

## A Comparative Study to Evaluate the Immediate And Prolonged Effect of Full Mud Bath And Full Body Massage on Heart Rate Variability in Healthy Volunteers

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### Abstract:

**Background and Objectives:** The full mud bath and full body massage are treatment modality is commonly used by Naturopathy physicians as a treatment. Though mud bath and full body massage therapy has been used extensively in a clinical scenario both for rejuvenation as well as therapy. But their effect on autonomic activity is not studied. Hence, this study aims at understanding the physiological changes of mud bath and massages therapy on heart rate variability and compares them in healthy volunteers.

**Methodology:** A Study conducted in SDMNCH Shantivana Dharamasthala. Subjects are randomly allocated into two groups, Group-A 30 & Group-B 30, using computerized generated random number table. For Group-A full mud bath given for 60 minutes. For Group-B, full body massage given for 60 minutes. Assessments done 5 minutes before the intervention as pre-assessment and 5 minutes after the intervention as post assessment and then for 5 minutes after 1hour of intervention.

**Results:** Data was checked for normal distribution and analysed by using paired sample t test with SPSS (Version20.0) package. Comparing among two group's immediately after the intervention results of the present study shown significant decrease in the HRV[Heart Rate

( $p \leq 0.0001^*$ ), LF( $p \leq 0.002$ ), VLF, LF/HF ratio and increase in RMSSD ( $p \leq 0.04^*$ ), NN50 ( $p \leq 0.0004^*$ ), Pnn50 ( $p \leq 0.0001^*$ ), Mean RR( $p \leq 0.0001$ ), HF( $p \leq 0.002$ ) in the full mud bath group than the full body massage. Parameter indicates that full mud bath reduces sympathetic tone and shifts symapthovagal balance towards vagal dominance which suggest parasympathetic dominance. When comparing both the group mud bath showed significant parasympathetic dominance after one hour of treatment than the full body massage group.

**Conclusion:** Full mud bath enhances parasympathetic activity immediate and after one hour hence it can be applied effectively in treating stress, insomnia and anxiety Whereas Full body massage enhances the sympathetic activity immediate after the treatment and has a commanding role in the cardiac tone but after one hour of intervention it enhances parasympathetic activity hence it can be applied effectively for calm down mind.

**Keywords:** Full mud bath, full body massage, Heart rate variability, Naturopathy

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### I. Introduction

The eastern health care believes that the universe is made up of panchamahaboothas (Five great elements) such as Akash, Vayu, Agni, Jala, and Prithvi. A healthy living body contains a definite composition of these five great elements and imbalance in this composition proposed to be the cause of diseases. Though the human body is composed of these elements, they are never used as the main treatment modality but instead we use similar components which are available in our surroundings as the treatment modality. The depletion of the earth qualities in the body is the cause of disease and its supplementation is the treatment in mud therapy. Mud baths have been known and used for thousands of years. Pelioid, fango, balneo is essentially technical term for mud, and using thermal mud for medicinal purposes is known as pelotherapy, balneotherapy and fango therapy. These treatments are enjoyable and are a relaxing and luxurious experience. Mud baths are also used in the treatment of rheumatism and various skin conditions.<sup>[1]</sup>

In Naturopathy mud being one of the core component and naturopathy physicians prescribes mud therapy/mud bath as one of their eliminative therapies. One of the unique properties of mud is that, it can absorb the heat and it changes the state of the toxins and dissolves whereby they could be easily eliminate from the body.<sup>[2]</sup> Mud therapy is a very simple and cost effective treatment procedure in Naturopathy. The mud used for treatment purpose should be collected from 122cm to 153 cm depth from the surface of the ground.. Full mud baths are one of the most popular and important treatment modalities in the naturopathy hospitals. In this type of mud applications, mud is applied all over the body, followed by cleansing by a cold shower. The duration of the treatment is 45 to 60 minutes. Full mud bath increases the circulation to the skin and energizes the skin tissue, affects the cardiovascular system, immune system, water and electrolyte balance, neurotransmission, central nervous system, enzymatic actions and metabolism in the human body. Mud is a mixture of inorganic and organic compounds with water. Mud is formed after undergoing various geological and biological processes under the influence of many factors in the environment. The chemical analysis of the mud has revealed that mud contains hydrophilic organic compounds like humic acid, fulmic acid and ulmic acids. It also contains organic substances like fatty acids. Because of these properties and components of the mud, it is having many therapeutic characters like improve membrane electrical conductance, absorption, hyperthermia, activate hypopoeitic glands and hormones in the body. However the composition and compounds of the mud and its properties change according to the area of availability. Mud therapy either as mud bath or mud pack are used to treat the conditions like fever, diarrhoea, piles, dysentery, constipation, anxiety, conjunctivitis, headache, allergy, errors of refraction in the eyes. It is useful to treat the cardiovascular, musculoskeletal gynaecological, dermatological and autoimmune diseases etc. Worldwide mud bath is taken for relaxation and luxurious purposes.<sup>[2,3]</sup>

Massage is the manipulation of superficial and deeper layers of muscle and connective tissue to enhance the function and promote relaxation and well-being.<sup>[4]</sup> Massage involves acting on and manipulating the body with pressure – structured, unstructured, stationary, or moving – tension, motion, or vibration, done manually or with mechanical aids. Target tissues may include muscles, tendons, ligaments, skin, joints, or other connective tissue, as well as lymphatic vessels, or organs of the gastrointestinal system. Massage can be applied with the hands, fingers, elbows, knees, forearm, and feet. There are eighty different recognized massage modalities.<sup>[5]</sup> There are different types of massage techniques use in massage treatment as Shiatsu massage, Ayurvedic Massage, Biodynamic massage, Tui Na massage, Swedish massage, Thai massage, Traditional Chinese massage<sup>[6]</sup>

The most cited reasons for introducing massage as therapy have been client demand and perceived clinical effectiveness.<sup>[7]</sup> In professional settings massage involves the client being treated while lying on a massage table, sitting in a massage chair, or lying on a mat on the floor. The massage subject may be fully or partly unclothed. Parts of the body may be covered with towels or sheets. Massage therapy encompasses many different touch therapy techniques.<sup>[8]</sup> Massage techniques play an important part in traditional Chinese and Indian medical care as in system of naturopathy.<sup>[9]</sup> Massage therapy is a systematic and scientific manipulation of soft tissues of the body. It has been extensively documented as one of the oldest therapeutic approaches used to reduce pain.<sup>[10,11]</sup> Massage brings about relaxation and thereby improves sleep and has some specific physical benefits, such as relief of muscular aches and pains.<sup>[8]</sup> Massage has positive effect on anxiety, disturbed mood, agitation, physiological arousal and sleep disruption.<sup>[10]</sup> Massage application increases the local circulation,<sup>[12]</sup> and immunity.<sup>[13]</sup> Massage therapy as a supplement to conventional medical therapy, has studied by various clinical trials, many of which have shown improvements in hemodynamic and nervous system function.<sup>[14-16]</sup> Massage causes a feeling of wellbeing, relaxation and comfort.<sup>[17]</sup> The most widely recognized and commonly used category of massage is the Swedish massage. The Swedish massage techniques vary from light to vigorous.<sup>[18]</sup> Swedish massage uses five styles of strokes. The five basic strokes are effleurage (sliding or gliding), petrissage (kneading), tapotement (rhythmic tapping), friction (cross fiber or with the fibers) and vibration/shaking.<sup>[19]</sup>

The massage oil used for applying massage, which acts as a lubricant during treatment plays important role for the therapeutic benefits. Although often massage oils used purely for their smell, the oils are claimed to have a wide range of medicinal properties, including effects on wound healing, infection, blood circulation, and digestion. They are said to act both pharmacologically, by absorption into the blood through the skin, and by olfactory stimulation. Practitioners generally massage the whole body, using oil to help their hands move over the patient's body. A variety of strokes are used, including effleurage, petrissage, kneading, friction and hacking.<sup>[9]</sup> Though mud bath and full body massage therapy has been used extensively in a clinical scenario both for rejuvenation as well as therapy. But their effect on autonomic activity is not studied. Hence, this study aims at understanding the physiological changes of mud bath and massages therapy on heart rate variability and compares them in healthy volunteers.

## **II. Materials And Methods**

### **2.1 Subjects**

Sixty individuals belonging to male gender normal healthy volunteers were aged between 18 to 30 years.

#### **2.1.1. Study Group**

Male Students from Sri Dharmasthala Manjunatheshwara (SDM) College of Naturopathy and Yogic Sciences, Ujire, Dakshina Kannada were recruited for the study.

#### **2.1.2. Exclusion criteria.**

- Age 18 to 30 years
- Male
- Those who have given written informed consent
- Subject who is willing to participate in the study
- BMI: 18- 25 kg/m<sup>2</sup>.

#### **2.1.3 Exclusion criteria**

- Subject with open wounds.
- Subject with any history of medical illness.
- Any health disorder.
- History was taken and a routine clinical examination was conducted).
- Those who were taking medication which could influence autonomic function e.g., phenylpropanolamine as a common cold remedy.<sup>[20]</sup>
- Weak and debilitating individuals
- Those who are consuming alcohol and nicotine except caffeine.

#### **2.1.4 Signed informed consent**

Subjects were explained in detail about the procedures involved in assessments as well as intervention. A signed informed consent was taken from each subject. The project was approved by the Institutional Ethics Committee.

### **2.2. Study setting**

#### **2.2.1 Setting for assessment & intervention**

The whole set up for the pre-assessment of variables, intervention and post assessment was carried out at Research laboratory at SDM Naturopathy and Yoga Hospital. For (group 1) full mud bath was given for 45 minutes followed by wash with cold water bath for 15 minutes, for (group 2) full body massage was given for 45 minutes followed by wash with cold water bath for 15 minutes. Assessments were done on HRV for 5 minutes before the Full Mud Bath and Full Body Massage treatment as pre intervention assessment, 5 minutes after the both the treatment as post intervention assessment and then for 5 minutes after 1hour of intervention.

### **2.3 Design**

The study adopts was Randomized Control Trial. 60 healthy volunteers were divided in to two groups. Group 1 received full mud bath, group 2 received full body massage. All the subjects were assessed before and after and after 1 hour of the treatment.

### **2.4 Assessments**

Condition of recordings: The subjects were seated on a chair recording leads were connected to the four-channel polygraph equipment (BIOPAC, Montana, USA; model No: BSL 4.0 MP 36) and monitored on a closed circuit TV. Instructions were given to the subjects to remain relatively undisturbed during the session.

### **2.5. Variables Studied**

#### **2.5.1 Heart rate and Heart rate variability spectrum (HRV).**

Heart rate variability (HRV) describes the variations between consecutive heartbeats. The regulation mechanisms of HRV originate from the sympathetic and parasympathetic nervous systems in addition to other controls and hence, HRV is used as a quantitative marker of the autonomic control over the heart. The electrocardiogram [EKG] was recorded using standard bipolar limb lead II configuration and an AC amplifier with 1.5 Hz high pass filter and 75 Hz low pass filter settings (BIOPAC, Montana, USA; model No: BSL 4.0 MP 36). The ECG was digitized using a 12-bit analogue-to-digital converter (ADC) at a sampling rate of 500 Hz. The R waves were detected to obtain a point event series of successive R-R intervals, from which the beat-

to-beat heart rate series was computed. The data recorded was visually inspected off-line and only noise free data was included for analysis. The heart rate was obtained based on R-R inter beat interval analysis. Schematic representation of ECG and Heart rate variability (HRV) are presented in. According to guidelines of the Task force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, the low frequency and high frequency values were expressed as normalized units.<sup>[21]</sup>

## **2.6 Intervention**

### **2.6.1 Intervention**

#### **Full mud bath for group 1.**

Black coloured soil which will be collected from rivers or tank beds or from hills. That mud will be collect from 10 cm below the ground level. Mud should be free from impurities, composts or pebbles. The mud will be finely sieved. It will be kept under sunlight for at least one day. Sufficient quantity of cold water should be added to the mud so as to making it a pasty like substance. Person should be with minimum dressing. The pasty like mud will be applied all over the body in sitting position. The mud should not slide off from the surface of the body and it should apply evenly and cover all over the body. No movements should be undertaken once application done. After the application left the person for a period of 45 minutes. After 45 minutes mud should be wash with cold water.<sup>[22, 24]</sup> Duration of treatment 45 minutes.<sup>[23]</sup> Temperature: 12.7 to 18.30C.<sup>100</sup>

#### **2.6.2. Full body Massage for group 2**

The subject will be instructed to have empty bowel before the intervention. Subject will wear loose minimum clothes before the intervention, the subject will be asked to lie down first in a supine position, followed by that in prone position. Subject will be also asked to close his eyes, take deep breaths, and refrain from any conversation during the entire intervention. Massage will be applied by using herbal massage oil as a skin lubricant. Each massage must be a direct hands-on and skin-to-skin manipulation of the soft tissue of the whole body and must last for 45 minutes. Each massage session includes selected strokes (mentioned below) with certain amount of time to all different body areas, including head and face, neck, back, gluteus muscles, chest, abdomen and the four extremities. The massage movement will be given only centripetal .Selected strokes include: touch, stroking, friction, all types of kneading, vibration, percussion, all joint movements.<sup>[25]</sup> After 45 minutes person should take bath with cold water.<sup>[22, 24]</sup> Duration 45 minutes.<sup>[23]</sup> Temperature: 12.7 to 18.30C.

#### **2.6.3 Materials Used:**

- Channel Polygraph.
- Massage Oil
- Cleaned wet mud.

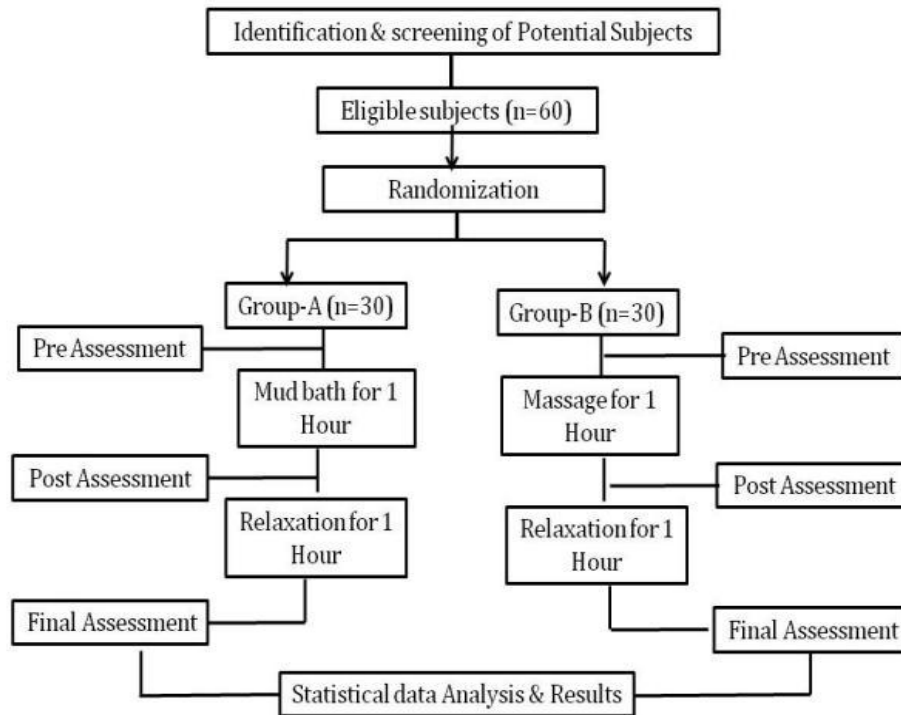
**Figure: 1.1** Treatment Undergoing Full Body Massage and Full Mud Bath.



**Figure: 1.2** Interventions



**Figure: 2** Illustration of Study Plan.



## 2.7 Data extraction

### 2.7.1 Heart rate variability

The HRV power spectrum was obtained using Fast Fourier Transform analysis (FFT). The energy in the HRV series of the following specific bands was studied viz. the very low frequency component (0.0-0.05 Hz), low frequency component (0.05-0.15 Hz), and high frequency component (0.15-0.50 Hz). The low frequency and high frequency values are expressed as normalized units. In addition to frequency domain analysis, time domain analysis was also done. The following components of time domain HRV were analyzed: (i) mean RR interval (the mean of the intervals between adjacent QRS complexes or the instantaneous heart rate), (ii) NN50 (the number of interval differences of successive NN intervals greater than 50 ms), and (iii) pNN50 (the proportion derived by dividing NN50 by the total number of NN intervals). Fourier analysis of the R-R interval series was done using the HRV analysis software version 2.1 developed by the Biomedical Signal Analysis Group, University of Kuopio, Finland. <sup>[26]</sup>

### 2.7.2 Heart rate:

The R waves from the electrocardiogram are detected, to obtain a point event series of successive R-R intervals, from which the beat to beat heart rate series are computed. The heart rate is obtained based on R-R inter-beat interval analysis. The heart rate in beats per minute (bpm) was obtained by continuously counting the QRS complexes in successive 60 s periods.

## 2.8 Data analysis

The raw data obtained from each subject in each recording session were tabulated separately. The groups mean values  $\pm$  standard deviation values were calculated for all the variables. Statistical analysis was done using SPSS (Version 21.0). Repeated measures analysis of variance (ANOVA) followed by a post hoc analysis with Bonferroni adjustment for multiple comparisons between the mean values of different group (Full mud bath and Full body massage was used). P values less than 0.001 were accepted as indicating significant value.

## III. Results

### 3.1 Heart rate and HRV:

#### Full mud bath immediate and after one hour of intervention:

In the present study Time domain analysis of full mud bath group showed significant increase in the mean RR immediate ( $p \leq 0.0001$ ) and measured after one hour ( $p \leq 0.0001$ ), RMSSD immediate ( $p \leq 0.04$ ) and

measured after one hour ( $p \leq 0.004$ ), NN50 immediate ( $p \leq 0.001$ ) and measured after one hour ( $p \leq 0.0004$ ), pNN50 immediate ( $p \leq 0.0005$  and measured after one hour ( $p \leq 0.0001$ ). Whereas significant decrease in heart rate immediate ( $p \leq 0.0001$ ) and even after one hour ( $p \leq 0.0001$ ).

Frequency domain analysis showed significant decrease in the values of LF power immediate ( $p \leq 0.002$ ) LF measured after one hour showed decreased values but not significant. No significant changes are seen in both VLF immediate and VLF after one hour even if there is decrease immediately and increase after one hour. There is significant increase in the values of HF power immediate ( $p \leq 0.002$ ) HF measured after one hour showed increased values but not significant. Whereas LF/HF decrease in immediate and even after the one hour of intervention compare to pre-test but no significant. Suggest arousal of parasympathetic activity following full mud bath.

**Full body massage immediate and after one hour of intervention:**

In Full body massage group, Time domain analysis showed increase in the mean RR , NN50 immediate & after one hour, pNN50 immediate but not significant. RMSSD decrease immediate whereas RMSSD ( $p \leq 0.01$ ) and pNN50 ( $p \leq 0.01$ ) measured after one hour showed significant increase in values. Time domain analysis showed no significant increase in heart rate immediately after the intervention, but significantly decreased the heart rate ( $p \leq 0.0001$ ) after one hour of full body massage. Frequency domain analysis showed decrease in the values of LF power immediate, LF measured after one hour but not significant. No significant changes are seen in both VLF immediate and VLF after one hour even if there is increase values immediately and after one hour. There is increase in the values of HF power immediate and decreased after one hour of intervention but not significant. Whereas no significant changes are seen in LF/HF even if values increased in immediate and after the one hour of intervention compare to pre-test. These could be suggestive of arousal of sympathetic activity immediately and para sympathetic activity after one hour of full body massage. Comparing among two group’s immediately after the intervention results of the present study shown significant decrease in the HR, LF, VLF, LF/HF ratio and increase in RMSSD, NN50, pNN50, Mean RR, HF in the full mud bath group than the full body massage. Parameter indicates that full mud bath reduces sympathetic tone and shifts symapthovagal balance towards vagal dominance which suggest parasympathetic dominance. When comparing both the group mud bath showed significant parasympathetic dominance after one hour of treatment than the full body massage group.<sup>[27]</sup>

**Comparing the Changes in Heart rate variability’s in normal healthy volunteers immediately and after one hour intervention of FMB and immediately and after one hour intervention of FBM .Values are group mean  $\pm$  S.D**

Variables	Group 1 (Fmb)		Group 2 (Fbm)		T-Test Value		P-Value	
	Mean (Sd)		Mean (Sd)					
	Immediate	1hr	Immediate	1hr	Immediate	1 Hr	Immediate	1 Hr
Mean RR	953.37 (154.18)	974.27 (152.64)	828.83 (151.33)	865.55 (202.33)	-3.67	-1.99	0.0005*	0.05*
HR	65.13 (11.38)	64.41 (11.09)	95.08 (116.5)	69.46 (10.26)	-1.29	-1.37	0.20	0.17
RMSSD	71.80 (41.56)	79.90 (48.78)	54.81 (28.50)	74.03 (37.25)	2.04	0.59	0.04*	0.55
NN50	115.30 (73.93)	127.30 (57.42)	65.96 (120)	102.47 (57.80)	1.35	0.97	0.18	0.33
PNN50	38.65 (25.90)	42.91 (21.65)	19.71 (37.40)	30.44 (20.57)	1.84	1.16	0.07	0.24
VLF	34.08 (17.30)	36.46 (16.41)	14.97 (35.25)	35.42 (16.09)	-0.43	0.11	0.66	0.90
LF	39.74 (18.03)	47.63 (19.66)	16.74 (55.36)	50.99 (18.71)	-1.79	-0.94	0.07	0.35
HF	60.26 (18.03)	52.37 (19.66)	16.26 (44.61)	48.66 (18.73)	2.00	1.03	0.05*	0.30
LF/HF	1.06 (1.35)	1.40 (1.59)	0.95 (1.89)	1.72 (1.90)	-1.78	-1.71	0.07	0.09

\*Represents significant, means they are non-normal in distribution. HR= Heart rate, mean RR, RMSSD= the square root of the mean squared difference between adjacent N-N intervals, NN50= Consecutive normal sinus (NN) intervals exceeds 50 ms, pNN50= The fraction of consecutive NN intervals that differ by more than 50 ms, VLF= Very low Frequency power, LF= Low Frequency Power, HF = High Frequency Power.

## IV. Discussion

### Discussion

The main aim of the study was to evaluate and compare immediate and prolonged effect of full mud bath and full body massage on HRV in normal healthy volunteers. Effect of full mud bath was found to be enhancement of parasympathetic activity immediate and after one hour of intervention. Results of the individuals who underwent full mud bath group showed significant increase in all the values whereas, the mean RR immediate ( $p \leq 0.0001$ ), mean RR measured after one hour ( $p \leq 0.0001$ ), RMSSD immediate ( $p \leq 0.04$ ), RMSSD measured after one hour ( $p \leq 0.004$ ), NN50 immediate ( $p \leq 0.001$ ), NN50 measured after one hour ( $p \leq 0.0004$ ), pNN50 immediate ( $p \leq 0.0005$  and pNN50 measured after one hour ( $p \leq 0.0001$ ). Whereas Time domain analysis showed significant decrease in heart rate immediate ( $p \leq 0.0001$ ) and even after one hour ( $p \leq 0.0001$ ). Frequency domain analysis showed significant decrease in the values of LF power immediate ( $p \leq 0.0023$ ) LF measured after one hour showed decreased values but not significant. No significant changes are seen in both VLF immediate and VLF after one hour even if there is decrease immediately and increase after one hour. There is significant increase in the values of HF power immediate ( $p \leq 0.0026$ ) HF measured after one hour showed increased values but not significant. Whereas LF/HF decrease in immediate and even after the one hour of intervention compare to pre-test but no significant. Suggest arousal of parasympathetic activity following full mud bath.

Individuals who underwent Full body massage group Time domain analysis showed increase in the mean RR immediate & after one hour, decrease RMSSD immediate, increase in NN50 immediate & after one hour, pNN50 immediate increase but not significant. RMSSD measured after one hour ( $p \leq 0.01$ ) and pNN50 measured after one hour showed significant increase in values ( $p \leq 0.01$ ). Whereas increase in heart rate immediate after the intervention but no significant whereas significantly decreased the heart rate ( $p \leq 0.0001$ ) after one hour of full body massage, Frequency domain analysis showed decrease in the values of LF power immediately, LF measured after one hour but not significant. No significant changes are seen in both VLF immediate and VLF after one hour even if there is increase values immediately and after one hour. There is increase in the values of HF power immediate and decreased after one hour of intervention but not significant. Whereas no significant changes are seen in LF/HF even if values increased in immediate and after the one hour of intervention compares to pre-test. These could be suggestive of arousal of sympathetic activity immediately and para sympathetic activity after one hour of full body massage. Comparing among both the group immediately after the intervention results of the present study shown significant decrease in the HR, LF, VLF, LF/HF ratio and increase in RMSSD, NN50, pNN50, Mean RR, HF in the full mud bath group than the full body massage. Parameter indicates that full mud bath reduces sympathetic tone and shifts sympathovagal balance towards vagal dominance which suggest parasympathetic dominance. When comparing both the group mud bath showed significant parasympathetic dominance after one hour of treatment than the full body massage group similar result was shown by Buchheit et al.,<sup>[28-29]</sup>.

The probable mechanism of action indicating a parasympathetic dominance might be due to peripheral vasodilatation following an exposure to cold temperature. Effects of full mud bath could also be thermic and chemical in origin. A study suggests that there is a significant mineral and percutaneous cationic exchange along with other chemical changes taking place upon the application of mud on the human body.<sup>[30]</sup>

In the HRV low frequency (LF) band of the HRV is mainly related to sympathetic modulation when expressed in normalized units while the efferent vagal activity is a major contributor to the high frequency (HF) band. The LF/HF ratio is correlated with the sympathovagal balance<sup>[31]</sup>. The changes in the autonomic variables found in the present study are comparable to the findings obtained by immersion bath study of Miyamoto et al<sup>[32]</sup>. He explains in the above study that the effect of water immersion is a simple and efficient method for increasing parasympathetic activity and lowering sympathetic tone at rest, as inferred from heart rate (HR) variability (HRV) measures. Although individual results of full mud bath immediate and prolonged effect indicate a parasympathetic dominance, when it compared to full body massage group. There is strong evidence in the form of significant p-value ( $< 0.0001$ ) of full mud bath immediate and after one hour when either groups are compared which could be used for clinical relevance.

**Directions for future research;** Conducting study with large sample size, Skin conductance (GSR) could be included, Study can be conducted on general population.

Other variables can be included i.e. Myogram, Gastrogram, EEG etc.

## V. Conclusion

To conclude, that full mud bath enhances the parasympathetic activity hence it can be applied effectively in treating stress, insomnia and anxiety. To overcome the effects of sympathetic dominance caused by stress, full mud bath can be used as one of the complementary alternate treatment modality.

And the immediate effect of full body massage enhances sympathetic activity and has a commanding role in the cardiac tone hence. Whereas prolonged effect of full body massage enhances parasympathetic activity also can be applied effectively in treating stress, insomnia and anxiety and which also can be a tool to calm down the mind.

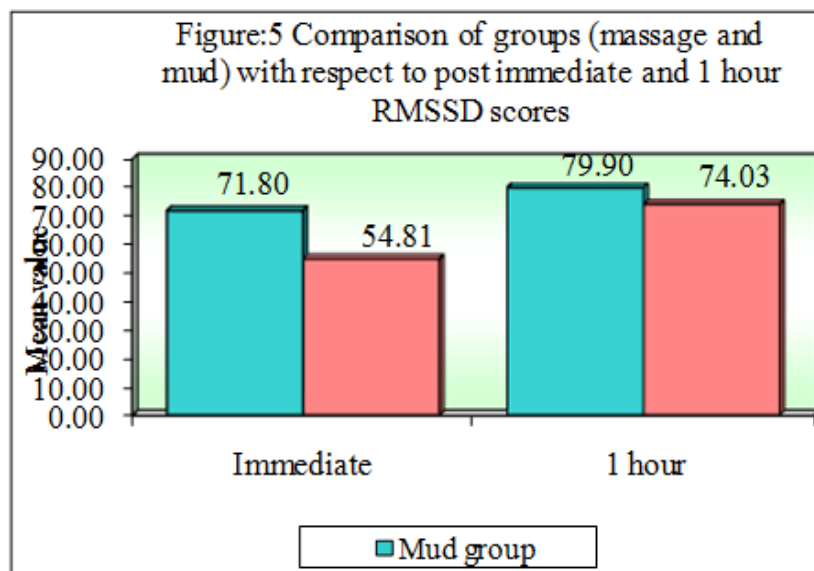
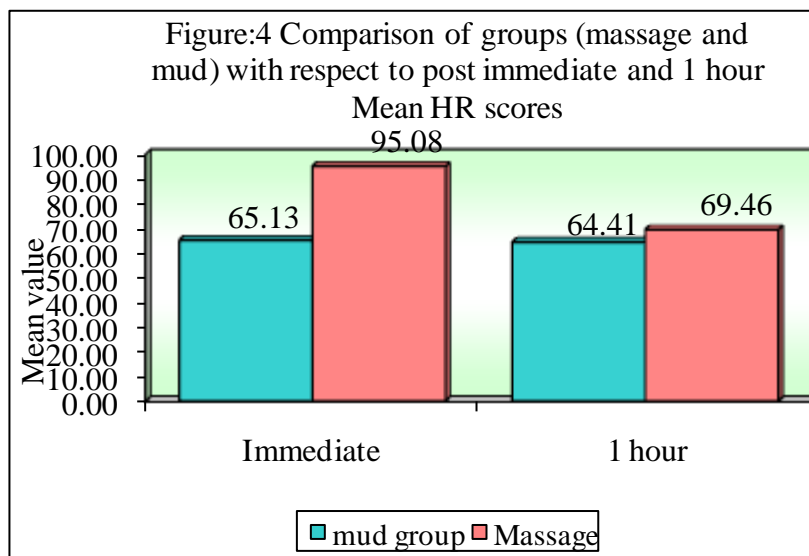
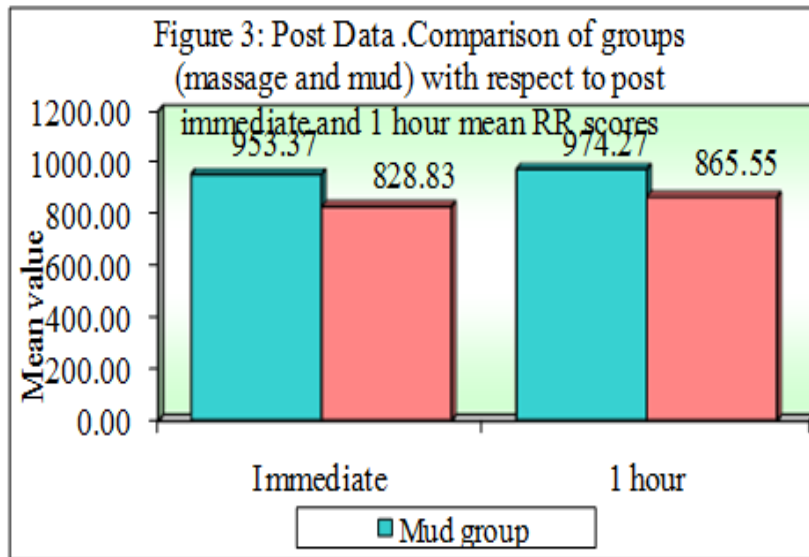
### Acknowledgements

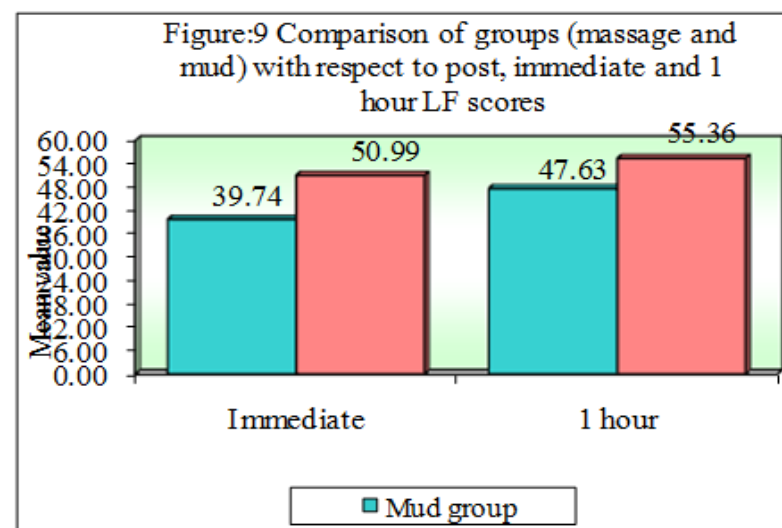
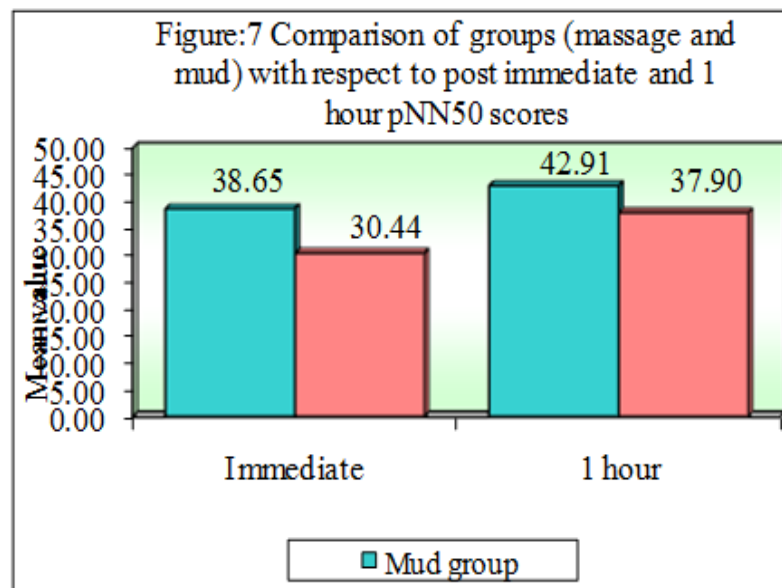
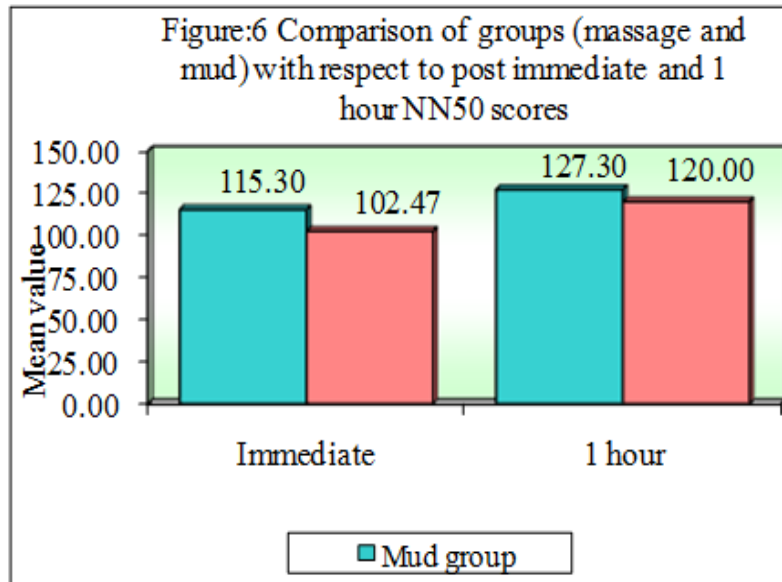
We are thankful to all the volunteered students of SDM College of Naturopathy & Yogic Sciences, Ujire, who had actively participated in our study. We are grateful to SDME Society, Ujire and SDM YOGA & NATURE CURE HOSPITAL "SHANTIVANA", Dharmasthala, Karnataka, India for their required support to complete this study successfully.

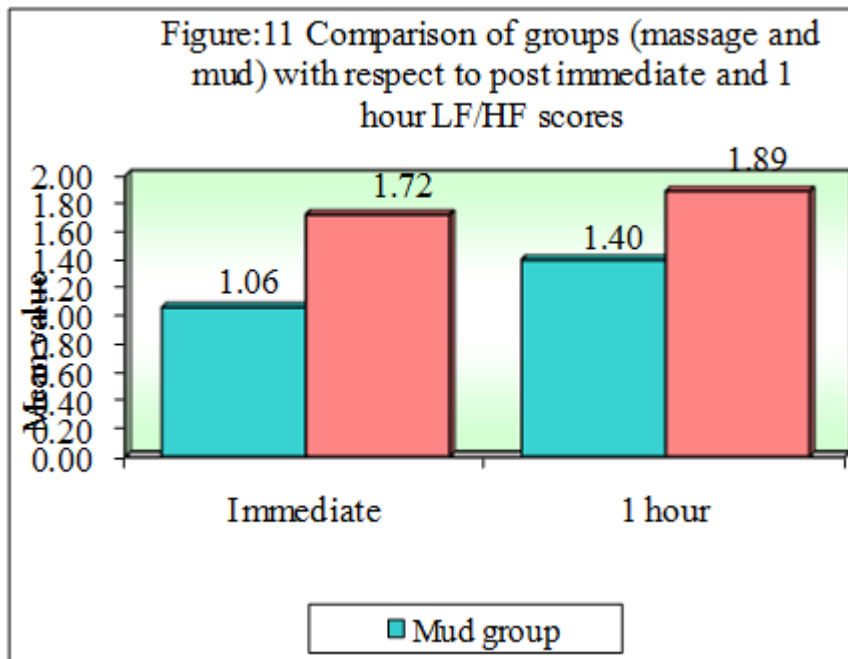
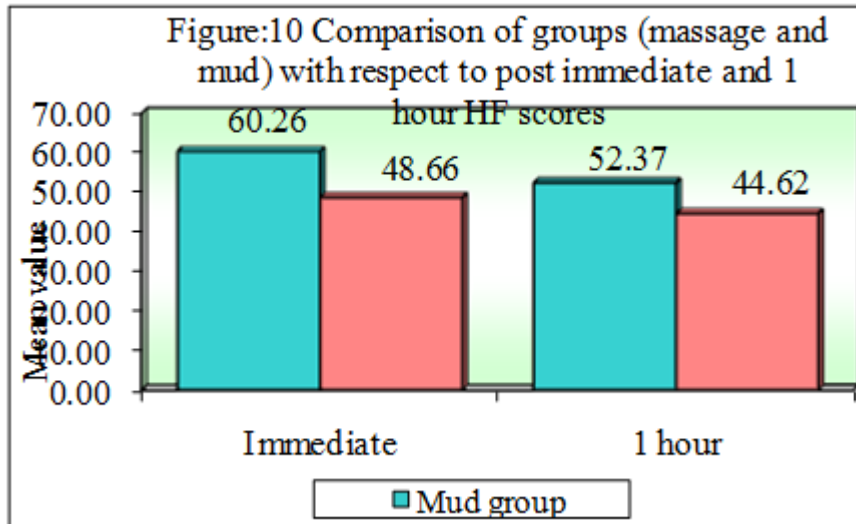
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