

The effects of mindfulness training program on reducing stress and promoting well-being among nurses in critical care units

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KEY WORDS

mindfulness, stress, anxiety, well-being, happiness, critical care nurse

ABSTRACT

Objective

This study was conducted to evaluate the effectiveness of a brief mindfulness-based training program in reducing stress and promoting well-being among critical care nurses.

Design

A quasi-experimental, single-group, pre-post study design was used to evaluate the effectiveness of the program.

Setting

This study was conducted in a tertiary referral centre in Malaysia.

Subjects

A non-probability voluntary sample of 41 critical care nurses participated in the program. Thirty seven (90%) completed the program, with at least 80% attendance.

Intervention

The intervention is an adapted and brief version of Mindfulness-based Cognitive Therapy (b-MBCT) using the local promotional name of 'Mindful-Gym'. b-MBCT is a group-based program, carried out for five weeks at two hours per week with practice sessions in between. It was delivered as part of the hospital's continuing nursing education program.

Main outcome measures

Perceived Stress Scale (PSS) and Depression Anxiety Stress Scale (DASS) were used to measure the stress-related outcomes. As for the well-being outcomes, the Mindfulness Attention and Awareness Scale and Subjective Happiness Scale (SHS) were used.

Results

After completing the program, the participants reported significant improvement in the level of perceived stress (PSS: $p < .001$; $r = 0.50$), stress (DASS-S: $p = .002$; $d = 0.56$), anxiety (DASS-A: $p < .001$; $r = 0.38$), depression (DASS-D: $p < .001$; $r = 0.37$), mindfulness (MAAS: $p < .001$; $d = 1.002$), and happiness (SHS: $p = .028$; $d = 0.57$), with a moderate to large effect size.

Conclusion

Results support the effectiveness of b-MBCT in reducing stress and promoting well-being among critical care nurses.

INTRODUCTION

Critical care nurses undergo a lot of stress compared to nurses from other disciplines. The study done by Zainiyah (2011) shows that 33% of the nurses reported having moderate to severe level of stress. Although the working environment of critical care nurses may appear to be more conducive and comfortable as they have a limited number of patients, the expectations regarding patient care and patient outcome are much higher compared to other general nurses (Mealer et al 2007; Poncet et al 2007). This is mainly due to their responsibilities in taking care of critically-ill patients (Donchin et al 1995), the high demands from patients and family members (AbuAl Rub 2004) and the complex use of sophisticated technology (Tahir 2007).

The effect of prolonged, unmanaged stress can have a negative impact on nurses' personal or professional lives, causing physical and psychological changes, such as job stress, anger, anxiety, insecurity, dissatisfaction and frustration (Kawano 2008); decreased productivity (Tahir et al 2007); physical ill health like depression (Makie 2006); and back injuries (Barnett et al 2010). Therefore, there is a need to develop a culturally acceptable mental health program to help nurses cope with excessive stress. A promising program is mindfulness-based training. The concept of mindfulness originates from ancient contemplative traditions, particularly Buddhism. However, since the 1970s, it has been integrated in a secular way for stress reduction, psychotherapy and healthcare.

One of the well-established mindfulness-based interventions is Mindfulness-based Cognitive Therapy (MBCT) (Chiesa and Serretti 2011), which was developed from Mindfulness-based Stress Reduction (MBSR) (Irving et al 2009). MBCT combines mindfulness training and elements of cognitive therapy (CT) in targeting vulnerability processes of maintenance depressive episodes (Keng et al 2011). The aims of CT and MBCT are to teach individuals to become more aware of their thoughts and feelings, and then relate it in a wider, decentred and detached perspective as mental events rather than attach to, or focus on, that negative thought (Phang and Oei 2012; Keng et al 2011; Segal et al 2002).

Both MBSR and MBCT are effective interventions for reducing stress and promoting well-being, either in clinical or non-clinical fields (Gold et al 2010; Penque 2009; Cohen-Katz et al 2005; Shapiro et al 1998). Several studies have also specifically supported the effectiveness of mindfulness-based training in reducing stress, enhancing coping ability, lowering perceived stress and promoting well-being among nurses as shown in table 1.

The definition of mindfulness in research, training and education is evolving; the most popular definition is "paying attention in a particular way; on purpose, in the present moment, and non-judgementally" (Kabat-Zinn 1991, pp. 2). Mindfulness training involves cultivating the ability to be aware of our current thoughts, feelings, bodily sensations with kindness and understanding. It creates a psychological 'space' between one's perception (e.g. stressful stimulus) and response (thoughts, speech and actions). This enables us to *respond* wisely instead of *react* impulsively with negative emotions (Phang and Oei 2012). In other words, mindfulness helps one to mobilise the inner resources to face problems openly, to be aware of and orient oneself to overcome the pressure, and propel oneself through it. It is like a sailor positioning the sail and making use of the pressure of wind to propel the boat (Kabat-Zinn 1991, pp. 3). Therefore mindfulness training is potentially useful in promoting well-being and stress management in the nursing profession.

This study is important as there have been no published studies on structured stress reduction or well-being programs for nurses in Malaysia. The objectives of this study were: a) to determine the level of stress, anxiety and depression among critical care nurses participating in a brief mindfulness training program (b-MBCT), b) to evaluate the effectiveness of b-MBCT in reducing perceived stress, stress, anxiety and depression, and c) to evaluate the effectiveness of b-MBCT in increasing mindfulness and happiness.

Table 1: The summary of studies on mindfulness-based intervention program on nurses

Author	Study design	Sample size	Population	Program	Duration of program	Measures of stress-related outcomes	Measures of well-being related outcomes	Measures with significant improvement
Penque et al 2009	Quasi-experimental, single group, pre and post study	61	Registered nurses	MBSR	8 weeks	-	MAAS, Self-compassion, Empathy	MAAS, Self-compassion
Beth Elisa et al 2007	Qualitative	4	Registered nurses	MBSR	8 weeks, follow-up for 3 month	-	MAAS, Self-development	MAAS
Mackenzie et al 2006	Quasi-experimental with control group	Treatment = 16, Control = 14	Nurses and aides nurses	MBSR/control	4 weeks, follow-up for 1 month	MBI	SWLS	MBI, SWLS
Cohen-Katz et al 2005	Quasi-experimental with control group and qualitative	Treatment = 12, Control = 13	Nurses	MBSR/control	8 weeks, follow-up for 3 months	BSI	MAAS	BSI, MAAS
Pipe et al 2009	Randomised controlled trial	Treatment = 15, Control = 17	Nurse leaders	MBSR/control	4 weeks, follow-up for 1 week	SCL-90-R	CES	SCL-90-R, CES
Shapiro et al 2005	Randomized controlled trial	Treatment = 10, Control = 18	Health care	MBSR/control	8 weeks, follow-up for 3 months	BSI, PSS	SWLS, Self-compassion	PSS, Self-compassion

MAAS = Mindfulness Attention Awareness Scale; MBI = Maslach Burnout Inventory; SWLS = Satisfaction With Life Scale; SRDI = Smith Relaxation Dispositions Inventory; JSS = Job Satisfaction Scale; BSI = Brief Symptom Inventory; SCL-90-R = Symptom Checklist 90-Revised Subscale; CES = Caring Efficacy Scale; PSS = Perceived Stress Scale.

METHOD

A quasi-experimental, single-group, pre-post study design was used to evaluate the effectiveness of the program. The study was carried out in all the critical care units of a tertiary referral public hospital in Malaysia. A non-probability voluntary sampling was used in this study due to scheduling constraints among the critical care nurses who were on three duty shifts. Self-reported questionnaires on participants' level of stress and well-being related outcomes were administered one week before and after completion of the program.

Participants

Participants were recruited by their ward managers through program flyers and information sheets. All nurses who felt they needed education on stress reduction or promoting well-being were encouraged to join the program. Continuous professional development (CPD) points were awarded and appropriate schedules were arranged to encourage participation.

Based on a quasi-experimental, single group, pre-post study of a similar program among 139 medical students in Malaysia (Phang et al 2013), the sample size required for a similar study ($\alpha = 0.05$, power = 80%, effect size = medium) is 40. The calculation was assisted by a sample size calculation software, "G*Power3" (Faul et al 2007). A total of 41 participants volunteered for the program. It was conducted in two batches; 24 participants in the first batch and 17 participants in the second batch. Only participants who completed at least four out of five sessions of the program (80% attendance) were included in the data analysis (per protocol analysis).

Ethical Considerations

Ethical approval was obtained from the Hospital's Ethical Committee and the National Medical Research Register Committee. All the participants were given a copy of the information sheet and consent for the study was obtained.

Instrument

The following self-report questionnaires were used to evaluate the stress-related outcomes: (a) Perceived Stress Scale (PSS-10) and (b) Depression Anxiety Stress Scale (DASS-21). The PSS-10 is a brief and easy-to-use measurement of the degree of stress in one's life during the last month. It is a 10-item inventory using the Likert Scale, a 5-point scale ranging from 0 (never) to 4 (very often). Item responses for each participant were summed up after reverse scoring four items (4, 5, 7 and 8), yielding a total score of perceived stress ranging from 0 to 40. Higher scores indicate higher levels of perceived stress (Cuneo et al 2011). The coefficient alphas were 0.84, 0.85 and 0.86 (Cohen et al 1983). The DASS-21 is a 21-item questionnaire that was developed by Lovibond (1995) to measure three negative emotional states - stress (DASS-S), anxiety (DASS-A) and depression (DASS-D). The Likert scale ranges from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Each subscale contains 7 items. Each scale summed up 7 relevant items, then multiplied them by 2 to obtain a final total score. The reliability coefficient of DASS-21 ranges from 0.81 to 0.97 (Gold et al 2010; Ramli et al 2009).

To evaluate the well-being related outcomes, two tools were used: (a) Mindfulness Awareness Attention Scale (MAAS-15) and Subjective Happiness Scale (SHS). The MAAS-15 consists of 15 items with a 6-point Likert scale ranging from 1 (almost always) to 6 (almost never). Item responses for each participant were summed up and averaged, yielding a total score of mindfulness ranging from 1 to 6. Higher scores indicate higher levels of mindfulness. The Cronbach alpha ranges from 0.82 to 0.87 (Brown and Ryan 2003). The SHS is a 4-item scale of global subjective happiness to measure whether a person is happy or unhappy. The Cronbach alpha ranged from 0.79 to 0.94 (Lyubomirsky and Lepper 1997).

Intervention

The brief Mindfulness-based Cognitive Therapy (b-MBCT) program was initially adapted from the eight week Mindfulness-based Stress Reduction, MBSR (Kabat-Zinn 2003) and Mindfulness-Based Cognitive Therapy (MBCT) (Segal et al 2002) by a local psychiatrist for use among medical students (Phang et al 2013). The b-MBCT is a group-based, five week program, at two hours per week with practice sessions in between. It was promoted among the nurses as a program for stress reduction and promoting well-being with the educational name, 'Mindful-Gym.' As part of the hospital's continuing nursing education program held in the hospitals' seminar rooms, it was conducted using a didactic and experiential approach.

The b-MBCT trainer was a consultant psychiatrist with training in cognitive behavioural therapy, mindfulness-based interventions and personal mindfulness practice. The slogan of the program was 'Be Present, Be Calm and Be Grateful'. Consistent with the slogan, various exercises (see table 2 for program outline) were introduced during the program to foster the ability to be present, calm and grateful – all positive mental states that are related to mindfulness. As part of the training, each participant was also given an audio compact disc and booklet to guide them during practice sessions (5-10 minutes per day). Typically, each week's two hour session would start off with sharing and discussion (fine tuning of technique and customisation for daily application) on the in between practice sessions (e.g. body scan). This would be followed by the introduction of new lessons and exercises for the week.

Table 2: The outline of b-MBCT program

Week 1	ABC of stress, introduction to mindfulness. Mindful stretching, muscle relaxation and 'NOW-ing' (labelling physical actions).
Week 2	Beginner's mind, deep and mindful breathing. Mindful imagery, mindfulness theme song.
Week 3	Gratitude workout (cultivating grateful thinking). Mindful-S.T.O.P.*
Week 4	Body scan and kindness. Mind-scan – mindfulness of thinking errors.
Week 5	Heart-scan (cultivating loving-kindness). MP3 - Mindfulness personal practice package (customizing mindfulness practice)

*'Mindful-S.T.O.P.' is an acronym for brief informal mindfulness practice (S – Stop, T – Take deep and/or mindful breaths, O – Observe surrounding sounds, P – Proceed with activities with a smile).

Data analysis

Data was analysed using Social Package Statistical Software (SPSS) version 21 (IBM Corp. Released 2010). Descriptive and inferential statistics were used after normality test.

Findings

Out of 41 participants, 37 participants (90%) completed the b-MBSR program with at least 80% attendance; 22 (60%) completed 5 sessions and 15 (40%) completed 4 sessions. Four participants did not complete the sessions due to personal problems. All of the participants were female, with 35 (95%) Malays, 2 Indians and no Chinese. The mean age was 29.19 ± 5.35 . The other demographic characteristics are shown in table 3.

Table 3: Demographic characteristics of participants

Variable	Total (n = 37); f (%)
Age	Mean = 29.19 (SD = 5.4)
Years of nursing experience	Mean = 6.03 (SD = 4.8)
Marital status	
Married	26 (70.3)
Single	11 (29.7)
Post basic training	
Yes	11 (29.7)
No	26 (70.3)
Current critical care unit	
CCU	6 (16.2)
CICU	9 (24.3)
ICU	12 (32.4)
NICU	8 (21.6)
CHDW	2 (5.4)

CCU= Coronary Care Unit; CICU= Cardiac Intensive Care Unit;
ICU= Intensive Care Unit; NICU= Neonate Intensive Care Unit;
CHDW= Cardiac High Dependency Ward.

Baseline of psychological distress level

In the assessment of the participants' baseline stress level using DASS-S, 16 (43%) reported having mild to severe stress levels. From the DASS-A, 30 (82%) of them were found to have mild to severe anxiety levels, while 15 (40%) were rated as having mild to severe depression as shown in table 4. This showed the participants' levels of stress, anxiety and depression were high before attending the b-MBCT.

Table 4: Level of stress, anxiety and depression before b-MBCT

	Normal f (%)	Mild f (%)	Moderate f (%)	Severe f (%)	Extremely severe f (%)
DASS-S	21 (56.8)	8 (21.6)	4 (10.8)	2 (5.4)	0
DASS-A	7 (18.9)	4 (10.8)	17 (45.9)	6 (16.2)	3 (8.1)
DASS-D	22 (59.5)	8 (21.6)	4 (10.8)	3 (8.1)	0

DASS = Depression Anxiety Stress Scale.

The effect of b-MBCT on stress-related outcome

Table 5: shows the paired-sample t test that was conducted on pre- and post- intervention scores of stress level. It showed a significant decrease in participants' stress level with a mean difference of 3.14; $p = .002$ after attending b-MBCT.

Table 5: Level of stress before and after b-MBCT

Measure	Pre-intervention		Post-Intervention		Pre-post difference		t	Sig. (p)	Effect size (d)
	Mean	SD	Mean	SD	Mean	SD			
DASS - S	14.65	6.17	11.51	5.02	3.14	5.75	-3.32	.002	0.56

DASS-S = Depression Anxiety Stress Scale (stress subscale).

As for the PSS, DASS-A and DASS-D, Wilconxon-rank test was conducted to evaluate the effectiveness of b-MBCT. Results showed significantly lower perceived stress levels with a median difference of 2, $p < .001$; decreased anxiety levels with a median difference of 4, $p = .001$ and decreased depression level with a median difference of 2, $p = .001$

Table 6: Level of perceived stress, anxiety, and depression before and after b-MBCT

Measure	Pre-intervention		Post-intervention		Pre-post difference		z	Sig. (p)	Effect size (r)
	Median	Interquartile rank	Median	Interquartile range	Median	Interquartile range			
PSS	20.00	4.00	17.00	4.50	3	5	-4.14	<.001	0.50
DASS -A	12.00	7.00	8.00	8.00	4	6	-3.23	.001	0.38
DASS- D	8.00	7.00	6.00	4.00	2	4	-3.18	.001	0.37

PSS = Perceived Stress Scale; DASS-A = Depression Anxiety Stress Scale (anxiety subscale); DASS-D = Depression Anxiety Stress Scale (depression subscale).

The effect of b-MBCT on wellness-related outcome

Table 7 shows the paired-sample *t* test results of the participants' mean score after attending b-MBCT. The participants' mindfulness level had increased significantly with a mean score of 0.56, $p < .001$; and the subjective happiness level improved with mean scores of 1.57, $p = .028$, after attending the b-MBCT program.

Table 7: Level of mindfulness and subjective happiness before and after b-MBCT

Measure	Pre-intervention		Post-intervention		Pre-post difference		t	Sig. (p)	Effect size(d)
	Mean	SD	Mean	SD	Mean	SD			
MAAS	4.08	0.55	4.64	0.58	0.56	0.56	-6.10	< .001	1.002
SHS	19.46	3.35	20.49	2.91	1.57	2.77	-3.44	.028	0.6

MAAS = Mindful Attention Awareness Scale; SHS = Subjective Happiness Scale. able 6: Level of perceived stress, anxiety, and depression before and after b-MBCT

DISCUSSION

Demographic Characteristics

The majority of the participants in this b-MBCT program were Malays (95%); all the previous mindfulness-based intervention studies for nurses were carried out among Caucasians. This is of great significance as it implies that mindfulness-based training is culturally acceptable among the Malays, the majority of whom are Muslims. As the concept of mindfulness mainly originates from Buddhism and is related to meditation (Keng et al 2011), there were concerns that it would not be acceptable and useful in a multi-ethnic society like Malaysia. This study resolved those concerns and reinforced the belief that mindfulness training, as shown in numerous Western studies, can be successfully applied in a secular setting and adapted to different cultures. In fact, there has been growing interest in mindfulness among the Malays in Malaysia. For example, the Malaysian Institute of Islamic Studies (IKIM) has been organising talks and workshops on mindfulness from an Islamic perspective (e.g. applying mindfulness in daily prayers) since 2008 (IKIM 2013). All these developments provide evidence that mindfulness-based interventions are potentially useful in a Malaysian setting.

Effectiveness of the b-MBCT

Findings show the baseline levels of mild to very severe stress, anxiety and depression among critical care nurses in this tertiary hospital were 44%, 82% and 40%, respectively. The baseline shows high stress, anxiety and depression levels.

Findings show that 43%, 82% and 40% of the critical care nurses had increased level of stress, anxiety and depression (i.e. mild to very severe level), respectively. After attending the b-MBCT program, the participants with increased levels of stress, anxiety and depression significantly decreased to 8%, 51% and 19%, respectively.

These indicated that b-MBCT is significantly effective in reducing the participants' stress-related outcomes in terms of stress, anxiety and depression levels; and in lowering the perceived stress levels. These results are similar to that of Pipe et al (2009) and Mackenzie's (2006) study on nurses, as well as Phang et al (2013) studies on local medical students.

The findings also showed significant improvement in participants' well-being-related outcomes, in terms of mindfulness and subjective happiness levels after attending the b-MBCT. This indicates that b-MBCT is an effective program for increasing mindfulness and happiness. These findings are in agreement with Penque (2009), Cohen Katz (2005) and Mackenzie's (2006) studies on nurses. This study's results are also similar to that of Phang et al (2013) studies on medical students using the same program and instructor. This further strengthens that b-MBCT is effective in reducing stress and improving well-being.

Five mindfulness-based intervention studies on nurses have been conducted abroad as shown in table 1. However, not all the studies measured stress-related and wellness-related outcomes to evaluate the effectiveness of their program. The present study measured both outcomes, suggesting that b-MBCT is a more structured program which can be practiced by nurses as a stress management strategy.

Contributing factors in enhancing the effectiveness of b-MBSR

In this study the compliance rate of attendance was 90%, where the participants completed at least four out of five sessions of b-MBCT. This was an improvement on Penque's (2009) study on nurses and Phang et al (2013) study on medical students, which had compliance rates of 75% and 69.2%, respectively.

This indicates the participants of this study were interested in attending the program even though they were busy juggling three shifts, were tired and had to balance their personal lives as well. There were various factors that contributed to the effectiveness of the b-MBSR program, such as:

1) duration of present b-MBCT was shortened to a five week mindfulness training session, putting fewer demands on nurses who already have to juggle a three shift work schedule and their family responsibilities. Out of the 5 MBSR studies on nurses only one study used the four week program, while the rest used the eight week program as shown in table 1. Although shortened, the positive outcomes were not significantly different between these studies;

2) the use of the Mindful-S.T.O.P approach, which is a shorter and more practical form of mindfulness meditation practice (can be practiced in 1, 3, 5 or 10 minutes depending on availability of time), compared to most of the previous studies which used 30 to 45 minutes of sitting or walking meditation;

3) the program was promoted as a wellness program instead of a mental health program (the word 'mental' somehow generates unnecessary social stigma). In view that many of the nurses had significant level of psychological distress, it would be a good strategy to integrate the program into the existing hospital continuous professional development (CPD) program. This is better than sending them for individual psychiatric or counselling sessions, which nurses are more likely to avoid due to the stigma of psychiatric issues; and

4) the instructor's experience and expertise further enhanced the participants' attendance. The instructor had conducted more than fifteen batches of similar trainings in Malaysia, and has personal mindfulness practice which is essential for quality experiential training.

The contributing factors above were strongly supported by Carmody and Baer (2009), who concluded that there is no correlation between the compliance rate and the number of class hours. The most important factor is to gain a better participation rate to practice the technique.

Limitation

The limitations of the present study were: 1) no control group, 2) no follow-up, 3) self-fulfilling effect in answering questionnaires, 4) no measures on productivity and patient-related outcomes, and 5) no measures on compliance with practice sessions.

RECOMMENDATION

A randomised controlled trial with follow-up is suggested to further examine the generalisability of the results for well-being and stress management. A study on the effect of mindfulness on nurses' work performance; as well as on patient and nurses' satisfaction or patient outcome, should be carried out to further support the evidence for the effectiveness of the b-MBCT program on nurses. MBCT should be promoted and internalised as part of the hospital's strategy to reduce stress and manage well-being among nursing staff and should also be integrated in nursing co-curriculum.

CONCLUSION

In conclusion, the study findings showed that the b-MBCT is effective in reducing stress and promoting well-being, and is feasible to be practised among critical care nurses.

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