Effect of mud pack to eyes on psychological variables in healthy volunteers: a pilot randomized controlled trial

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Abstract:

Background: Mud pack is one of the fundamental therapeutic procedures used in naturopathy to treat various diseases. There is a lack of scientific evidence for the use of mud-pack application in psychological variables. The present study aims at evaluating the effect of mud pack to eyes on psychological variables in healthy volunteers.

Materials and methods: Sixty healthy individuals with the age varied from 18 to 21 years were recruited and randomly divided into either mud-pack group (n=30) or wet-pack group (n=30). Mud-pack group received mud pack to eyes and wet-pack group received wet pack to eyes for a duration of 30 min/session (a total of 15 sessions). Psychological assessments like Mindful Attention Awareness Scale (MAAS), Perservative Thinking Questionnaire (PTQ) and Positive and Negative Affect Scale (PANAS) were taken before and after the intervention. Statistical analysis was performed using statistical package for the social sciences, version 16.

Results: Result of this study showed a significant reduction in PTQ score and PANAS negative score in both mud-pack and wet-pack groups. But, a significant increase in MAAS score was observed only in the mud-pack group, unlike wet-pack group. However, there was no significant difference found in between group analysis.

Conclusions: Result suggests that though both mud pack and wet pack to eyes reduced the scores of PTQ and negative affects, only mud pack to eyes increased the state of mindfulness in healthy individuals.

Keywords: hydrotherapy, mindfulness, mud therapy, naturopathy, water

DOI: 10.1515/jcim-2016-0085

Received: August 22, 2016; Accepted: May 28, 2018

Background

Mud is a mixture of inorganic and organic matter with water, which has undergone geological and biological processes under the influence of various physico-chemical factors [1]. Mud-pack therapy is a therapeutic application of natural products containing a mix of mineral or mineral-medicinal water (including seawater or salt water from lakes) with organic or inorganic compounds resulting from geological, biological or even both processes, used in the form of a wrap or a bath [2].

In India, mud pack to eyes is one of the treatment procedures commonly employed by the naturopathy physicians in patient with psychological and psychosomatic disorders. In previous studies, mud therapy was shown to be an effective treatment modality in various psychosomatic diseases like rheumatoid arthritis [3], psoriatic arthritis [4], fibromyalgia syndrome [5], spondylitis associated with inflammatory bowel disease [6] and also in osteoarthritis of knee [7]. Though mud therapy is used in various psychological and psychosomatic diseases, there is lack of evidence in its precised psychological effects. To the best of our knowledge, there is no known study reported the effect of mud pack to eyes on psychological variables. Hence, this present study was performed to evaluate the effect of mud pack to eyes on psychological variables in healthy volunteers.
Materials and methods

Subjects

Sixty healthy individuals with the age varied from 18 to 21 years were recruited from a residential college (located in South India, India.). Both male and female genders aged 18 years and above who were willing to participate in the study were included. Subjects with the history of any systemic and mental illness, regular use of medication for any diseases, addiction to smoking and alcoholism were excluded from the study. The study protocol was approved and a written informed consent was obtained from each subject.

Study design

This is a pilot randomized controlled trial, in which subjects were randomly divided into either mud-pack group (n=30) or wet-pack group (n=30). Mud-pack group received mud pack to eyes and wet-pack group received wet pack to eyes. Baseline and post-test assessments were taken before and after the intervention. Trail profile has been given in Figure 1.

Randomization

All the recruited subjects were randomly divided into either mud-pack group (n=30) or wet-pack group (n=30) using computerized randomization. Randomization was performed by one of the authors who did not involve in either intervention or any part of the investigation.
Blinding/masking

Since the intervention was given with the closed eyes, all the subjects were blinded to the mud-pack and wet-pack interventions. Investigator was kept blind to the mud-pack and wet-pack groups.

Assessment

Mindful Attention Awareness Scale (MAAS): It is a 15-item single-dimension measure of trait mindfulness designed to assess a core characteristic of mindfulness, namely, a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the present, simply observes what is taking place. Here, the subject was asked to indicate how frequently or infrequently they currently have each experience and answer according to what really reflects their experience rather than what they think as their experience should be. Response options ranged from 1 to 6, where 1=almost always; 2=very frequently; 3=somewhat frequently; 4=somewhat infrequently; 5=very infrequently; 6=almost never. Internal consistency levels (Cronbach’s alphas) generally range from 0.80 to 0.90. The MAAS has demonstrated high test–retest reliability, discriminant and convergent validity, known-groups validity and criterion validity [8].

Perseverative Thinking Questionnaire (PTQ): It is a 15-item questionnaire in which the subjects were asked to describe how he/she typically thinks about his/her negative experiences or problems. They were instructed to read and rate all the 15-item the extent to which they apply to them when they think about negative experiences or problems. Response options ranged from 0 to 4, where 0=never; 1=rarely; 2=sometimes; 3=often; 4=almost always. Internal consistencies (Cronbach’s alphas) were found for the total scale is 0.95 [9].

Positive and Negative Affect Schedule (PANAS): It consists of two ten-item scales that describe different feelings and emotions for positive affects (PAs) and negative affects (NAs) respectively. The ten items for PA are attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong and active, and the ten items for NA are distressed, upset, hostile, irritable, scared, afraid, ashamed, guilty, nervous and jittery. Subjects were instructed to read each item and then mark the appropriate answer in the space next to that word to indicate to what extent they have felt like this in the past few hours. Response options ranged from 1 to 5, where 1=very slightly or not at all; 2=a little; 3=moderately; 4=quite a bit; 5=extremely. The scores generated used to vary along the scale of 10–50, with lower scores indicating low (positive or negative) affect and higher scores indicating high (positive or negative) affect. The validity and the reliability of the PANAS have been tested [10].

Intervention

Mud-pack group: All the subjects received mud pack to eyes. Mud pack was prepared using clay obtained from about 6 ft below the surface of the earth. Clay was exposed in sunlight, crushed very well, and pebbles and stones were removed. The clay was then made into a smooth paste with pure water 1 h before the intervention. Mud was kept on a strip of cotton cloth to prepare eye pack (9 cm × 6 cm × 1 cm). The mud pack was prepared using water at 20–21°C. All the subjects were asked to lay down on the back with closed eyes, followed by mud pack was kept on the subject’s closed eyelids for the duration of 30 min/session for 15 sessions.

Wet-pack group: All the subjects received wet pack to eyes. Wet pack (9 cm × 6 cm × 1 cm) was prepared using cotton cloth wetted in water at the temperature of 20–21°C. All the subjects were asked to lay down on the back with closed eyes, followed by mud pack was kept on the subject’s closed eyelids for the duration of 30 min/session for 15 sessions.

Statistical analysis

All the data were checked for the normality test using Kolmogorov–Smirnov and Shapiro–Wilk. Statistical analysis was performed using paired sample t-test for within group and independent sample t-test for between groups analysis. p-Value <0.05 was considered as significant.

Results

Of 83 subjects, 23 subjects did not fulfil the criteria and hence did not include in the study. Recruited 60 subjects were randomized into either mud-pack group (n=30) or wet-pack group (n=30). Five subjects in each
group were irregular and did not complete the study. Hence, their data were not included for the analysis. Demographic (Table 1) and the baseline assessments were comparable and no significant difference exists in between groups except PANAS positive score (Table 2).

Table 1: Demographic variables of mud-pack group (n=25) and wet-pack group (n=25).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mud-pack group (n=25)</th>
<th>Wet-pack group (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>17.96 ± 0.89</td>
<td>18.04 ± 0.20</td>
</tr>
<tr>
<td>Gender</td>
<td>7 Males/18 females</td>
<td>9 Males/16 females</td>
</tr>
<tr>
<td>Height, cm</td>
<td>160.64 ± 10.70</td>
<td>166.28 ± 11.29</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>45.80 ± 4.24</td>
<td>45.68 ± 4.59</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>28.54 ± 2.28</td>
<td>27.48 ± 2.07</td>
</tr>
</tbody>
</table>

Table 2: Baseline and post-test assessments of mud-pack (n=25) and wet-pack (n=25) groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Assessment</th>
<th>Mud-pack group (with paired t-test values)</th>
<th>Wet-pack group (with paired t-test values)</th>
<th>Independent samples t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAS</td>
<td>Baseline</td>
<td>53.20 ± 12.819</td>
<td>59.68 ± 15.510</td>
<td>1.610</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>68.96 ± 13.843</td>
<td>60.60 ± 15.984</td>
<td>1.977</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>t=4.412 p&lt;0.001</td>
<td>t=0.326 p&gt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTQ</td>
<td>Baseline</td>
<td>29.36 ± 11.284</td>
<td>27.36 ± 10.336</td>
<td>0.654</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>20.32 ± 14.642</td>
<td>19.04 ± 13.284</td>
<td>0.324</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>t=2.392 p&lt;0.05</td>
<td>t=3.410 p&lt;0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANAS Positive score</td>
<td>Baseline</td>
<td>37.88 ± 6.240</td>
<td>33.72 ± 5.374</td>
<td>2.526</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>38.44 ± 6.844</td>
<td>36.56 ± 7.528</td>
<td>0.924</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>t=0.416 p&gt;0.05</td>
<td>t=1.741 p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANAS Negative score</td>
<td>Baseline</td>
<td>22.84 ± 7.809</td>
<td>20.16 ± 6.606</td>
<td>1.310</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>18.76 ± 5.995</td>
<td>16.56 ± 5.165</td>
<td>1.390</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>t=2.548 p&lt;0.05</td>
<td>t=2.616 p&lt;0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All values are in mean ± standard deviation. MAAS: Mindful Attention Awareness Scale; PANAS: Positive and Negative Affect Scale; PTQ: Perservative Thinking Questionnaire.

Result of this study showed a significant reduction in PTQ and PANAS negative scores in both mud-pack and wet-pack groups. But, a significant increase in MAAS score was observed only in mud-pack group unlike wet-pack group. However, there was no significant difference found in between groups (Table 2).

Discussion

Result of this study showed a significant reduction in PTQ score and PANAS NA score along with a significant increase in MAAS score in subjects those who underwent mud pack to eyes. It suggests that mud pack to eyes is an effective modality in reducing the repeated negative thinking (RNT) and NAs while increasing the state of mindfulness in healthy individuals.

A number of different emotional problems have been found to be related to heightened levels of repetitive negative thinking in the form of worry and/or rumination. For example, individuals with depressive disorders have shown to ruminate excessively about the symptoms, causes and consequences of the depression. The heightened levels of rumination and/or worry are present in various disorders including post-traumatic stress disorder, social phobia, obsessive–compulsive disorder, insomnia, eating disorders, panic disorder, hypochondriasis, alcohol use disorder, psychosis and bipolar disorder. The PTQ is regarded as a valid measure of RNT [9]. Result of this study showed a significant reduction in the PTQ score followed by the 15 sessions of mud pack to eyes in healthy individuals. It suggests that mud pack to eyes might be useful in reducing RNT. However, since this study is conducted in healthy individuals, further studies in clinical population are required to find its effect in the prevention and management of various psychological disorders related with RNT.

In PANAS, the PA represents the extent to which an individual experiences pleasurable engagement while the NA represents the extent to which an individual experiences unpleasurable engagement with the environment [10]. The high NA scores reflect ‘subjective distress’ and low NA scores reflect ‘a state of calmness...
and serenity’ [11]. Hence, in this study, a significant reduction in NA score after 15 sessions of mud pack to eyes suggests that mud-pack therapy might be useful in increasing a state of calmness and serenity in healthy individuals.

Mindfulness is defined as paying attention in a particular way: on purpose, in the present moment, and non-judgmentally. The MAAS positively correlated with various measures of well-being like life satisfaction, optimism, and self-esteem and negatively correlated with neuroticism [8] (a stable temperament that is one of the vulnerable factors for depression) [12], depression, anxiety and unpleasant affect [8]. Hence, increase in the MAAS score followed by the 15 sessions of mud pack to eyes might be useful in increasing attention, optimism and self-esteem in healthy individuals.

Likewise, wet pack to eyes has also showed a significant reduction in PTQ and PANAS NA scores. However, there was no significant change in MAAS score compared to its respective baseline. It suggests that though wet pack to eyes is effective in reducing RNT and NAs, it was not effective in increasing the state of mindfulness in healthy individuals. Hence, even though both mud pack to eyes and wet pack to eyes are effective in reducing RNT and NAs, mud pack to eyes was effective in increasing the state of mindfulness too in healthy individuals.

In various studies, cold application has shown to be effective in improving cardiovascular functions including workload of the heart [13, 14] and autonomic functions towards either sympathetic withdrawal or parasympathetic activation [15]. Reduction in sympathetic withdrawal is known to activate a state of relaxation and activate relaxation response [16]. And thus, a significant reduction in RNT and NA both in mud-pack group and wet-pack group might be possibly through either sympathetic withdrawal or parasympathetic activation due to the cooling and relaxing effect followed by the application of wet pack to eyes or mud pack to eyes. Though water application produces effect that are similar to mud application and can be applied more easily and cleanly than mud application, the moisture and coolness retaining property of a mud application (mud pack or direct application) is much longer than a water application (pack or compress) [17]. It suggests that mud pack to eyes might have produced a better relaxation through its longer cooling effect that is needed to increase the state of mindfulness than wet pack to eyes.

Stress is one of the risk factors associated with sympathetic activation that increases muscle rigidity, blood pressure, cortisol and restless mood [16] that are known to affect the mindfulness. Whereas, mud application has shown to be effective in reducing muscle rigidity [17], blood pressure and salivary cortisol (indicative of reduction in stress) and in improving mood [18] that helps in increasing mindfulness. Since mud is a mixture of inorganic and organic matter with water, which has undergone geological and biological processes under the influence of various physico-chemical factors [1], the beneficial effects of or mechanism of action of mud application were reported to be as a result of combination of its chemical and thermal effects [19]. Whereas, the beneficial effect of water application is believed to be mainly as a result of thermal effects. Hence, mud application has reported to produce a better therapeutic effect than water application [17]. This explains the possible mechanism for the increase in the state of mindfulness in mud-pack group unlike wet-pack group. However, further studies are required to warrant the effect of mud therapy on autonomic functions and the mechanism behind its effect.

**Strengths of the study:** To the best of our knowledge, this is the first study reporting the effect of mud pack to eyes on various psychological variables in healthy individuals. Subjects and the investigator were blind to the mud-pack and wet-pack groups. Both the applications were feasible, acceptable and none of the subject reported any adverse reaction throughout the study period. Hence, this study reports a simple, low-cost intervention that can be given by anyone.

**Limitations of the study:** Sample size was small and it was not calculated based on the previous study. Study was conducted in healthy volunteers and thus, application of its results in the pathological condition is limiting the scope of the study. Assessments were based on the subjective methods and not on any objective measures. Hence, further study is required with larger sample size and objective variables in healthy as well as in clinical conditions for the better understanding.

**Conclusions**

Result suggests that though both mud pack and wet pack to eyes reduced the scores of PTQ and NAs, only mud pack to eyes increased the state of mindfulness in healthy individuals.

**Author contributions:** All the authors have accepted responsibility for the entire content of this submitted manuscript and approved submission.

**Research funding:** None declared.
Employment or leadership: None declared.

Honorarium: None declared.

Competing interests: The funding organization(s) played no role in the study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the report for publication.

References