ-28 was considered the gold standard of questionnaires for screening psychiatric disorders in the general population and non-psychiatric patients (de la Revilla Ahumada, de los Rios Alvarez et al. 2004). The Japanese version of the instrument has been previously validated, (Nakagawa 1985, Goldverg 1988, Iwata, Uno et al. 1994) and many GHQ studies have recently been conducted in Japan (Hayasaka, Nakamura et al. 2007).

Analysis

First, we divided the study participants according to how long they had been in training: group I (<1 year), group II (≥ 1 year and <3 years), and group III (≥ 3 years).

The eight SF-36 subscale scores (both raw and norm-based), PCS, and MCS scores were calculated. HRQOL is affected by many factors based on cultural differences, so norm-

based score is necessary to understand the results (Fukuhara 2004). We used norm-based scores rather than non-norm-based scores.

Total GHQ-28 scores were calculated, as well as subscale scores for somatization, anxiety, social dysfunction, and depression.

We considered whether the data were normally distributed. Normally distributed data were analyzed by a one way ANOVA and Tukey test for multiple comparison by using IBM SPSS Statistics ver.21. Non-distributed data were analyzed by a Kruskal Wallis test. The significance level was set at 95% confidence interval.

Results

The mean age of study participants was 27.7(SD = 6.5) years, all participants were male, and the mean training length was 2.6 (SD = 3.2) years.

Table 1 shows the SF-36 subscale scores, PCS and MSC scores. The SF-36 subscales were non-normally distributed. The SF-36 PCS and MCS were normally distributed.

The SF-36 seven subscale scores (PF, RP, BP, GH, VT, RE and MH) were statistically significant ($p = 0.001, 0.001, 0.015, 0.003, 0.009, 0.005, 0.003$, respectively) by using Kruskal Wallis test.

The SF-36 MCS score were also significantly different ($p < 0.05$) between the groups. The scores between group I (<1 year) and group III (≥ 3 years) were statistically different ($p = 0.012$). The SF-36 PCS scores between groups did not attain statistical significance ($p = 0.085$).

Table 2 shows the GHQ-28 total and subscales (somatization, anxiety, social dysfunction and depression) scores which were not normally distributed. All of these scores were significantly different (p values of total, anxiety, social dysfunction and depression were <0.001 , p value of somatization was 0.001) between the groups.

Discussion

We hypothesized that Zen training would lead to improved health-related quality of life and lower psychological distress, as measured by the SF-36 and GHQ-28. For the SF-36, scores on all of subscales were lower than Japanese standards for participants who had trained for a shorter length of time, and scores on all of the subscales, except SF, were increased for participants who had trained for longer periods. Since Zen training practices are organized and regular, the trainees may have become accustomed to the physical rigors. Modern young people may find Zen monastery training to be very strict, rigid, and distressing, especially since it leaves little free time, limits contact with those outside the monastery, and requires adaptation to a different lifestyle. The closed environment of Zen monasteries would affect the finding of no significant difference in the SF-36 PCS and SF scores. In addition, the vertical relationship between young trainees and senior trainees or supervisors may be a cause of distress because senior supervisors coach sharply and strictly. We also speculate that the motivations to enter the monasteries were diverse among the participants in this study. Some people may enter training against their will, while others are attracted to the religious teachings. Sometimes Zen trainees join monasteries in order to become successors in the Zen temples run by their monk fathers. After one to three year of training, they can be certified monk except higher level of monk. Many monk trainees quit their training after one to three years. The backgrounds of the participants stated above would reduce the SF-36 scores of trainees with shorter length training, whereas longer periods of Zen training would improve their SF-36 scores.

According to previous studies, the mean total score for the Japanese GHQ-28 is 7.73 (SD = 6.19) and the mean total score for neurosis is 13.93 (SD = 6.51) (Nakagawa 1985, Goldverg 1988, Iwata, Uno et al. 1994). Our data show that GHQ-28 total scores of group

I (<1 year) were higher than the Japanese mean total scores, while the GHQ-28 total scores of group III (≥ 3 years) were lower than the Japanese mean total scores. These findings suggest that monks who trained for a shorter length of time have difficulty coping because of their tough training experience. However, the GHQ-28 total scores and scores for each of the subscales decreased with longer length of training. This finding suggests that longer Zen training may have been influential in improving the respondents' general mental health. It is important to note, however, that Zen training is designed to focus on the internal experience of the trainees, and the items on the GHQ-28 may not capture all of the changes that trainees experience.

Previous research using the SF-36 and GHQ-28 has examined the effectiveness of a psychoeducational intervention program and has reported that the positive effects of the intervention lasted beyond the duration of the program (Martin-Carrasco, Martin et al. 2009). Zen training may be considered a similar type of intervention program, in which trainees learn from seniors and supervisors. It is to be expected that systematic Zen training, like other forms of training, would continue to have positive effects beyond the end of the training program.

This study had several important limitations. All assessment measures were self-reported psychological questionnaires, which are inherently limited and open to response bias. The validity of the GHQ-28 as a screening tool is especially limited in patients with more chronic symptoms and those with more frequent social and interpersonal problems (Benjamin, Decalmer et al. 1982). It may be possible that due to shorter periods involved in training, trainees may not adapt to the Zen lifestyle and feel anxious about the strict practices and systems. Trainees that were unable to adapt to the lifestyle, may quit their training at an earlier stage. However, some monasteries are unwilling to acknowledge the number of trainees that have quit the practice.

Traditional system has been continued in closed world for a long time. This study is the first step to understand the still closed traditional Zen monasteries.

The way of life in Zen monasteries is unknown and very mysterious to most people, despite the fact that these traditions and customs have been practiced for several hundred years. Indeed, the trainee's level of distress is connected to individual factors. As noted earlier, MBSR is based in part on Zen Buddhist teachings. More research is necessary to understand the effects of Zen training and the potential medical benefits. This study utilized a cross-sectional method, but longitudinal studies will be necessary to thoroughly understand the effects of Zen Buddhist training.

There are no previous systematic studies of HRQOL and psychological distress among Japanese Zen trainees, despite several hundred years of Japanese Zen history. This study provides a point of departure that Scientists cooperate with Buddhists with the hopes that this type of work may develop new findings and create a healthier world (Barinaga 2003). Future studies should explore other Zen Buddhist practices in addition to meditation, such as food customs, insight practices, and beliefs about human relationships, because these techniques may provide effective remedies for our busy and complicated modern social lives. Since Zen training changes the individual's inward status, qualitative studies (for example, utilizing individual interviews) may also aid in understanding the mental health of Zen Buddhist trainees.

Conclusions

We conclude that longer Zen training improves the trainee's QOL and GHQ. A more detailed qualitative and longitudinal study is required in order to fully understand and assess the relationship between Zen training and QOL and GHQ suggested by this study.

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Author Disclosure Statement

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Competing Interest

The authors have no competing interest to declare.

Authors' Contribution

All the authors contributed to and have approved the final manuscript. FS was the project leader for the study, responsible for the data collection and the first draft of the manuscript. MT contributed the statistical analyses. HG contributed to the data collection and statistical analyses. DSA was responsible for the overall design of the study.

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Table 1: SF-36 scores among group I, II, and III

		Group I (<1 year) (n = 57)	Group II (1-3 years) (n = 81)	Group III (\geq 3 years) (n = 60)	p-value
Age (years)		28.1 \pm 9.2	25.8 \pm 3.1	29.9 \pm 6.2	
SF-36	PCS	53.7 \pm 10.1	55.8 \pm 8.2	57.2 \pm 7.3	0.085
	MCS	41.7 \pm 9.7	43.3 \pm 10.4	47.0 \pm 9.8	0.012*
	PF	91.0 \pm 12.5	95.1 \pm 7.2	97.2 \pm 5.2	0.001 [§]
	RP	79.7 \pm 18.8	86.6 \pm 18.6	91.8 \pm 12.7	0.001 [§]
	BP	62.0 \pm 24.3	69.2 \pm 24.3	74.9 \pm 24.9	0.015 [§]
	GH	55.7 \pm 17.2	59.4 \pm 19.9	68.1 \pm 16.3	0.003 [§]
	VT	47.3 \pm 18.1	51.1 \pm 22.4	58.1 \pm 16.9	0.009 [§]
	SF	67.8 \pm 29.3	72.2 \pm 31.6	79.0 \pm 29.1	0.074
	RE	76.6 \pm 25.5	84.4 \pm 19.4	90.8 \pm 13.7	0.005 [§]
MH	55.3 \pm 20.0	62.2 \pm 19.6	68.3 \pm 15.5	0.003 [§]	

PCS and MCS: One way ANOVA

*significant difference between group I and group II at Tukey test

Subscales:Kruskal Wallis test

[§]significant difference

SF-36 International Quality of Life Assessment Short Form-36
 PCS Physical Component Summary
 MCS Mental Component Summary
 PF Physical Functioning
 RP Role Physical
 BP Bodily Pain
 GH General Health
 VT Vitality
 SF Social Functioning
 RE Role Emotional
 MH Mental Health

Table 2: GHQ scores and ages

		Group I (<1 year)	Group II (1-3 years)	Group III (≥3 years)	*p-value
		(n = 57)	(n = 81)	(n = 60)	
Age	(years)	28.1 ± 9.2	25.8 ± 3.1	29.9 ± 6.2	
GHQ	Total	10.7 ± 6.8	8.7 ± 6.5	5.3 ± 5.2	<0.001
	Somatization	3.4 ± 2.4	2.9 ± 2.1	1.9 ± 2.1	0.001
	Anxiety	3.5 ± 2.1	2.7 ± 2.2	2.0 ± 2.0	<0.001
	Social Dysfunction	2.4 ± 2.1	1.6 ± 1.8	1.0 ± 1.4	<0.001
	Depression	1.5 ± 2.2	1.5 ± 2.0	0.5 ± 1.2	<0.001

*Kruskal Wallis test

GHQ total and all subscale scores showed significant difference.