

## Research Article

# Analysis of Mindfulness Practices Using Electroencephalogram (EEG) Interaxon Muse™ Headband Against the Concept of Self-Acceptance of Poststroke Clients

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**Abstract.** The Buddhist guidance and counseling model was applied to a client who experienced post-stroke 3 stress disorder and was isolated at the start of the Covid-19 pandemic in 2020. Mindfulness of breathing, body and mind activities is very important in mindfulness practice. Mental relaxation treatments and measurements were administered using the first generation Muse™ "S" Series. Portable and "Muse: Meditation and Sleep" by the InteraXons app, linked by mobile technology (iPad/iOS). This research method uses a single subject research design with a time series approach. However, this report reports qualitatively descriptively about the client's self-acceptance concept after each session of stroke. The research sample was conducted on clients with post-stroke comorbidities. Treatment of mental relaxation sessions using mindfulness techniques. The results of measuring brain wave conditions that are inferred from the Muse™ application show an increase in mental relaxation conditions. Along with that the client's self-acceptance of the illness can be accepted with full awareness by the client. The client underwent a total of twelve guided mental relaxation sessions. In each session, the client feels able to accept the illness, forgive and fully accept himself with love.

**Keywords:** *Acceptance, Covid-19, Post-stroke Comorbidities, Mindfulness, Buddhist Guidance and Counseling, Electroencephalography (EEG), Muse™.*

## A. INTRODUCTION

Stroke can cause muscle weakness, balance problems, and speech problems or problems with communication, swallowing, and memory that affect the ability to perform daily activities (Loupaty et al., 2019). The emergence of the 2019 corona virus (COVID-19) has an impact on the mental and mental health of health workers (Alnazly et al., 2021). Likewise experienced by clients (KA) who experience stress disorders, feel isolated, and lack of access to resources play an important role in increasing anxiety after the 3rd stroke amid the rise of Covid-19.

Post-stroke clients generally feel anxious, angry, annoyed, helpless, irritable, and have difficulty controlling their emotions, especially during the first six months after a stroke. Correcting the client's emotional and behavioral problems cannot be separated from the role of many disciplines in helping family members and close relatives provide support. For this reason, it is very important for nurses to never tire of providing moral support and belief to patients that their condition will improve over time. In addition, in carrying out treatment, it is important to adapt to the conditions of the sufferer, such as when they have difficulty communicating, are forgetful, or start to understand what they are saying (Savitri, 2022). The client (KA), a 70 year old male, had his 3rd stroke. Then the family, his only child and his wife, were taken to their son's house. In this new environment, clients find it increasingly difficult to accept that they have suffered a stroke.

Apart from drug therapy such as aspirin, anticoagulants, antihypertensives and the like, other stroke rehabilitation therapies that can be done are talk therapy, physical therapy, psychological counseling, and occupational therapy. The team caring for the patient must be a

multidisciplinary team that includes members such as doctors, nurses, social workers, psychologists, occupational therapists, physical therapists, and speech therapists (dr. Raehana, 2022). Clients in this study used the Mindfulness technique as an intervention.

According to (Girivirya, 2018, 2021), mindfulness is the ability to pay attention to the current moment deliberately and without judgment. This can be done by focusing on thoughts, feelings, and bodily sensations, which allows a person to notice what is happening to them in the present moment more clearly. A more common introduction to mindfulness comes from the practice of Buddhist meditation, which practitioners have studied and observed for centuries. However, today mindfulness has been applied in various forms and in various fields, including mental health, physical health, education, and work. Meanwhile, according to (Oliver et al., 2013), acceptance is the process of encouraging clients to accept their thoughts and feelings without trying to reject, avoid, or suppress them through "avoidance experiences". This is not just a process of tolerance or surrender, but a full will to move forward and make room for psychological phenomena, including psychotic symptoms, without making a struggle that cannot be changed.

## **B. LITERATURE REVIEW**

### **1. Muse™ "S" Portable Electroencephalography (EEG) on Mindfulness Practices**

Muse S multi-sensor meditation device that provides real-time feedback on brain waves, heart rate and body movements allows users to seamlessly switch from daytime meditation sessions to bedtime clothing in comfortable, sleep-inducing fabrics using advanced EEG technology to respond to mind, heart, and breath. The Muse "S" is a comfortable brain-sensing headband that helps clients understand and track how well you focus, sleep, and recharge so you can refocus during the day and recover each night. Muse's meditation library includes relaxing sound landscapes for daytime use and a responsive Go-to-Sleep Journey for nighttime sessions, inviting clients to explore relaxing lavender fields, forests, and underwater landscapes. Advanced EEG tracks sleep from the client's bed.

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#### **a. Calm Point**

Calm Points are awarded for time spent meditating with a relaxed and focused mind. Receive 1 point for every second the brain is in its natural resting (neutral) state and 3 points for every second spent intensely focusing on the breath (calm).

#### **b. Bird Sounds**

Calm Points are awarded for time spent meditating with a relaxed and focused mind. Receive 1 point for every second the brain is in its natural resting (neutral) state and 3 points for every second spent intensely focusing on the breath (calm).

#### **c. Recovery**

Every time clients see the mind wandering and bringing attention back, they are given rejuvenation. Recovery celebrates the moment when it goes from being active (mind wandering/fluctuating attention) to neutral (a state of natural rest). Recovery is key to building focused attention skills and integrating the benefits of meditation into

everyday life. Tap the graph to see the exact moment of resuscitation highlighted in orange.

d. Chart

Client results in a graph showing what their brain was doing while they meditated and when they were in each state.

e. Active

This is time spent with a wandering mind. Attention fluctuates. The client observes that the mind is active and returning attention to the breath builds mindfulness skills.

f. Neutral

This is time spent with a wandering mind. Attention fluctuates. The client observes that the mind is active and returning attention to the breath builds mindfulness skills.

g. Calm

Deep calm focus on the breath. These are the moments when concentrating on the breath. If it is quiet and focused long enough, it will hear a bird's call.

## 2. Effects of Mindfulness Using Brainwave Entrainment on Sleep Disorders

Although one is most likely to experience the consequences of a poor night's sleep, such as low energy, dizziness, and irritation (See also Kobayashi et al., 2016; Zhang et al., 2020; Amaerjiang et al., 2021; Bhat and Chokroverty, 2021; LaGoy et al., 2021; Hall and Cocco, 2022; Moavero et al., 2022; Ristanovic et al., 2022; Schäfer et al., 2022). Somebody may need to know all the benefits of mindfulness meditation for consistent quality sleep. Several studies show the benefits of mindfulness training (Berk et al., 2018; Cavic et al., 2021; Corbally & Wilkinson, 2021; du Plessis & Just, 2022; E. et al., 2021; Eberth & Sedlmeier, 2012; Ihme & Sundstrom, 2021; Oliver et al., 2013; Pallozzi et al., 2017; Yoon-Suk Hwang et al., 2015). Consistent meditation practice has been shown to increase melatonin levels, which play an important role in sleep regulation.

Activate one's parasympathetic nervous system: Transcendental meditation techniques have been shown to activate one's parasympathetic nervous system. Alternatively, the resting and digestive responses are essential for bringing the body into a state of calm and relaxation. While there is no best time to meditate during the day, meditation provides different benefits depending on when a person finishes the session. Meditating at night or before bed can help clients slow down their breathing and heart rate, which can help them move more quickly into the first stage of non-REM sleep.

Sati (Pali: सति; Sanskrit: स्मृति smṛti), usually translated as "mindfulness" in early Buddhism, and examines its soteriological function and its central role in early Buddhist practice and philosophy. Using textual analysis and criticism, a new approach to this subject is needed through the comparative study of Buddhist texts in Pali, Chinese and Sanskrit. It also provides a unique perspective on ancient teaching by applying findings in modern psychology (Kuan, 2007). The term mindfulness in this study intends to practice mental relaxation by paying attention to the breath and body. In addition, with or without the help of brain wave entrainment, such as natural sounds, water, and the like.

The intervention or treatment in this study refers to attention to the body, in this case, the in-and-out breath and sensations of the body. Intervention was given twelve times. (I) was given to clients using Muse Portable-EEG without brainwave entrainment in odd sessions, compared to (II) given to clients using Muse™ Portable-EEG with brainwave entrainment in even sessions. Measurements are monitored from the Mus® software. The mindfulness interventions used in this study were not strictly approachable, such as a training course based on the work of John Kabat-Zinn. However, the intervention was carried out by using the

technique of paying attention to the breath and paying attention to the condition of the body (Lin & Mai, 2018; Stelter, 2009).

### C. METHOD

The method used for data collection in this study was a single-subject study with an alternative treatment design (without baseline or sequential treatment) without prior testing (Richards, 2019). The ranking data consists of the methods used to infer behavior changes. According to (Kleinhans et al., 2021), the basic purpose of designing a series of treatment types is to compare the effects of two independent variables (treatments) on the same behavior. Therefore, it is a potentially important design for researchers working out which intervention procedures are most effective. Applied studies use a single case design using experimental and therapeutic criteria to evaluate data (Gehart, 2012). Experimental criteria relate to how data are evaluated to determine whether an intervention has an enforceable or testable effect on behavior. Experimental criteria are usually based on comparisons of behavior under different conditions during the intervention and non-intervention (baseline) phases. The test criteria are met in varying performance under these different conditions. However, this article only discusses the results of in-depth interviews regarding post-treatment clients regarding the concept of self-acceptance. In particular, the client's acceptance of post-stroke experienced after practicing mindfulness.

The therapeutic criteria refer to whether the effect of the intervention is significant. This criterion requires a comparison of the behavior change achieved and the degree of change required for the client to function well in society. Even if behavior changes are feasible and related to experimental interventions, they may not be clinically significant or implied. To meet the therapeutic criteria, the treatment must make significant changes in the client's daily functioning. Data collection begins with consultation in guidance and counseling sessions. Then treat them privately using mindfulness techniques. This counseling is part of the application of the Buddhist Guidance and Counseling Model (Girivirya, 2021). At the end of the session, the researcher interviewed the post-treatment conditions.

### D. RESULT AND DISCUSSION

At the end of each session, the researcher opens client data. The intervention was carried out by (I) odd sessions of clients not using headsets (S1, S3, S5, S7, S9, S11); (II) in an even session, the client uses a headset to hear brainwave entrainment sounds (S2, S4, S6, S8, S10, S12). Bird sounds indicate the depth of the client's relaxed state and still maintain awareness of the breath going in and out. The results of the subject intervention are explained as illustrated in the following chart with quiet points.

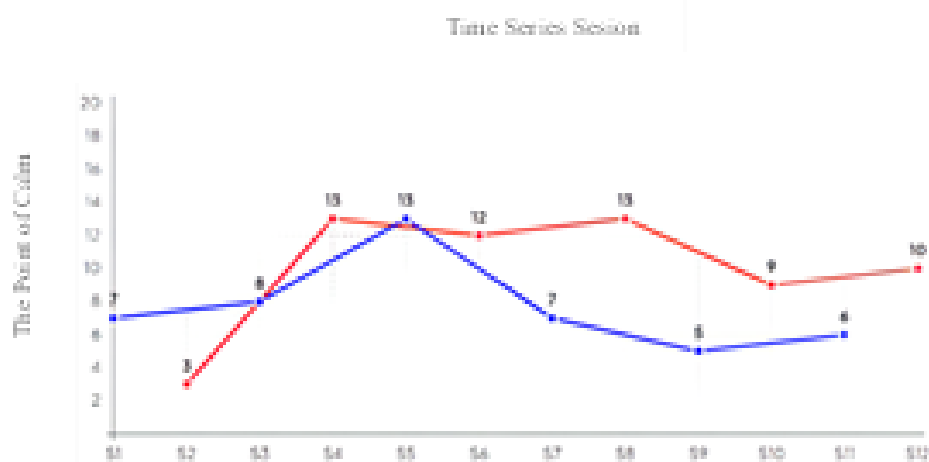


Figure 1. Intervention Results from Sessions 1-12

This data shows a mindfulness practice intervention using the Muse™ Interaxon Headband Electroencephalogram (EEG). The graph shows that relaxation tends to increase when mindfulness practices use Muse™ together with brainwave entrainment stimulation resulting from the client's brainwave activity. Meanwhile, the concept of self-acceptance of the client to the clinic of post-stroke sufferers is shown after the session through in-depth interviews.

Acceptance is the process of paying constant attention to difficult experiences and enabling awareness of all aspects of the self. This directly supports self-acceptance, because accepting psychosis no longer defines the complete individual. According to, (Oliver et al., 2013) it is important to note that acceptance is not simply a process of inviting clients to participate. This is also realized by the therapists. The therapist or counselor unconditionally accepts the client and their entire experience, including psychotic experiences and stereotypes (the domain of symptom meanings). This attitude makes it easier for clients to accept their psychotic experiences as aspects of themselves rather than as a whole (the symbolic self).

Developing mindfulness (through mindfulness techniques) is one of the main endeavors in Buddhist practice. But it is also used in the field of psychotherapy practice in general. According to (Phelan, 2012), seeing consciousness as part of a three-legged stool. The other two legs are self-acceptance and openness to whatever is in a person. In the preface to Salzberg's book *Love* (1995, p. ix), Kabat-Zinn writes: "The present moment..." Love, like compassion, requires a critical orientation, not clinging to, and not denying in the present moment. Traditionally, Buddhism has held that perception and acceptance coexist. One cannot accept a mental or emotional state of which one is not aware.

What follows is that the idea that universal love is the foundation of compassion makes a stronger case for how important it is to practice love. When someone erases themselves, fights against it, or feels punished, someone disconnects themselves from wholeness. As a person grows, however difficult some of these parts may be, they can participate in self-awakening endeavors. Thus expressed the client (KA), "I am able to accept this physical suffering and fully love myself after practicing full awareness in each session." When all parts of one's self support mindfulness practice, one has a wider awareness to practice and rise from adversity. As expressed (Phelan, 2012), "The limit of what we can accept is the limit of our freedom."

Spirituality is associated with the attainment of true humanity, and religion is the means of attaining it before the Most-High. Spiritual and religious people have attitudes, but neither spirituality nor religion per se are attitudes. Belief is an attitude. When one interprets faith broadly, it is the subjective side of spirituality, and when one understands faith in a narrower and more religious sense, it is the subjective side of religion. Faith is a positive response to questions raised by spirituality and religion. In a broader sense, if belief is a fundamental human response, then they can speak of belief without religion, but they cannot speak of religion without belief. According to (Hull, 2002) faith in a broad sense is faith in a receptive attitude directed at human transcendence, whereas faith in the narrow sense of religious belief is directed at ultimate symbolism. Religion is a means. Spirituality is the goal. Faith is a belief which means leading to a goal. Beliefs differ according to religion. Buddhist beliefs are not as detailed as Christian beliefs. Faith was originally a Christian term, and its application to other religious traditions is more complicated. Meanwhile, in this study, mindfulness techniques were practiced not only as a particular religious practice. Mindfulness techniques make the concept of universal love even bring about an effect on the client's self-acceptance of illness, post-stroke and old age.

In the end, mindfulness practice using the Electroencephalogram (EEG) Interaxon Muse™ Headband is able to have an effect of self-acceptance, and most importantly for the development of universal love (especially towards the pain suffered), and have been able to



forgive oneself (forgiveness). It doesn't matter if forgiveness, self-acceptance or love comes first. Everything is interrelated and necessary for the awakening process. Surrendering the past to the past allows the client to live to live and die in the present. Up until now, neither had harbored feelings of guilt toward oneself or a clear need to forgive other people's and circumstances. This intervention technique has had many positive impacts (see also Brink, 2005; Burmansah et al., 2020; Ferris-Fearnside et al., 2002; Filipović & Rihtar, 2017; Garreta-Bochaca et al., 2019; Gregory L. Cascione, 2003; Hermans, 2003; Hull, 2002; Kaji & Ono, 2021; Kim, 2021; Lipiäinen et al., 2020; McCaffrey et al., 2017; Nagle, 2017; Phelan, 2012; Singh et al., 2016; Slee, 2015; Vietze et al., 2022). Applying mindfulness techniques to these clients can uncover obstacles in the client's post-stroke problems that are resolved mindfully.

## E. CONCLUSION

The measurable results of Muse™ monitoring indicate a state of relaxation. Through this research, mindfulness using the Interaxon Muse™ Headband Electroencephalogram (EEG) has an effect on client self-acceptance with the 3rd poststroke sufferer. Self-acceptance for post-stroke clients is a good experience for clients to gain better mental quality in dealing with physical suffering. This research report reports an aspect of a series of interventions in the Buddhist guidance and counseling model.

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