

Effectiveness of heartfulness meditation in the management of recurrent aphthous ulcers

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Abstract

Background. Recurrent aphthous ulcers (RAUs) are the most prevalent form of painful oral mucosal disorder. Conventional treatment for RAUs involves the administration of tetracycline, which has been shown to alleviate clinical signs and symptoms. However, this medication has been associated with a number of adverse effects. Heartfulness meditation (HM) has been shown to facilitate natural healing of ulcers without complications by developing a compassionate connection with oneself.

Objectives. The aim of the study was to evaluate the effectiveness of HM in the management of RAUs and to compare its effects with those of conventional treatment.

Material and methods. A parallel study was conducted among 54 patients affected with RAUs. The patients were divided into 3 groups: group 1 – HM; group 2 – tetracycline treatment; and group 3 – combination of tetracycline treatment and HM. The evaluated outcomes included pain levels and the duration of ulceration. One-way analysis of variance (ANOVA) and paired *t*-test were applied to identify significant differences between the groups.

Results. A substantial decrease in pain intensity was observed during HM. The group that engaged in meditation alongside tetracycline treatment exhibited the lowest pain scores. At follow-up intervals of 3, 5 and 7 days, pain levels between the tetracycline group and the HM group were similar. The group that received a combination of tetracycline treatment and HM demonstrated the shortest duration of ulcers (7.167 ± 0.383 days).

Conclusions. The study concluded that when HM was practiced in addition to tetracycline treatment, it demonstrated superior efficacy in reducing pain at the shortest time. Furthermore, the study noted a reduction in the duration of ulcers when HM was used in conjunction with tetracycline, as compared to the practice of HM alone.

Keywords: pain, stress, meditation, tetracycline, oral mucosal ulcers

Highlights

- The study demonstrates that heartfulness meditation complements conventional treatments for recurrent aphthous ulcers.
- Combining heartfulness meditation with tetracycline accelerates healing and reduces pain more effectively than tetracycline alone.
- At follow-up, heartfulness meditation alone reduces pain similarly to tetracycline, highlighting its potential as a non-pharmacological approach.
- Findings suggest integrating heartfulness meditation with standard therapy to enhance treatment outcomes for recurrent aphthous ulcers.

Introduction

Recurrent aphthous ulcers (RAUs), also known as canker sores, are the most prevalent form of painful oral mucosal disorder.¹ Recurrent aphthous ulcers manifest during infancy or adolescence as multiple, tiny ulcers with round or ovoid shapes, constricted edges, yellow or grey floors, and erythematous haloes.² The etiology of RAUs is multifactorial, involving stress, dietary influences, nutritional deficiencies, and immune system dysfunction.^{3,4}

The preferred treatment for RAUs is tetracycline. While tetracycline has been shown to reduce inflammation and promote healing of the ulcers, it does not address their underlying cause.⁵ The overuse of antimicrobials leads to the development of antibiotic-resistant bacteria, which can complicate treatment of future infections.⁶ In addition, tetracycline can have side effects such as upset stomach and discoloration of teeth, which can limit its use. Lifestyle changes have been demonstrated to be effective in the prevention of the recurrence of RAUs.⁷

Heartfulness meditation (HM) is a form of meditation that focuses on developing compassion, inner peace and a deeper connection with oneself and others. The practice of meditation can effectively reduce stress and promote relaxation, supporting the body's natural healing processes.⁸ While scientific literature on the effects of HM on RAUs remains limited, some studies have shown that meditation may have a positive influence on overall physical and mental health. For instance, a study by Taub et al. demonstrated that mindfulness-based stress reduction (MBSR) decreased symptoms of depression and anxiety in cases with chronic illness.⁹

Studies identify a definite relationship between RAUs and stress. In fact, stress is considered a triggering factor for the development of ulcers. It can affect and impair the regular functioning of the immune system. This, in turn, weakens the body's defense mechanisms, making it more susceptible to infections and inflammatory diseases such as RAUs. Stress can lead to hormonal imbalances, specifically by increasing the levels of stress hormones such as cortisol. These hormonal changes may affect various physiological processes, including the healing and repair mechanisms of the oral mucosa, potentially contributing

to the development of ulcers. Given the established role of stress as a triggering factor for RAUs, the potential benefits of HM, a practice aimed at stress reduction and relaxation, are a compelling area for investigation.¹⁰ Hence, the present study was conducted to answer the following research question: "Is the practice of HM as effective as conventional treatment for managing RAUs?"

Material and methods

Study setting

The present double-blind, three-arm clinical trial was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Ethics Committee of the Department of Public Health Dentistry, People's College of Dental Sciences & Research Centre, Bhopal, India (IEC No. EC 202133). After explanation of the risks and benefits of the study, all patients and their parents provided written consent to participate in the study.

Participants

The study population comprised healthy individuals of both sexes, aged 18–45 years, who presented with ulcers persisting for more than 24 h. Patients with systemic conditions, allergy to tetracyclines, and those undergoing any other treatment for RAUs, as well as pregnant and lactating women were excluded. The selection process is depicted in Fig. 1.

The assessment of aphthous ulcers was based on a review of patient's medical history and clinical examination. The clinical examination criteria included the following: the presence of ulcers on non-keratinized oral mucosa (i.e., the inside of the lips, cheeks, floor of the mouth, or underside of the tongue); round or oval-shaped with well-defined borders; typically manifesting as a shallow surface with a depressed center surrounded by an inflamed and slightly elevated border; causing pain and discomfort, especially during activities such as eating, drinking, or speaking. The clinical examination was conducted by a single examiner to ensure reproducibility.

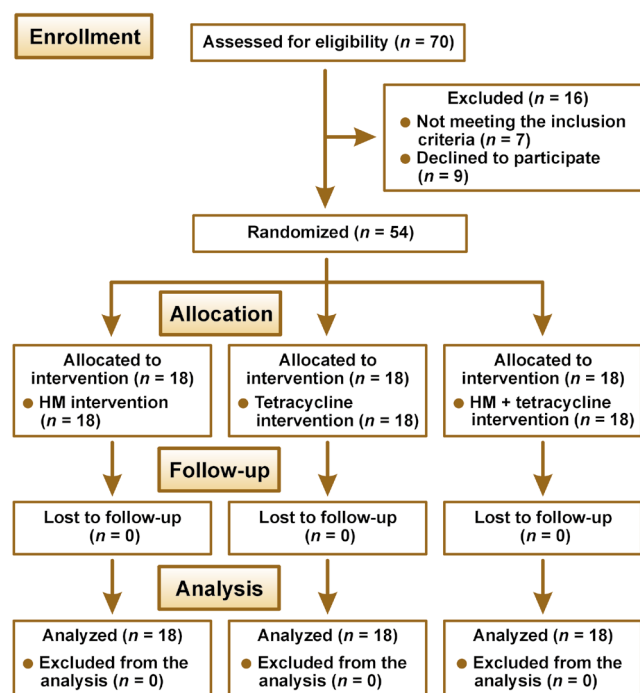


Fig. 1. CONSORT (Consolidated Standards of Reporting Trials) diagram of the study

HM – heartfulness meditation.

Sample size

The sample size was calculated based on the following formula (Equation 1):

$$N = 2 \times \left(\frac{Z_{1-\alpha/2} + Z_{1-\beta}}{\delta} \right)^2 \times S^2 \quad (1)$$

where:

N – size per group;

δ – effect size or a clinically acceptable margin (as per Zeeshan et al.¹¹);

$Z_{1-\alpha/2}$ – critical value from the standard normal distribution for a given level of significance (α);

$Z_{1-\beta}$ – critical value for the study's statistical power ($1-\beta$).

S^2 – pooled standard deviation of both comparison groups.

The power was conventionally set at 0.80.

Considering a 10% loss to follow-up, the final sample was rounded off to 17.6, thereby establishing 18 subjects in each group. The final sample size was determined to be 54.

Randomization and blinding

The patients were randomly assigned to one of the 3 groups based on computer-generated random numbers. To ensure the blinding of the study participants, patients from different groups were recalled on separate days so that they never met.

Groups and intervention

The study population was comprised of 3 groups; group 1 consisted of 18 subjects who underwent the HM program; group 2 consisted of 18 individuals who were treated with tetracycline; and group 3 included 18 patients who received a combination of both interventions.

Group 1 participants underwent an orientation session, during which they received instruction on the meditation procedure. The presentation, delivered via PowerPoint, encompassed the benefits of meditation, heartfulness practice, rejuvenation technique, and bedtime prayer meditation. The presentation was also shared with the participants to reinforce the intervention. The HM practice entailed a sequence of 5–7 min of relaxation, followed by 20 min of meditation. The participants were instructed to close their eyes and focus on a source of light within their hearts. The evening session included 15 min of rejuvenation, during which the patients were guided to visualize stress and heaviness leaving their bodies in the form of smoke or vapor. A bedtime prayer meditation was recommended for introspection of the day for 5 min before going to bed. All patients were provided with a practice tracker sheet and were requested to document their session attendance.

In group 2, the first application of tetracycline was conducted in the clinic to all participants to demonstrate the method of application. The medication was administered in the form of a capsule, which was to be mixed with a small amount of saline and applied to the ulcer thrice daily.

Group 3 received a combination of tetracycline and HM practice.

Outcomes assessed

The assessed outcomes included the severity of pain and the duration of ulceration. Pain was evaluated using the visual analogue scale (VAS) on the 1st, 3rd, 5th, and 7th day. The duration of ulceration was recorded in days.

Statistical analysis

The results were analyzed using the IBM SPSS Statistics for Windows software, v. 25.0 (IBM Corp., Armonk, USA). One-way analysis of variance (ANOVA) was applied to identify statistically significant differences between the groups at different time intervals. A paired t -test was conducted to ascertain the presence of any variation in pain and ulcer duration on the 1st and 7th day in each group. This analysis was conducted at a 5% level of significance.

Results

A total of 54 RAU patients were examined. The mean age of the participants was 27.59 ± 5.31 years.

The predominance of female patients was noted, with 37 (68.5%) cases being assessed. When the intensity of pain was evaluated at various time intervals, no significant differences were observed between the groups on the 1st day ($p = 0.699$). On the 3rd day, the pain scores in groups 1 and 2 were comparable, with means of 5.167 ± 0.618 and 5.000 ± 0.767 , respectively. However, group 3 exhibited a significantly lower pain score (3.944 ± 0.802 ; $p = 0.000$). Similar findings were noted on the 5th and 7th day (Table 1).

Table 1. Comparison of pain intensity at various time intervals between the groups

Day	Group	VAS $M \pm SD$	F statistic	p-value
1 st day	group 1	6.222 ± 0.647	0.361	0.699
	group 2	6.000 ± 0.907		
	group 3	6.056 ± 0.873		
3 rd day	group 1	5.167 ± 0.618	14.694	0.000*
	group 2	5.000 ± 0.767		
	group 3	3.944 ± 0.802		
5 th day	group 1	3.889 ± 0.758	11.103	0.000*
	group 2	3.833 ± 0.618		
	group 3	2.944 ± 0.639		
7 th day	group 1	1.667 ± 0.485	4.071	0.023*
	group 2	1.722 ± 0.575		
	group 3	1.278 ± 0.461		

* statistically significant ($p < 0.05$, ANOVA); VAS – visual analogue scale; M – mean; SD – standard deviation.

Within-group comparisons revealed a gradual reduction in pain scores across all groups from the 1st day to the 7th day. The findings obtained on the 3rd day were more pronounced for group 3 as compared to groups 1 and 2 (Table 2). This finding indicates that HM reduced pain intensity at the shortest time interval. The pain levels in the tetracycline group and the HM group were comparable at all follow-up time points.

The healing process for ulcers was the longest in group 2 (8.056 ± 0.639 days), while the condition was cured the fastest in group 3 (7.167 ± 0.383 days). This discrepancy was found to be statistically significant ($p = 0.002$) (Table 3). The findings indicate that the combination of tetracycline and HT resulted in the lowest pain scores and the most rapid healing rate.

Table 2. Within-group comparison of pain intensity at various time intervals

Group	VAS $M \pm SD$				F statistic	p-value
	1 st day	3 rd day	5 th day	7 th day		
Group 1	6.222 ± 0.647	5.167 ± 0.618	3.889 ± 0.758	1.667 ± 0.485	171.805	0.000*
Group 2	6.000 ± 0.907	5.000 ± 0.767	3.833 ± 0.618	1.722 ± 0.575	114.554	0.000*
Group 3	6.056 ± 0.873	3.944 ± 0.802	2.944 ± 0.639	1.278 ± 0.461	141.703	0.000*

* statistically significant ($p < 0.05$, ANOVA).

Table 3. Comparison of the duration of ulceration between the groups

Groups	Duration of ulceration [days] $M \pm SD$	F statistic	p-value
Group 1	7.722 ± 0.752	9.714	0.002*
Group 2	8.056 ± 0.639		
Group 3	7.167 ± 0.383		

* statistically significant ($p < 0.05$, ANOVA).

Discussion

The current study revealed that conventional treatment with tetracycline in combination with HM yielded optimal outcomes in terms of pain reduction and ulcer healing. This study is pioneering in its field, as there have been no previous studies that have examined this particular aspect. The practice of yoga and meditation, with their emphasis on stress reduction and pain management, have been integral components of therapeutic interventions in learning schools and settings since ancient times. Numerous researchers have utilized the methods of contemporary brain research to examine the effects of meditation on the mind and body.

The exact cause of RAUs remains unknown. However, current hypotheses attribute the occurrence of RAUs to a combination of genetic, environmental and immunological factors. The mechanism underlying the pain experienced in RAUs is not fully understood, but several theories have been postulated to explain this phenomenon. One such theory suggests that the pain is caused by the release of inflammatory cytokines, such as tumor necrosis factor alpha (TNF- α) and interleukin 1 beta (IL-1 β), in response to tissue damage. These cytokines have been observed to activate pain receptors, including nociceptors, which send pain signals to the brain. Another theory stipulates that the pain is caused by the activation of the immune system in response to the ulcer. The immune system releases inflammatory mediators, such as prostaglandins and leukotrienes, which can also activate pain receptors. Additionally, pain may be caused by nerve damage or irritation, as the ulcers can damage nerve endings in the affected area.¹² Overall, the exact pain mechanism in RAUs is not fully understood and may involve a combination of factors. Treatment regimens for RAUs are aimed at relieving pain and promoting ulcer healing.

Studies have demonstrated that RAUs are triggered by psychological stress.^{13–15} A possible explanation for the efficacy of HM in RAU management is its capacity to reduce stress. Research indicates that HM can reduce stress by activating the parasympathetic nervous system, which is responsible for the “rest and digest” response. This response leads to a decrease in heart rate, blood pressure, and other physiological responses to stress. Furthermore, HM has been shown to reduce amygdala activity, thereby mitigating feelings of anxiety and stress. The amygdala, a key component of the brain, plays a pivotal role in processing fear and other negative emotions. Heartfulness meditation has also been shown to enhance the activity of the prefrontal cortex, which is responsible for executive functions such as decision-making, problem-solving and self-control. Thus, HM can help individuals to better manage their emotions and respond to stressful situations in a more effective manner.¹⁶

Heartfulness meditation has shown beneficial effects on various aspects of health. Gurram et al. assessed anxiety levels in 26 individuals undergoing impacted third molar surgery who practiced HM.¹⁷ They observed that a single session of HM effectively reduced intraoperative anxiety levels in a target population.¹⁷ Khan et al. assessed the efficacy of Raja yoga meditation and pranayama in patients with myofascial pain dysfunction syndrome (MPDS) and compared the results with continued traditional non-invasive therapy techniques.¹⁸ Pain and inflammation improved significantly in individuals who practiced meditation. The therapeutic intervention had a prolonged effect, accompanied by a reduction in anxiety and stress. The authors concluded that Raja yoga meditation and pranayama, combined with conventional non-invasive intervention, showed promising results in MPDS cases when compared to either modality alone.¹⁸ Thimmapuram et al. determined the variation in all domains of health-related quality of life (HQoL) among 3,164 practitioners of yoga and meditation across 39 countries.¹⁹ It was noted that individuals with more than 2 years of meditation experience had better outcomes for HQoL as compared to those who did not practice or had less than 1 year of experience.¹⁹

Research has demonstrated the effectiveness of meditation on chronic mucosal and skin conditions associated with stress. In a clinical trial conducted on 57 participants, González-Moret et al. found that inflammatory biomarkers were enhanced in patients with inflammatory bowel disease (IBD) when treated with mindfulness-based therapy.²⁰ Inflammatory bowel disease is frequently associated with psychological distress, and thus stress management is the recommended line of therapy. Concurrently, Meesters et al. reported enhanced wound healing in 23 individuals who practiced meditation.²¹ In addition, a reduction in cytokines (IL-8 and placental growth factor) was observed among these individuals. Taub et al. expressed promising interventions for systemic lupus erythematosus patients, encompassing outcomes such as quality of life,

the psychological impact of the condition, and shame.⁹ These studies suggest that an intervention capable of effectively reducing stress can alleviate the distress experienced by RAU patients. The validity of VAS as a pain assessment scale has been widely studied, and it is considered a reliable and valid tool for quantifying pain intensity.²²

Limitations

The present study is subject to certain limitations. Longitudinal research is necessary to establish the causality between meditation and the outcomes of the study. Also, the possibility of inclusion bias cannot be dismissed, as the study's participants were voluntarily enrolled. The influence of dietary habits, oral hygiene practices and medication changes was not considered in the present study. These factors, if present, could have confounded the results, thereby complicating the isolation of the intervention effect.

Conclusions

The severity of pain was found to be reduced in the group that practiced HM along with conventional treatment. The findings suggest a potential impact of HM on brain activity, which may contribute to disrupting the cycle of pain. Further studies are necessary to determine the specific effects of HM on pain in RAUs. However, incorporating meditation into one's daily routine has the potential to provide overall benefits for physical and mental health. It is therefore strongly recommended that HM be integrated with pharmacological interventions to ensure optimal results.

Ethics approval and consent to participate

The study was approved by the Institutional Ethics Committee of the Department of Public Health Dentistry, People's College of Dental Sciences & Research Centre, Bhopal, India (IEC No. EC 202133). All patients and their parents provided written consent to participate in the study.

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

Use of AI and AI-assisted technologies

Not applicable.

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