Effects of balneotherapy on stress

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ABSTRACT

Stress is a part of the daily life of people. Psychosocial hazards and work-related stress have reached epidemic proportions in Europe. Stress hormones released during stress disrupt the body's metabolism and suppress the immune system. Balneotherapy is a clinically effective complementary approach in the treatment of low-grade inflammation and stress-related pathologies. Balneotherapeutic methods provide important contributions to the stress response. The stress caused by various factors has gained a considerable dimension in terms of animals today. In this review, the effects of balneotherapeutic methods on stress were reviewed.

Key words: Stress, balneotherapy, human, animals.

INTRODUCTION

Stress - often called the "disease of the century" - is a topic of interest among researchers to evaluate the participation of the central nervous system and the entire body (Martins et al., 2015). Psychosocial hazards and work-related stress have reached epidemic proportions in Europe (De Sio et al., 2016). This phenomenon is known to interfere with institutional, social and personal activities. Internal and external sources of stress are influenced by each individual's thoughts, beliefs and interpretations of the world and by general events, although much about its influence remains unclear. Definitions of stress emphasise facets of the work environment and everyday life that exceed an individual's coping ability or an individual's physiological or psychological responses to stressors. Individuals may alter their behaviour in response to a stressful stimulus, which may be an activity, situation or psychological experience that is observed directly or indirectly (Tomei et al., 2015; De Sio et al., 2015; Ippoliti et al., 2017; Martins et al., 2015). On the other hand, di-stressful stimuli are capable of increasing the secretion of cortisol as a short-term effect (Antonelli and Donelli, 2018).

Balneotherapy is a clinically effective complementary approach in the treatment of low-grade inflammation and stress-related pathologies. The biological mechanisms by which immersion in mineral-medicinal water and the application of mud alleviate symptoms of several pathologies are still not completely understood, but it is known that neuroendocrine and immunological responses—including both humoral and cell-mediated immunity—to balneotherapy are involved in these mechanisms of effectiveness; leading to anti-inflammatory, analgesic, antioxidant, chondroprotective, and anabolic effects together with neuroendocrine-immune regulation under different conditions. Hormesis can play a critical role in all these biological effects and mechanisms of effectiveness. The hormetic effects of balneotherapy can be related to non-specific factors such as heat—which induces the heat shock response, and therefore the synthesis and release of heat shock proteins—and also to specific biochemical components such as hydrogen sulfide (H2S) in sulfurous water and radon in radioactive water (Galvez et al., 2018).

Unfortunately, there are limited scientific studies related to balneotherapy, especially for animals. Most of these studies are related to human beings under different conditions. PubMed/Medline, Embase, and Cochrane Library were searched for relevant articles in English or Italian on healthy and subhealthy subjects or patients diagnosed with a disease and the effects of balneotherapy, mud/peloid therapy, and SPA therapy on serum and salivary cortisol levels. Fifteen studies involving 684 subjects were included. Five studies investigated the biological effects of balneotherapy alone. Two of them reported significant changes in cortisol levels in healthy participants. The other three studies reported no significant variations in patients with rheumatic conditions. No studies investigated the biological effects of mud/peloid therapy alone. Ten studies investigated the biological effects of SPA therapy...
with or without included mud/peloid therapy, and in all but two studies, significant variations of cortisol levels were reported (Antonelli and Donelli, 2018).

Balneotherapy is a well-known practice, although scientific studies on biological effects are not sufficient. In a study on the effects of balneotherapeutic practices on stress and cortisol levels (Antonelli and Donelli, 2018), balneotherapy methods were found to relieve stress and contribute to cortisol levels in stressed people, but it was reported that further study is needed in this regard. It was found that the presence of mineral springs contributes significantly to the restoration of stress-disturbed metabolism and insulin regulation (Zhernov et al., 2017; Elitok, 2011; Magiaku et al., 2006; Whitworth et al., 2005).

Antonelli and Donelli (2018) suggested that balneotherapy may have the potential to influence cortisol levels in healthy subjects, in such a way as to improve stress resilience. Spa therapy with or without included mud/peloid therapy demonstrated the same potential to influence cortisol levels also in sub-healthy subjects and in patients diagnosed with a disease. Therefore, balneotherapy and spa therapy may be considered as useful interventions for the management of stress conditions. Further investigation is needed due limited available data.

Levels of cortisol decreased in response to single sessions and improved after an entire cycle of spa therapy. Some evidence indicates that mud/peloid therapy has the potential to activate the pituitary gland and induce a transitory but significant rise in ACTH production. It is possible to speculate that mud/peloid therapy can exert an effect on cortisol levels by influencing skin microbiome. Reported changes in cortisol levels suggest that mud baths may modulate the activity of the hypothalamic-pituitary-adrenal axis in subjects with different health conditions. In adults with a high level of stress, moor baths (a type of mud/peloid therapy) and resting appear to influence cortisol levels of participants, underscoring some potential benefits of muds/peloids (Antonelli and Donelli, 2018).

Although there is no scientific report about the healing effects of balneotherapy in animals with stress, the results from several investigations in human suggest that the beneficial effects of balneotherapy and hydrotherapy are in line with the concept of hormesis, and thus support a role for hormesis in hydrothermal treatments (Galvez et al., 2018). It is assumed that balneotherapeutic applications will also provide positive effects on animals and human being. Therefore, this area is untrodden for animals and as such, need to be studied.

REFERENCES


